

Transaction Processing Facility



Migration Guide: Program Update Tapes

Version 4 Release 1

Transaction Processing Facility



Migration Guide: Program Update Tapes

Version 4 Release 1

Note!

Before using this information and the product it supports, be sure to read the general information under "Notices" on page Ixiii.

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This edition applies to Version 4 Release 1 Modification Level 0 of IBM Transaction Processing Facility, program number 5748-T14, and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. Make sure you are using the correct edition for the level of the product.

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About This Book

This book, which should be used as a planning guide and is subject to change, is written for any IBM Transaction Processing Facility (TPF) customer who has the TPF 4.1 system installed and needs guidance while applying changes and updates to the TPF 4.1 system. These changes and updates are provided to you in the form of a program update tape (PUT) and may come about as:

- Small programming enhancements (SPEs)
- Authorized program analysis reports (APARs).

This information is **not** intended to replace other books in the TPF 4.1 library or the APAR response information that accompanies an SPE or an APAR. Rather, this information simply supplements that information. For example, you will continue to find information about prerequisite APARs, modules to be reassembled, solution statements, and so on in the associated APAR response information.

In this book, abbreviations are often used instead of spelled-out terms. Every term is spelled out at first mention followed by the all-caps abbreviation enclosed in parentheses; for example, Systems Network Architecture (SNA). Abbreviations are defined again at various intervals throughout the book. In addition, the majority of abbreviations and their definitions are listed in the master glossary in the *TPF Library Guide*.

Before You Begin

Before you begin using this book, make the following determination:

- If you are migrating, or planning to migrate, from the TPF 3.1 system to the TPF 4.1 system, please see the *TPF Migration Guide: TPF 3.1 System to TPF 4.1 System*.
- If you are applying changes and updates to an **existing** TPF 4.1 system, go to “Guidelines for Using This Publication” on page 1 for information about how to use this book.

See “Communicating Your Comments to IBM” for more information about how to contact your TPF support representative.

Who Should Read This Book

This book is designed for anyone responsible for:

- Planning the application of PUTs to a TPF 4.1 system such as system programmers, operators, and application programmers
- Installing, initializing, operating, customizing, tuning, or diagnosing problems in the TPF 4.1 system.

Readers of this book should have an in-depth knowledge of the TPF system as well as the configuration and procedures of their own complex.

How This Book is Organized

This book is organized by chapter, and includes an appendix and index:

- Guidelines for Using This Publication explains how the book is organized and how to use the book efficiently.

- Learning about What Is in the TPF 4.1 System provides an overview of changes or new functions shipped on each PUT.
- Operating Environment Requirements and Planning Information provides information about the minimum system configuration requirements necessary to operate the TPF 4.1 system.
- A chapter for each PUT, which provides the migration considerations for each new function or SPE shipped on that PUT.

Conventions Used in the TPF Library

The TPF library uses the following conventions:

Conventions	Examples of Usage
<i>italic</i>	Used for important words and phrases. For example: A <i>database</i> is a collection of data. Used to represent variable information. For example: Enter ZFRST STATUS MODULE <i>mod</i> , where <i>mod</i> is the module for which you want status.
bold	Used to represent text that you type. For example: Enter ZNALS HELP to obtain help information for the ZNALS command. Used to represent variable information in C language. For example: level
monospaced	Used for messages and information that displays on a screen. For example: PROCESSING COMPLETED Used for C language functions. For example: maskc Used for examples. For example: maskc(MASKC_ENABLE, MASKC_IO);
<i>bold italic</i>	Used for emphasis. For example: You <i>must</i> type this command exactly as shown.
<u>Bold underscore</u>	Used to indicate the default in a list of options. For example: Keyword=OPTION1 <u>DEFAULT</u>
Vertical bar	Used to separate options in a list. (Also referred to as the OR symbol.) For example: Keyword=Option1 Option2 Note: Sometimes the vertical bar is used as a <i>pipe</i> (which allows you to pass the output of one process as input to another process). The library information will clearly explain whenever the vertical bar is used for this reason.
CAPital LETters	Used to indicate valid abbreviations for keywords. For example: KEYWord= <i>option</i>

Conventions	Examples of Usage
Scale	<p>Used to indicate the column location of input. The scale begins at column position 1. The plus sign (+) represents increments of 5 and the numerals represent increments of 10 on the scale. The first plus sign (+) represents column position 5; numeral 1 shows column position 10; numeral 2 shows column position 20 and so on. The following example shows the required text and column position for the image clear card.</p> <p> ...+....1....+....2....+....3....+....4....+....5....+....6....+....7...</p> <p>LOADER IMAGE CLEAR</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. The word LOADER must begin in column 1. 2. The word IMAGE must begin in column 10. 3. The word CLEAR must begin in column 16.

Related Information

A list of related information follows. For information on how to order or access any of this information, call your IBM representative.

IBM Transaction Processing Facility (TPF) 4.1 Books

- *TPF ACF/SNA Data Communications Reference*, SH31-0168
- *TPF Application Programming*, SH31-0132
- *TPF C/C++ Language Support User's Guide*, SH31-0121
- *TPF Concepts and Structures*, GH31-0139
- *TPF General Macros*, SH31-0152
- *TPF Library Guide*, GH31-0146
- *TPF Migration Guide: TPF 3.1 System to TPF 4.1 System*, GH31-0186
- *TPF Operations*, SH31-0162
- *TPF System Installation Support Reference*, SH31-0149
- *TPFDF and TPF Structured Programming Macros*, SH31-0183
- *TPF System Generation*, SH31-0171
- *TPF System Macros*, SH31-0151
- *TPF System Performance and Measurement Reference*, SH31-0170
- *TPF Transmission Control Protocol/Internet Protocol*, SH31-0120.

IBM High-Level Language Books

- *IBM C/C++ for MVS/ESA C++/MVS Language Reference*, SC09-1992
- *OS/390 C/C++ IBM Open Class Library Reference*, SC09-2364
- *OS/390 C/C++ IBM Open Class Library User's Guide*, SC09-2363
- *OS/390 C/C++ Run-Time Library Reference*, SC28-1663
- *OS/390 C/C++ User's Guide*, SC09-2361
- *OS/390 UNIX System Services Command Reference*, SC28-1892
- *SAA Common Programming Interface C Reference - Level 2*, SC09-1308.

Miscellaneous IBM Books

- *IBM 3590 Hardware Library* (order the correct books, version and release for your installation)

- *MQSeries Application Programming Reference*, SC33-1673
- *MQSeries Clients*, GC33-1632
- *MQSeries Distributed Queue Management Guide*, SC33-1139
- *MQSeries Message Queue Interface Technical Reference*, SC33-0850
- *NCP/SSP/EP Resource Definition Reference* (order the correct version and release for your installation)
- *S/390 Processor Resource/Systems Manager Planning Guide*, GA22-7236
- *TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1*, SC31-7133
- *VTAM Network Implementation Guide* (order the correct version and release for your installation)
- *VTAM Operation*, SC31-6495
- *VTAM Resource Definition Reference* (order the correct version and release for your installation).

Online Information

- *IBM Online Library Omnibus Edition: OS/390 Collection*, SK2T-6700
- *IBM TPF Product Information Center CD-ROM*, SK2T-8062
- IBM TPF Product Information Center on the TPF Web site.
- *IBM Online Library: Transaction Processing and Data Collection Kit*, SK2T-0730
- *XML User's Guide*
- *z/OS Software Products Collection*, SK3T-4270.

How to Send Your Comments

Your feedback is important in helping to provide the most accurate and highest quality information. If you have any comments about this book or any other TPF information, use one of the methods that follow. Make sure you include the title and number of the book, the version of your product and, if applicable, the specific location of the text you are commenting on (for example, a page number or table number).

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

- If you prefer to send your comments electronically, do either of the following:
 - Go to <http://www.ibm.com/tpf/pubs/tpfpubs.htm>.
There you will find a link to a feedback page where you can enter and submit comments.
 - Send your comments by e-mail to tpfid@us.ibm.com
- If you prefer to send your comments by mail, address your comments to:

IBM Corporation
 TPF Systems Information Development
 Mail Station P923
 2455 South Road
 Poughkeepsie, NY 12601-5400
 USA
- If you prefer to send your comments by FAX, use this number:
 - United States and Canada: 1 + 845 + 432 + 9788
 - Other countries: (international code) + 845 + 432 +9788

Guidelines for Using This Publication

This chapter provides information about the organization of this publication and how to use it efficiently.

Who Should Use This Publication

This publication is written for any IBM Transaction Processing Facility (TPF) customer who has the IBM Transaction Processing Facility Version 4 Release 1 system (referred to as the TPF 4.1 system in the remainder of this publication) installed and needs guidance while applying changes and updates to the TPF 4.1 system. These changes and updates are provided to you in the form of a program update tape (PUT) and may come about as:

- Small programming enhancements (SPEs)
- Authorized program analysis reports (APARs).

You may have highly modified TPF 4.1 systems as compared to the *vanilla*, or uncustomized, product IBM provides. The information provided in this publication is written for those of you with *vanilla*, or uncustomized, TPF 4.1 systems. If you have a highly modified TPF 4.1 system, apply changes and updates provided in a PUT based on the modifications you have made to your TPF 4.1 system by using the information provided in this publication.

This information is **not** intended to replace other publications in the TPF 4.1 library or the APAR response information that accompanies an SPE or an APAR. Rather, this information simply supplements that information. For example, you will continue to find information about prerequisite APARs, modules to be reassembled, solution statements, and so on in the associated APAR response information.

IBM recommends that you make the changes and updates provided in a PUT on a TPF 4.1 test system and validate those changes thoroughly before making the changes and updates to a TPF 4.1 production system.

How This Publication Is Organized

This publication is organized in chapter format. Each chapter is dedicated to a specific program update tape (PUT). Within each chapter you will find sections dedicated to discussion about migration considerations for each new function or SPE shipped on the PUT.

How to Use the Migration Considerations Information

Each new function or SPE documented in this publication uses the following format to present the migration considerations to you. As you are using this information keep in mind that some migration considerations may not be applicable for a particular new function or SPE. In those cases a statement indicating that there are no changes is printed.

Note: Depending on the complexity of the new function or SPE, additional migration considerations may be included with the information for that new function or SPE. In those cases, the appropriate section will be added and repeated across the chapter for each new function or SPE as appropriate.

Table 1. Format of Migration Considerations

Section	Type of Information You Will Find In This Section
Name of the New Function or SPE and the APAR Number	Provides the name of the new function or SPE and the associated APAR number.
Prerequisite APARs	Provides a cross reference to the APEDIT for you to review any APARs that must be installed on your TPF 4.1 system before installing the new function or SPE.
Functional Overview	This section provides a high-level description or overview of the new function or SPE, as well as a description of the benefits the new function or SPE will bring to your TPF 4.1 system.
Architecture	This section provides a general description about the architecture of the new function or SPE and how it is implemented.
Operating Environment Requirements and Planning Information	To ensure that your TPF 4.1 system performs properly, you must establish the required operating environment. This section provides information about changes by the new function or SPE to the minimum hardware and software (programming requirements) system configuration requirements necessary to operate the TPF 4.1 system. See "Operating Environment Requirements and Planning Information" on page 35 for more information about these minimum system configuration requirements.
Interface Changes	<p>This section provides information about the interfaces that are new, changed, or no longer supported by the new function or SPE. These interfaces include (but are not limited to):</p> <ul style="list-style-type: none"> • Build scripts • Configuration constant (CONKC) tags • Control program interface (CINFC) tags • Copy members • C/C++ header files • DLM stubs • Dynamic load module (DLM) members • Fixed file records • Macros • Segments • User exits.
Functional and Operational Changes	This section provides information about the functional and operational changes (such as commands, system errors, offline messages, and online messages) that are new, changed, or no longer supported by the new function or SPE.
Performance or Tuning Changes	<p>This section provides recommendations about tuning the TPF 4.1 system because of the new function or SPE. For example, here you will find:</p> <ul style="list-style-type: none"> • Information about changes that affect timing considerations • Changes about how the TPF load is balanced • Estimates of performance enhancements or losses • Tuning values, operational procedures, configuration parameters, and other information that may improve performance.
Storage Considerations and Changes	This section provides information about considerations for and changes to storage that are necessary for the new function or SPE.
System Initialization Program (SIP) and System Generation Changes	<p>This section provides information about the SIP and system generation changes necessary for the new function or SPE. For example, here you will find information about modifications that must be made to SIP parameters such as:</p> <ul style="list-style-type: none"> • Guidelines for recommended parameter values • Changes to the size or content of keypoints or non-keypoint data areas • Cross references to the appropriate TPF 4.1 publications and code for more information about parameter values.
Loading Process Changes	This section provides information about changes to the allocator (ALDR, TLDR, OLDR), the pilot tape, and current loading procedures introduced by the new function or SPE.

Table 1. Format of Migration Considerations (continued)

Section	Type of Information You Will Find In This Section
Online System Load Changes	This section provides information about changes associated with loading the TPF 4.1 system that must be specified before performing an online system load because of the new function or SPE. In addition, information may be provided about new commands or procedures that must be used when IPLing the TPF 4.1 system.
Publication Changes	This section provides information about changes to the publications in the TPF 4.1 library to document the new function or SPE.
Host System Changes	This section provides information about considerations that would impact the installation of the PUT. For example, here you will find information such as: <ul style="list-style-type: none"> • Changes to the cataloged procedures • Special assembly or link-edit requirements • Changes to partitioned data sets • Changes to an associated operating system like the IBM VM or IBM MVS systems • IBM VM or IBM MVS system configuration requirements, changes, and recommendations that may enhance the performance of the new function or SPE.
Application Programming Interface (API) Changes	This section provides information about changes to the external interfaces that may affect existing application programs because of the new function or SPE.
Database Changes	This section provides information about database organization or support changes because of the new function or SPE.
Feature Changes	This section provides information about changes in operations or support of the following TPF 4.1 features: <ul style="list-style-type: none"> • High Performance Option (HPO) Feature • Multi-Processor Interconnect Facility (MPIF) Feature • TPF Application Requester (TPFAR) Feature.
Installation Validation	This section provides information about specific tests or procedures that you can run to verify that the installation of the new function or SPE was done properly.
Migration Scenarios	This section provides migration scenarios you can use when installing the new function or SPE.

How to Read the Tables

Within the migration considerations for each new function or SPE a series of tables is used to present the migration considerations to you. The information in each table is order sequentially or alphabetically depending on the type of information presented. To help you better understand the content of each table, a description of the various column headings follows in Table 2.

Table 2. How to Read the Tables

Column Heading	Description
APPC Macro	Indicates the name of the Advanced Program-to-Program Communications (APPC) macro. An <i>APPC macro</i> is an assembler macro in an application or program that uses the APPC communications protocol.
Build Script	Indicates the name of the build script. A <i>build script</i> is a file that defines the module type and specifies the components of a dynamic link library (DLL), dynamic load module (DLM), or library load module (LLM), and is used by the CBLD program to create the finished DLL, DLM, or LLM.
C/C++ Language Header File	Indicates the name of the general use C/C++ language header file. A <i>general use C/C++ language header file</i> is a header file that is available for general use and includes function prototypes and related definitions that may be used by any application program.
C/C++ Language Header File (IBM Use Only)	Indicates the name of the implementation-specific C/C++ language header file (IBM use only). An <i>implementation-specific C/C++ language header file</i> is a header file that is used by the TPF system only. These headers files are internal to the implementation of certain functions.

Table 2. How to Read the Tables (continued)

Column Heading	Description
CINFC Tag	Indicates the name of the CINFC tag. The <i>CINFC tag</i> is the symbolic name of a main storage resident system table.
Communication Macro or Statement	Indicates the name of the communication macro or statement. A <i>communication macro or statement</i> is a macro or statement used in applications or programs that use any of the various aspects of TPF communications support.
CONKC Tag	Indicates the name of the CONKC tag. The <i>CONKC tag</i> is the symbolic name of a system configuration variable.
Control Program (CP) User Exit Activated In	Indicates the name of the CP from which the user exit is activated.
Copy Member	Indicates the name of the copy member. A <i>copy member</i> is a file that is copied into a control section (CSECT). For example, CICR40 is a copy member of CCNUCL.
CSECT Where Copy Member Is Located	Indicates the CSECT where the copy member is located. The CSECT must be assembled.
Data Macro	Indicates the name of the data macro. A <i>data macro</i> is a declarative macro that generates DSECTs defining records that may be called by any TPF source program by using the data macro name.
Description of Change	Provides a description of the entity or the changes made to it by the new function or SPE.
DLM/DLL/LLM Name	Indicates the name of the dynamic load module (DLM), the dynamic link library (DLL), or the library load module (LLM) in which the member is a part. A <i>DLM</i> is a type of load module. A <i>DLL</i> is a collection of one or more functions or variables gathered in a load module and executable or accessible from a separate DLL application load module.
DLM, DLL, LLM, or Control Program	Indicates whether the link-edited module is a DLM, DLL, LLM, or control program.
DLM Stub	Indicates the name of the DLM stub. A <i>DLM stub</i> is a small object-code file that allows a DLM to call another real-time program. DLM stubs are created by the DLM stub generator tool (STUB).
DLM Where CSECT Is Located	Indicates the DLM where the CSECT is located. The DLM must be link-edited. If there is no DLM associated with the CSECT, Not Applicable is printed.
Do You Need to Reassemble Programs?	Indicates whether you must reassemble programs because of the macro change (Yes, No, or Not Applicable).
Do You Need to Reassemble Programs Using This Data Macro?	Indicates whether you must reassemble programs using the data macro (Yes, No, or Not Applicable).
Do You Need to Recompile Segments?	Indicates whether you must recompile segments (Yes, No, or Not Applicable).
Equate Value	Indicates the equate value.
Fixed File Record	Indicates the name of the fixed file record. A <i>fixed file record</i> is a data record that is permanently assigned to a specific function (record type) and is accessed through the FACE/FACS programs, which use the FACE table.
Function	Indicates the name of the function.
Command	Indicates the name of the command. A <i>command</i> is an operator message, accepted only from CRAS terminals, that is used to communicate with the control program to request services or modify system parameters. Commands are sometimes called Z-messages because the first character of the command is always z.
General Macro	Indicates the name of the general macro. <i>General macros</i> provide system services (such as performing alphabetic scans, using tape drives, or handling input and output), control application programming processing (such as entry creation), and control events for resource sharing (such as posting and waiting, queuing and dequeuing).
ISO-C	An X in this column indicates that the C/C++ language header file is for ISO-C support. A blank in this column indicates that the header file is for offline programs.
Library Interface Script	Indicates the name of the library interface script. A <i>library interface script</i> is a file that lists functions contained in a library and provides an index number for that function. The file is used by the library interface tool (LIBI) to create library stubs.
Link-Edited Module	Indicates the name of the link-edited module. A <i>link-edited module</i> is a file of load module code produced by the linkage editor.

Table 2. How to Read the Tables (continued)

Column Heading	Description
Link-Edited Module (Where Offline Segment Is Linked)	Indicates the name of the module where the <i>offline segment</i> is linked. If the segment is not an offline segment, Not Applicable is printed. <i>Link-edited modules</i> are files of load module code produced by the linkage editor.
Member	Indicates the name of the member. <i>Members</i> are files of object code that are components of dynamic load modules (DLMs), dynamic link libraries (DLLs), or library load modules (LLMs).
Member Type	Indicates whether a member is assembler language, C Language, C++ Language, or Object Code Only.
Message ID or System Error Number	Indicates the message ID for the offline or online message, or the system error number for the system error. <i>Messages</i> are transactions or entries received by a TPF 4.1 system for immediate action. TPF <i>system messages (system errors)</i> such as dump messages, and offline and offline messages, are intended for operators and system programmers responsible for operating and maintaining the TPF 4.1 system.
Message Type	Indicates whether the message is an offline message, online message, or system error.
Name of Link-Edited Module	Indicates the name of the link-edited module that contains the copy member.
New, Changed, or No Longer Supported	Indicates whether an entity is new, changed, or no longer supported because of the new function or SPE.
Object Code Only (OCO) Stubs	Indicates the name of the object code only (OCO) stub, which are stubs that resolve to external references generated by the C and C++ compilers.
Programs to Reassemble	Indicates the programs that you must reassemble. If non-IBM (customer only) programs must be reassembled, that is noted. This information is new for program update tape (PUT) 14 and beyond, and "PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)" on page 1269. This information is not provided for PUT 2 to PUT 13 ("Program Update Tape 2 (PUT 2)" on page 53 to "Program Update Tape 13 (PUT 13)" on page 765).
Publication Title	Indicates the name of the publication from the TPF 4.1 library.
SCK Macro	Indicates the name of the system communication (SCK) general macro.
Segment	Indicates the name of the segment. A <i>segment</i> is real-time code or offline code that is not part of the control program (CP).
Segments to Recompile	Indicates the segments that you must recompile. If non-IBM (customer only) segments must be recompiled, that is noted. This information is new for program update tape (PUT) 14 and beyond, and "PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)" on page 1269. This information is not provided for PUT 2 to PUT 13 ("Program Update Tape 2 (PUT 2)" on page 53 to "Program Update Tape 13 (PUT 13)" on page 765).
Segment Where Copy Member is Included	Indicates the name of the segment where the copy member is located.
Selected Equate Macro	Indicates the name of the selected equate macro. A <i>selected equate macro</i> is an assembler macro, such as REGEQU, that provides equate support.
SIP Skeleton and Internal Macro	Indicates the name of the SIP skeleton and internal macro. A <i>SIP skeleton and internal macro</i> is a macro or skeleton (such as SPPBLD or SPCOMP) that is used by the system initialization program (SIP).
SIP Stage I Macro	Indicates the name of the SIP Stage I macro.
SIP Stage II Macro	Indicates the name of the SIP Stage II macro.
Softcopy File Name	Indicates the softcopy file name for the publication.
Structured Programming Macro (SPM)	Indicates the name of the SPM. A <i>structured programming macro (SPM)</i> is a macro used to add structured programming verbs to existing assembler language.
SYSEQ Tag	Indicates the name of the SYSEQ tag. A <i>SYSEQ tag</i> is a system equate that provides a symbolic name for a system parameter or commonly used constant.
System Macro	Indicates the name of the system macro. A <i>system macro</i> is a macro that is restricted to system use. There are three types of system macros: those that require authorization, those that do not require authorization, and those that are restricted to the control program (CP).
System Macro (IBM Use Only)	Indicates the name of the system macro (IBM use only).

Table 2. How to Read the Tables (continued)

Column Heading	Description
TARGET (TPF)	An X in this column indicates that the C/C++ language header file is for TARGET(TPF).
Type	<p>Indicates whether the build script is a dynamic load module (DLM) or a dynamic link library (DLL) in the Build Scripts table.</p> <p>Indicates whether the member is a DLM, DLL, or LLM in the Members table.</p> <p>Indicates the type of copy member, for example a control program (CP) or real-time assembler in the Copy Members table.</p> <p>Indicates the type of segment in the Segments table.</p>
User Exit Activated In	Indicates the name of the segment in which the user exit is activated.
User Exit Program	Indicates the name of the user exit program.
User Routine Label	Indicates the name of the user routine label.

Learning about What Is in the TPF 4.1 System

The TPF 4.1 system is an operating system that works with application programs to process transactions for you in a real-time environment. For example, you can use the TPF 4.1 system for computing needs such as transaction processing, network switching, and front-end processing.

The TPF 4.1 system is designed for businesses and organizations that have high online transaction volumes and large networks. Because of its high capacity and high availability characteristics, the TPF 4.1 system is well-suited for environments where growth is expected to be very fast or unpredictable, or where there are high peak periods of transaction activity. It is especially useful for application programs that need high capacity and extremely low cost per transaction.

Very short path lengths for critical system services such as DASD input/output (I/O) to help make efficient use of the TPF 4.1 system resources and to provide a very low cost per transaction.

This chapter provides an overview of the changes and updates to the TPF 4.1 system that are included on each program update tape (PUT). See *TPF Migration Guide: TPF 3.1 System to TPF 4.1 System* for information about the features of the TPF 4.1 system.

Changes or New Functions Found on Program Update Tapes (PUTs)

Table 3 includes changes or new functions to the TPF 4.1 system that you will apply as program update tapes (PUTs). See the chapters that follow in this publication for more information about these changes or new functions and the resulting migration considerations.

The information in Table 3 is presented in alphabetic order by the area of change.

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs)

Area with Changes or New Functions	Description of the Changes or New Functions
C++ Class Library Support	<p>The TPF 4.1 system now provides support for C++ class libraries. C++ class libraries provide you, the programmer, with more powerful tools for the development and maintenance of object-oriented programs. Built on the solid foundation of the C language, the C++ language adds support for object-oriented programs and many other features without sacrificing any of the power, elegance, or flexibility of the C language. C++ class library support provides specific class libraries that you can use and extends the power of the C++ language, which enables you to take advantage of more powerful C++ features and standards.</p> <p>Although the TPF 4.1 system does not provide all the C++ class libraries that are available, it does provide the I/O Stream Class Library.</p> <p>In addition, the TPF 4.1 system provides support for the STLport standard template library.</p> <p>See "C++ Class Library Support (APARs PJ26187 and PJ26173)" on page 587 for more information about C++ class library support.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
C++ Class Library Support for Application Support Class Library	<p>With APAR PJ27627, the TPF 4.1 system provides support for a subset of the Application Support Class Library. This library provides specific classes that extend the power of the C++ language. The specific classes supported are: IBinaryCodedDecimal and decimal, IDate, IException, IString, ITime, ITimeStamp, and I0String.</p> <p>As described in the <i>OS/390 C/C++ IBM Open Class Library Reference</i>, header files <code>idate.hpp</code>, <code>idecimal.hpp</code>, <code>ixcbase.hpp</code>, <code>istring.hpp</code>, <code>itime.hpp</code>, <code>itimestamp.hpp</code>, and <code>i0string.hpp</code> are used by applications to make use of the Application Support Class Library (CPP3). All other header files shipped with APAR PJ27627 are for implementation only.</p> <p>The TPF 4.1 system also provides enhanced I/O Stream Classes that support the Application Support Class Library.</p> <p>A tar file, which is available for this APAR, includes Application Support Class Library source code.</p> <p>To build applications with a partitioned data set (PDS), the SEARCH option for the compiler must be set to <code>xxx.inl</code>, (where <code>xxx</code> is the PDS for the include files). This PDS is shipped with the Application Support Class Library code.</p> <p>See "PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)" on page 1269 for more information about APAR PJ27627 and see "C++ Class Library Support (APARs PJ26187 and PJ26173)" on page 587 for more information about C++ class library support. See the <i>OS/390 C/C++ IBM Open Class Library User's Guide</i> for more information about the Application Support Class Library and the I/O Stream Class Library.</p>
C++ Support	<p>The TPF 4.1 system now provides support for the C++ language, which is designed to take advantage of object-oriented (OO) programming concepts. Except for minor details, the C++ language is a superset of C language. In addition to the facilities provided by C language, the C++ language provides flexible and efficient facilities for defining new data types. You can partition an application into manageable pieces by defining new data types that closely match the logical design of the application. When used well, these techniques result in shorter, easier to understand, and easier to maintain programs.</p> <p>Dynamic link libraries (DLLs) are now supported. A DLL is a collection of one or more functions or variables gathered in a load module that can be run or accessed from a separate application load module. The key concept in DLLs is that functions or variables can be dynamically linked while the application is running rather than statically when the application is built. You can, therefore, call a function or use a variable in a load module other than the one that contains the definition. This allows you greater flexibility in accessing library functions or variables.</p> <p>See "C++ Support (APAR PJ25084)" on page 358 for more information about C++ support.</p>
C Function Trace	<p>C function trace provides the ability to trace ISO-C programs. When an ISO-C program has been compiled with the TEST option of one of the IBM C/370 family of compilers supported by the TPF 4.1 system, C function trace provides the programmer with relevant information to expedite the analysis of C program problems.</p> <p>APAR PJ23493 provides trace information in the C function trace table for breakpoints other than program entry breakpoints and program exit breakpoints.</p> <p>See "C Function Trace (APAR PJ19422)" on page 118 for more information about C function trace. See "Trace Information in the C Function Trace Table (APAR PJ23493)" on page 308 for more information about APAR PJ23493.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Continuous Data Collection (CDC)	Continuous data collection (CDC) collects real-time TPF 4.1 system performance information. CDC uniquely stores the data in a relational database by using the TPF Application Requester (TPFAR) feature. An offline application is then used to interpret and display the data. This information is available in the database on a continual basis, so you can use CDC as a monitoring tool. You can run CDC with a minimum impact on TPF 4.1 system performance. Data collected in CDC is a subset of the data collected by the system performance and measurement package. User exits assist in recording additional data.
Coupling Facility (CF) Record Lock Support	The limited lock facility (LLF) and the concurrency filter lock facility (CFLF), which are two external lock facilities (XLFs) supported by the TPF 4.1 system, were required to control access to data shared by two or more processors in a loosely coupled complex. CF record lock support now provides the option of using one or more CFs as XLFs. See "Coupling Facility (CF) Record Lock Support (APAR PJ26707)" on page 646 for more information about CF record lock support.
Coupling Facility (CF) Support	Coupling facility (CF) support allows TPF routines to use a CF for high-performance, high-availability data sharing. A <i>coupling facility (CF)</i> is an IBM System/390 processor used to centralize storage for all attached processors in a processor configuration by providing shared storage and shared storage management functions. TPF services support data sharing while maintaining data integrity and consistency. See "Coupling Facility (CF) Support (APAR PJ25781)" on page 450 for more information about CF support.

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions																										
Coverage Display Tools	<p>Coverage display tools provides the following display-type commands. See <i>TPF Operations</i> for more information about these commands.</p> <table> <tr> <th>Command</th><th>Description</th></tr> <tr> <td>ZCHCH</td><td>You can now obtain a list of the file pool addresses chained from a specific location in a specific record, and display each file pool address or only the last address in the chain.</td></tr> <tr> <td>ZDDSI</td><td>You can now display the status of a subchannel for an input/output (I/O) device.</td></tr> <tr> <td>ZDEBB</td><td> <p>You can now display blocked tapes online and perform the following functions:</p> <ul style="list-style-type: none"> • Display records on a blocked tape • Shift a blocked tape forward or backward • Search a blocked tape for a specific item. </td></tr> <tr> <td>ZDECB</td><td>You can now display information about entry control blocks (ECBs) that are in use.</td></tr> <tr> <td>ZDFCT</td><td>You can now display the characteristics of a record type as well as the file address and module, cylinder, head and record (MCHR) information for each extent of a record type.</td></tr> <tr> <td>ZDMOD</td><td> <p>You can now display the following main storage addresses for a module file:</p> <ul style="list-style-type: none"> • File status table • Device number • Queue length • Control status table. </td></tr> <tr> <td>ZDPLT</td><td> <p>You can now display:</p> <ul style="list-style-type: none"> • Program names from the program allocation table (PAT) and the extra PAT slots with the specified linkage type. • The date and time when the PAT was created. </td></tr> <tr> <td>ZDTOD</td><td> <p>You can now display:</p> <ul style="list-style-type: none"> • The current value of the time-of-day (TOD) clock, including a translation to a date and time. The TOD clock is set to Greenwich Mean Time (GMT). • The corresponding date and time for a specific TOD clock value. • The corresponding TOD clock value for a specific date and time. </td></tr> <tr> <td>ZDWGT</td><td>You can now display the terminal control table (WGTA) entry for a specific line number, interchange address, and terminal address (LNIATA) and CPU ID.</td></tr> <tr> <td>ZFECH</td><td>You can now display a list of active ECBs or a formatted display of a particular ECB.</td></tr> <tr> <td>ZMPIF</td><td>You can now display the current contents of the Multi-Processor Interconnect Facility (MPIF) I/O trace table.</td></tr> <tr> <td>ZSTAT</td><td>You can now display the delayed and deferred ECB count.</td></tr> </table>	Command	Description	ZCHCH	You can now obtain a list of the file pool addresses chained from a specific location in a specific record, and display each file pool address or only the last address in the chain.	ZDDSI	You can now display the status of a subchannel for an input/output (I/O) device.	ZDEBB	<p>You can now display blocked tapes online and perform the following functions:</p> <ul style="list-style-type: none"> • Display records on a blocked tape • Shift a blocked tape forward or backward • Search a blocked tape for a specific item. 	ZDECB	You can now display information about entry control blocks (ECBs) that are in use.	ZDFCT	You can now display the characteristics of a record type as well as the file address and module, cylinder, head and record (MCHR) information for each extent of a record type.	ZDMOD	<p>You can now display the following main storage addresses for a module file:</p> <ul style="list-style-type: none"> • File status table • Device number • Queue length • Control status table. 	ZDPLT	<p>You can now display:</p> <ul style="list-style-type: none"> • Program names from the program allocation table (PAT) and the extra PAT slots with the specified linkage type. • The date and time when the PAT was created. 	ZDTOD	<p>You can now display:</p> <ul style="list-style-type: none"> • The current value of the time-of-day (TOD) clock, including a translation to a date and time. The TOD clock is set to Greenwich Mean Time (GMT). • The corresponding date and time for a specific TOD clock value. • The corresponding TOD clock value for a specific date and time. 	ZDWGT	You can now display the terminal control table (WGTA) entry for a specific line number, interchange address, and terminal address (LNIATA) and CPU ID.	ZFECH	You can now display a list of active ECBs or a formatted display of a particular ECB.	ZMPIF	You can now display the current contents of the Multi-Processor Interconnect Facility (MPIF) I/O trace table.	ZSTAT	You can now display the delayed and deferred ECB count.
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Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Enhancements to TPF MQSeries Local Queue Manager Support	<p>Enhancements to TPF MQSeries local queue manager support include the following:</p> <ul style="list-style-type: none"> • The TPF MQGET application programming interface (API) now supports the MQGMO_WAIT option, which allows an entry control block (ECB) to be suspended when a queue is empty and to resume when a message arrives. A wait interval is specified by the application to indicate how long the MQGET API should wait for the message. The MQGMO_WAIT option works with processor unique and processor shared queues. • TPF local normal queues now support trigger type EVERY, which triggers a new ECB every time a message arrives on the application queue. Trigger type EVERY works with processor unique and processor shared queues. • TPF local normal queues now allow you to associate a process object with a queue. This allows you to trigger a program in the process object, when a message arrives on that queue.
Enterprise Storage Server (ESS) disk storage system support	<p>ESS disk storage system support for the TPF 4.1 system exploits the functions provided by the ESS. The ESS disk storage system is defined to the TPF 4.1 system as a type of IBM 3990 storage controller with attached IBM 3380 or 3390 device types configured in TPF mode. The ESS disk storage system provides the following performance, scalability, and accessibility improvements:</p> <ul style="list-style-type: none"> • You can add capacity and connectivity and upgrade performance while your complex continues to run. Specifically, additional channel command words (CCWs) improve performance for standard TPF disk input/output (I/O) operations for single record read and write operations as well as full track I/O operations used during TPF transaction services, copy, and capture and restore processing. • The ESS disk storage system scales from 420 gigabytes (GB) to 11 terabytes (TB). • The ESS disk storage system works with a variety of platforms including IBM System/390, IBM VM/ESA, and TPF to name a few.
Expression Enhancements for the TPF Debuggers	<p>Expression enhancements for the TPF debuggers provides the following enhancements for TPF Assembler Debugger for VisualAge Client and TPF C Debugger for VisualAge Client (referred to as the assembler debugger and C debugger, respectively, in the remainder of this information):</p> <ul style="list-style-type: none"> • Assembler debugger symbolic support has been added to the assembler debugger listing view. • Global symbol display for both assembler and C has been added to the assembler and C debuggers. • ecbptr function support in the C debugger. • You can now use expressions with all breakpoint type in the assembler debugger. • Local variable support was added to the assembler debugger to display the operands of the current line of execution. • You can now view expressions in different data representation in the assembler debugger. <p>See "Expression Enhancements for the TPF Debuggers (APAR PJ27905)" on page 1042 for more information about expression enhancements for the TPF debuggers.</p>
Fiber Channel Support	<p>Fiber channel support allows the TPF 4.1 system to exploit the performance features associated with IBM System/390 fiber channels. Input/output (I/O) devices attach to the IBM System/390 fiber channels through native channel-attached control units or through a fiber channel bridge device to control units attached to Enterprise Systems Connection (ESCON) Architecture for migration.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
FIFO Special File Support	<p>FIFO special file support builds on the infrastructure provided previously with TPF Internet server support (APARs PJ25589 and PJ25703) and open systems infrastructure (APAR PJ26188). FIFO special file support provides the following:</p> <ul style="list-style-type: none"> • Support for FIFO special files. A <i>FIFO special file</i> is a file that is typically used to send data from one process to another so that the receiving process reads the data in first-in-first-out (FIFO) format. A FIFO special file is also known as a <i>named pipe</i>. This support provides a method for independent processes to communicate with each other by using TPF file system functions, such as the read and write functions. • Enhancements to the select function to allow the use of file descriptors for named pipes. • A syslog daemon to provide a message logging facility for all application and system processes. Internet server applications and components use the syslog daemon for logging purposes and can also send trace information to the syslog daemon. Messages can be logged to file or to tape. Remote syslog daemons can also log messages to the local syslog daemon through remote sockets. <p>See “FIFO Special File Support (APAR PJ27214)” on page 787 for more information about FIFO special file support.</p>
File System Support	<p>The TPF 4.1 system now provides support for a file system. The key concepts of file system support are an application programming interface (API) and C run-time environment supporting main functions. Implementation of file system support eases porting of applications by providing a standard and open interface.</p> <p>The file access API contains all of the standard C library functions and part of the Portable Operating System Interface for Computer Environments (POSIX) standards and reduces the complexity of TPF applications suited to flat files by providing a flat-file data model as a simpler alternative to the TPF linked-record architecture.</p> <p>See “File System Support (APAR PJ25089)” on page 370 for more information about the file system.</p> <p>Additional file system support includes:</p> <ul style="list-style-type: none"> • Authorized Program Analysis Report (APAR) PJ26174, which provides additional commands to manage the file system. See Table 1280 on page 1342 for a list of these functional messages. • APAR PJ26713, which enhances the performance of the file system.
File System Tools	<p>File system tools enhances the file system by allowing you to do the following:</p> <ul style="list-style-type: none"> • Activate scripts and TPF segments from the command line • Pass data from the standard output (stdout) of one ZFILE command to another as standard input (stdin) by using a vertical bar () as a pipe • Use ZFILE commands to support Web hosting and scripting • Emulate additional Portable Operating System Interface for Computer Environments (POSIX) functions to process file system files with more than one level of redirection • Preserve the meaning of special characters by using a quoting mechanism in the ZFILE commands. <p>See “File System Tools (APAR PJ27277)” on page 805 for more information about file system tools.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
File Transfer Protocol (FTP) Server Support	<p>The TPF 4.1 system now provides FTP server support, which allows you to transfer files between the TPF 4.1 system and a remote host that supports Transmission Control Protocol/Internet Protocol (TCP/IP) and FTP clients. FTP server support provides the following benefits:</p> <ul style="list-style-type: none"> • Reliable file transfer. FTP server support is built on the transport layer of Transmission Control Protocol services. • Features and options such as the following: <ul style="list-style-type: none"> – User authentication – Data conversion – Directory listings. <p>See “File Transfer Protocol (FTP) Server Support (APAR PJ27028)” on page 710 for more information about FTP server support.</p>
Heap Storage	<p>An application may allocate and release system heap storage using the GSYSC and RSYSC macros, respectively. The contiguous storage allocated by the GSYSC macro is in the system virtual memory (SVM) address space and is accessible to all ECBs at the same address. The system heap storage is a convenient way to share data among ECBs but must be used with care. The storage obtained is not attached to the ECB; therefore, the application must provide storage management and cleanup.</p> <p>See “ISO-C File Resident Support (APAR PJ21167)” on page 170 for more information about the system heap storage.</p> <p>System heap enhancements (APAR PJ28363) allows a TPF 4.1 system with up to 2 GB of storage to have a large system heap area without losing large amounts of real storage. The CORREQ system initialization program (SIP) macro was updated to include the SSPS parameter, which allows you to define the size of the system heap area. In TPF 4.1 systems with 2 GB of storage, the system heap area is permanently backed with real storage. In TPF 4.1 systems with less than 2 GB of storage, if there is no need to remove the real storage to make room for system heap virtual addresses, the system heap area is backed with 4 KB frames as each system heap storage request is made.</p> <p>See “PUT 16 Interface Changes by Authorized Program Analysis Report (APAR)” on page 1249 for more information about APAR PJ28363. See <i>TPF System Generation</i> for more information about SIP and the CORREQ macro.</p>
High-Performance Routing (HPR) Support	<p>HPR support allows the TPF 4.1 system to connect to a Systems Network Architecture (SNA) network as an HPR rapid transport protocol (RTP) node.</p> <p>See “High-Performance Routing (HPR) Support (APAR PJ25760)” on page 464 for more information about HPR support.</p>
Infrastructure for 32-Way Loosely Coupled Processor Support	<p>Infrastructure for 32-way loosely coupled processor support provides necessary prerequisite infrastructure support for future expansion to 32-way loosely coupled processors. This support includes the following:</p> <ul style="list-style-type: none"> • Enhancements to the internal event facility (IEF) so that an application processor can track responses from as many as 32 loosely coupled processors. • Changes to the communication control record structure so that additional loosely coupled processors can be added without reorganizing the control record structure. • Enhancements to the processor resource ownership table (PROT) to support additional #PRORI ordinals and to E-type loaders to remove the constraint of a maximum of 8 loosely coupled processors. <p>Note: Program update tape (PUT) 13 does not remove the constraint of a maximum of 8 loosely coupled processors. Additional functions are required to complete 32-way loosely coupled processor support.</p> <p>See “Infrastructure for 32-Way Loosely Coupled Processor Support (APAR PJ27387)” on page 818 for more information about infrastructure for 32-way loosely coupled processor support.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Integrated Online Pool Maintenance and Recoup Support	<p>Integrated online pool maintenance and recoup support enhances pool utilities in a TPF 4.1 system environment by doing the following:</p> <ul style="list-style-type: none"> • Eliminating most offline processing • Eliminating recoup and pool general files • Increasing performance and data integrity • Allowing all phases of recoup to be run in NORM state • Providing multiprocessor and multi-I-stream capability • Providing online historical data • Providing recoup and PDU fallback capability. <p>See "Integrated Online Pool Maintenance and Recoup Support (APAR PJ27469)" on page 831 for more information about integrated online pool maintenance and recoup support.</p>
ISO-C Support	<p>With ISO-C support, you can write applications using an ANSI/ISO-conforming implementation of C. This brings TPF applications closer to open systems.</p> <p>A few highlights of ISO-C support are:</p> <ul style="list-style-type: none"> • Standard support for all ANSI/ISO C freestanding environment language features • Removal of the 4 KB limitation for C object modules, stack frames, and static blocks • Removal of the 1 MB limitation for heap storage • Easy migration of existing and potential TARGET(TPF) C applications <p>See "ISO-C Support (APAR PJ17852)" on page 54 for more information about ISO-C support.</p> <p>Additional ISO-C support includes:</p> <ul style="list-style-type: none"> • Common offline loader program TPFLDR includes OLDR, ALDR, and TLDR to permit code sharing. See "ISO-C E-Type Loader Support (APAR PJ19966)" on page 127 for more information about ISO-C E-type loader support. See "Migration of TPF System Code to ISO-C Support (APAR PJ19938)" on page 138 for more information about migrating to ISO-C support. • File resident support of C programs through the use of an expanded system heap storage. See "ISO-C File Resident Support (APAR PJ21167)" on page 170 for more information. • APAR PJ24472 provides support for additional features of standard C: main, and system, atexit, and strerror functions. See "C main() Support (APAR PJ24472)" on page 316 for more information.
Link Map Support for C Load Modules	<p>Link map support makes it easier to debug problems that occur in C load modules. C load modules loaded to the online TPF 4.1 system will contain link maps that can be displayed using a new command. Link maps will also be included in certain types of dumps that include C load modules.</p> <p>See "Link Map Support for C Load Modules (APAR PJ24845)" on page 348 for more information about link map support.</p>
Logical Record Cache and Coupling Facility (CF) Cache Support	<p>Logical record cache and CF cache support further exploits CF support and CF record lock support, which were provided on program update tape (PUT) 9 and 11 respectively. With logical record cache support you can use the logical record cache for data consistency and to keep track of data that resides in the local cache and in permanent storage; you can create processor shared caches and processor unique caches. In contrast, CF cache support supports processor shared caches. See "Logical Record Cache and Coupling Facility (CF) Cache Support (APAR PJ27083)" on page 894 for more information about logical record cache and CF cache support.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Mapping of Airline Traffic over Internet Protocol (MATIP) Support	<p>MATIP support allows the TPF 4.1 system to receive and transmit airline reservation, ticketing, and messaging traffic over a Transmission Control Protocol/Internet Protocol (TCP/IP) network. MATIP support is provided for the communication of two main types of airline traffic: transactional and messaging. The ZMATP command and seven user exits have been provided to enable you to use MATIP support, which can coexist with your current network configurations.</p> <p>See "Mapping of Airline Traffic over Internet Protocol (MATIP) (APAR PJ26161)" on page 554 for more information about MATIP support.</p>
Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements	<p>Mapping of Airline Traffic over Internet Protocol (MATIP) enhancements expands MATIP support by providing a way to define a host descriptor table for Type-A and Type-B hosts. The ZMATP command is updated with new parameters, there are new error messages, and a new user exit is added.</p> <p>Agent set control unit (ASCU) information, which was provided through user exits, is also provided through the ZMATP command and can be associated with a specific host name. ASCU information is preserved on file, so if you do an initial program load (IPL) of the TPF 4.1 system you do not need to reenter the information.</p> <p>See "Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements (APAR PJ26693)" on page 679 for more information about MATIP enhancements.</p>
Message Queue Interface (MQI) Client	<p>With the MQI client, you can write applications using the message queue interface (MQI). The MQI client connects to MQSeries queue managers that support the MQSeries function using LU 6.2 sessions. Using a remote procedure call (RPC) type of interface, the MQI client sends the MQI function calls to MQSeries for processing.</p> <p>See "Message Queue Interface (MQI) Client (APAR PJ22434)" on page 268 for more information about MQI client support.</p>
Multiple I-Stream DASD I/O Support	<p>Multiple I-stream DASD I/O support allows:</p> <ul style="list-style-type: none"> • The TPF 4.1 system to process most DASD input/output (I/O) requests from any I-stream • You to take advantage of processors with more I-streams by not overloading the main I-stream with DASD I/O related work. <p>See "Multiple I-Stream DASD I/O Support (APAR PJ21313)" on page 213 for more information about multiple I-stream DASD I/O.</p>
Multiple Module Copy Support	<p>Multiple module copy support allows you to:</p> <ul style="list-style-type: none"> • Run more than one copy function at the same time. • Display the status of direct access storage device (DASD) modules that are being copied. • Set the maximum number of DASD modules that can be copied concurrently in a processor complex, on a channel, on a control unit, or on a processor. • Copy a DASD module to the same channel or control unit as a specified prime DASD module. • Cancel copying a DASD module from a processor that is not performing the copy function. • Restart all DASD module copies in a processor complex.
Multibyte Character, Wide Character, and Locale (MWL) Support	<p>Multibyte and wide-character functions and header files and support for extended locales is now part of the TPF 4.1 system. Extended locales are the locale definition files based on the localedef utility that is provided with IBM C/C++ compilers on the IBM System/390 platform. The localedef utility processes locale definition files and produces the locale load modules.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Open Systems Infrastructure	<p>Open systems infrastructure eases the porting of applications written for other systems to run in the TPF 4.1 system. Infrastructure components include:</p> <ul style="list-style-type: none"> • Shared memory using the X/Open interface to allow sharing of data among processes • Pipes using a POSIX interface for interprocess communications • Enhanced signal support so that: <ul style="list-style-type: none"> – A signal handler remains installed after a signal is raised. – A process can choose to block certain signals. – The TPF 4.1 system automatically blocks a signal when that signal is being handled. • Enhancements to support password and group files as actual files in the file system. <p>See "Open Systems Infrastructure (APAR PJ26188)" on page 595 for more information about these components.</p>
Pool Expansion (PXP) Support	<p>Currently, the TPF 4.1 system is limited to 64 K file pool directories. However, with the new pool expansion (PXP) support you can:</p> <ul style="list-style-type: none"> • Expand your database capacity up to 65 536 file pool directories for each short-term pool section and 16 777 216 file pool directories for each subsystem • Exploit the file addressing range provided by file address reference format 4 (FARF4) and file address reference format 5 (FARF5) • Have a complex of 2 or more processors (one with PXP support and one without) coexist indefinitely • Take advantage of an increase in offline performance because DYOPM now runs above 16 MB. <p>See "Pool Expansion (PXP) Support (APAR PJ17912)" on page 89 for more information about PXP support.</p>
Recoup Follow-On Support	<p>Recoup follow-on support includes the following:</p> <ul style="list-style-type: none"> • Recoup core resident descriptor support, which enhances recoup processing performance because descriptors are loaded to and accessed from memory instead of files. • Recoup functional support console (FSC) support, which provides a recoup profile option that routes recoup status messages to the real-time database services (RDBS) console instead of the prime CRAS. • Recoup message parsing enhancements, which centralize ZRECP command parsing routines and allow extra spaces to be specified when a ZRECP command is entered with parameters.
Remote Procedure Call	<p>In the TPF 4.1 system you can run remote procedure call (RPC) servers through a partial port of the Distributed Computing Environment (DCE) RPC run-time library. RPC allows applications on one workstation to start functions that reside on and are run by another workstation. The RPC run-time library allows you to develop RPC server applications that can be accessed using Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) Internet protocols. The RPC library application programming interfaces (APIs) establish required client/server connections through the use of socket APIs.</p> <p>Client applications that run on IBM or non-IBM DCE platforms are able to run RPC to a TPF server. All DCE services are available to client applications; however, the TPF 4.1 system supports only a subset of the DCE RPC services.</p> <p>See "Remote Procedure Call (APAR PJ26575)" on page 667 for more information about RPC.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Secure Sockets Layer (SSL) Support	<p>The SSL protocol, which was originally developed for Web browsers, is a set of rules governing authenticated and encrypted communication between Transmission Control Protocol/Internet Protocol (TCP/IP) clients and servers. SSL is widely used on the Internet by an increasing number of varied applications, especially for interactions that involve exchanging confidential information such as credit card numbers. SSL evolved into the Transport Layer Security (TLS) Version 1 standard.</p> <p>SSL is positioned as a protocol layer between the TCP layer and the application to form a secure connection between clients and servers by providing privacy, integrity, and authentication. SSL support on the TPF 4.1 system, which is based on the OpenSSL Version 0.9.6 open source package, supports the following:</p> <ul style="list-style-type: none"> • SSL version 2, SSL version 3, and TLS version 1. • Rivest-Shamir-Adelman (RSA) public key cryptography. • Rivest's Cipher (RC) 2, RC4, Data Encryption Standard (DES), and Triple-DES ciphers. • Message Digest Algorithm 5 (MD5) and Secure Hash Algorithm (SHA) digests. • Client and server authentication using digital certificates. • A single x509 certificate or chain of x509 certificates. • Use of any SSL toolkit to create public and private keys and certificates (including OpenSSL on another platform). You can then use File Transfer Protocol (FTP) to send the key and certificate files to the TPF 4.1 system. • Certificate revocation lists (CRLs). <p>See "Secure Sockets Layer (SSL) Support (APAR PJ27863)" on page 1061 for more information.</p>
Shared PR/SM Partition Support	<p>The TPF 4.1 system now supports tightly coupled systems running in shared PR/SM partitions. This improves customer utilization of processor capacity. Before the TPF 4.1 system, only uniprocessor systems were supported in shared PR/SM partitions; tightly coupled systems required dedicated partitions when in a PR/SM environment.</p> <p>See "Shared PR/SM (APAR PJ17778)" on page 106 for more information.</p>
Shared SSL Session Support	<p>Shared SSL session support provides the following enhancements to SSL support:</p> <ul style="list-style-type: none"> • Activate on receipt (AOR) capability for SSL through the SSL_aor function • Secure Web server support • Shared SSL sessions • SSL diagnostic tools. <p>See "Shared SSL Session Support (APAR PJ28118)" on page 1069 for more information.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Simple Network Management Protocol (SNMP) Agent Support	<p>SNMP is an industry-standard protocol that enables you to monitor and manage diverse and complex Transmission Control Protocol/Internet Protocol (TCP/IP) networks. SNMP is defined by a series of Request for Comments (RFC) documents that describe the flows and information that is communicated between the network management station and the different TCP/IP devices that are being managed. The SNMP architecture defines three entities:</p> <ul style="list-style-type: none"> • SNMP agents, which are network devices such as hosts, gateways, routers, or servers that receive requests from SNMP managers to retrieve or change Management Information Base (MIB) variables. SNMP agents then respond to these requests. • An SNMP manager, which runs an application or suite of applications to manage and monitor TCP/IP networks. • The MIB, which contains data that provides information about the SNMP agent and the TCP/IP network to the SNMP manager. <p>The TPF 4.1 system provides agent support for SNMP Version 1 with a standard set of SNMP MIB variables (MIB-II). This allows an SNMP manager to monitor and manage the TPF 4.1 system as an SNMP agent. SNMP agent support provides the following:</p> <ul style="list-style-type: none"> • A program interface to send enterprise-specific traps (unsolicited messages) to notify SNMP managers of significant system events • A user exit to provide security by validating SNMP requests • A user exit to retrieve your own enterprise-specific MIB variables. <p>See “Simple Network Management Protocol Agent Support (APAR PJ27932)” on page 1083 for more information.</p>
SNA Resource Definition	<p>You are no longer required to define remote logical unit (LU) resources and adjacent link station (ALS) resources to the TPF 4.1 system using the offline ACF/SNA table generation (OSTG) program. You can use dynamic LU support to automatically create resource definitions for remote LU resources when they log on to applications in the TPF 4.1 system. If the TPF 4.1 system is running in TPF Advanced Peer-to-Peer Networking (TPF/APPN) mode, you can also use dynamic LU support to automatically create resource definitions for ALS resources when the ALS links are activated.</p> <p>You can also use the ZNDYN ADD command online to create resource definitions for ALS, CDRM, CTC, and NCP resources.</p> <p>See “Dynamic LU Support (APAR PJ21044)” on page 180 for more information about dynamic LU support and the ZNDYN ADD command.</p>
SNA Resource Names	<p>SNA network IDs and resource names must both begin with an uppercase letter (A–Z), @, #, or \$. The remaining characters can be uppercase letters (A–Z), numbers (0–9), @, #, or \$. See <i>TPF ACF/SNA Network Generation</i> for more information.</p>
Tape Record Migration	<p>Tape record migration supports the use of additional record types for tape support. Ordinal-based processor unique fixed file record types are replaced with file address compute (FACE) program table processor unique fixed file record types. Using these additional record types removes some of the complexity of adding a processor to your complex. See “Tape Record Migration (APAR PJ26577)” on page 690 for more information about the additional #TPLBL, #TDTDR, and #IBMMP4 fixed file record types.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Threads Precursor	<p>Threads precursor provides the following in the TPF 4.1 system:</p> <ul style="list-style-type: none"> An address space change. <p>The TPF 4.1 system will allocate enough frames and entry control blocks (ECBs) to cover the total size of the ISO-C stack, the ECB heap, and the ECB private area of 1 MB.</p> <ul style="list-style-type: none"> The YIELD macro. <p>This macro is used to give up control of the processor and allow processing of other entries. The entry is placed on the specified processor list.</p> <ul style="list-style-type: none"> longjmp and setjmp enhancements. <p>The longjmp and setjmp functions are not restricted to the same dynamic load module (DLM). Additional programming considerations were added.</p> <p>See "Threads Precursor (APAR PJ24530)" on page 324 for more information about Threads Precursor.</p>
TPF Advanced Peer-to-Peer Networking (TPF/APPN) Support	<p>With TPF/APPN support, the TPF 4.1 system can connect to an Advanced Peer-to-Peer Networking (APPN) network as an end node (EN).</p> <p>See "TPF Advanced Peer-to-Peer Networking (TPF/APPN) Support (APAR PJ19949)" on page 148 for more information about TPF/APPN support.</p>
TPF Application Requester Enhancements	<p>The TPF 4.1 system supports connections to distributed relational database architecture (DRDA) level-1 compliant platforms in addition to the IBM Multiple Virtual Storage (IBM MVS) system for applications using structured query language (SQL). These DRDA platforms include the IBM RISC System/6000 (RS/6000) and IBM Personal System/2 (PS/2) platforms. Run-time binding, dynamic SQL verbs, expanded (double-byte and mixed-byte) character representations, and expanded diagnostics are available as well.</p> <p>See "TPF Application Requester Enhancements (APAR PJ23931)" on page 294 for more information about TPF Application Requester Enhancements.</p>
TPF Assembler Debugger for VisualAge Client	<p>TPF Assembler Debugger for VisualAge Client is a workstation development environment that is similar to TPF C Debugger for VisualAge Client with the following two main differences:</p> <ul style="list-style-type: none"> It debugs programs at the assembler level. The disassembler does not require hooks to start tracing programs. <p>Like TPF C Debugger for VisualAge Client, this remote development environment offers easy-to-use tools that provide you with an effective means of increasing your programming productivity when developing applications for the TPF 4.1 system. For example, TPF Assembler Debugger for VisualAge Client provides a disassembled view or a corresponding listing view of the program that you are tracing.</p> <p>Note: TPF Assembler Debugger for VisualAge Client does not support 24-bit file resident or private programs.</p> <p>The loaders enhancement for the TPF Assembler Debugger for VisualAge Client gives you the ability to load ADATA files used by the assembler debugger rather than using trivial file transfer protocol (TFTP) to transfer ADATA files to the online TPF system. Loaders enhancement for the TPF Assembler Debugger for VisualAge Client provides the following benefits:</p> <ul style="list-style-type: none"> Eliminates the need to remember and specify the path and name of the ADATA file in the hierarchical file system (HFS). The debugger finds and uses the ADATA file loaded by the TPF loader. E-type loader support for ADATA files allows the assembler debugger to automatically use the correct ADATA file for any version of a program. Provides a foundation for changes to the assembler debugger that enable tracing in a multiple database function (MDBF) environment by loading ADATA files to a specific subsystem. <p>See "Loaders Enhancement for the TPF Assembler Debugger for VisualAge Client (APAR PJ27422)" on page 881 for more information about loaders enhancement for the TPF Assembler Debugger for VisualAge Client.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
TPF C Debugger for VisualAge Client	<p>TPF C Debugger for VisualAge Client, which is part of VisualAge TPF for Windows NT, is a workstation development environment that provides you, the C and C++ programmer, with an effective means of increasing your programming productivity when developing applications for the TPF 4.1 system. This remote development environment provides easy-to-use tools that enable you as a TPF developer to improve quality and productivity by writing, debugging, and analyzing the performance of your applications in a team environment.</p> <p>See "TPF C Debugger for VisualAge Client (APAR PJ25632)" on page 537 for more information about TPF C Debugger for VisualAge Client.</p> <p>TPF C Debugger for VisualAge Client was enhanced by APAR PJ25982 to work with a new version of the VisualAge for TPF user interface code that resides on your workstation. To use APAR PJ25982, you must install VisualAge for TPF corrective service diskette (CSD) 14 before applying the APAR. VisualAge for TPF CSD 14 is compatible with the PUT 9 version of TPF C Debugger for VisualAge Client as well as this APAR.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
TPF Collection Support	<p>TPF collection support (TPFCS) is a database manager service that enables application programs running on TPF to create, modify, and access collections. Collections are abstract representations of data. TPFCS provides three collection lifetimes:</p> <ul style="list-style-type: none"> • Persistent long-term • Persistent short-term • Temporary. <p>Collections are said to be <i>persistent</i> if they maintain their state beyond the life of the entry control block (ECB) that creates them. Those which are <i>temporary</i> maintain their state and are accessible only for the life of the ECB that creates them.</p> <p>TPFCS transparently integrates database functionality with the application program and eliminates the need for data translation routines.</p> <p>See "TPF Collection Support (APAR PJ25098)" on page 403 for more information about TPFCS.</p> <p>APAR PJ25332 provides the following TPFCS enhancements:</p> <ul style="list-style-type: none"> • Recoup has been made more robust: <ul style="list-style-type: none"> – Embedded file address support has been added to TPFCS recoup. – TPFCS recoup processing now uses an enhanced control mechanism with a user-defined number of entry control blocks (ECBs) activated. If an ECB is available for use by recoup, it will be used immediately without waiting for any other ECBs to end. • Performance enhancements have been added. • Record information for TPFCS can now be displayed. • Two new collection types have been added: <ul style="list-style-type: none"> – Sorted set – Key sorted bag. • New application programming interfaces (APIs) for processing binary large object (BLOB) collections have been added. <p>See "TPF Collection Support Enhancements (APAR PJ25332)" on page 526 for more information about TPFCS enhancements.</p> <p>APAR PJ26143 provides the following TPFCS enhancements:</p> <ul style="list-style-type: none"> • New APIs and commands for adding, displaying, using, and removing alternate key paths for persistent keyed and persistent sorted collections have been added. • Support for the ZBROW PATH command, which displays the following: <ul style="list-style-type: none"> – The actual path information for keys and relative record numbers (RRNs) – The actual starting location of an array element or relative byte address (RBA). • The ZBROW DISPLAY command has been updated so the contents of a directory entry for a specific RRN can be displayed. • Support for reusing released long-term pool records has been added. • The maximum number of bytes that can be managed for a binary large object (BLOB) has been increased from 32 KB to 4 MB. <p>See "TPF Collection Support Enhancements (APAR PJ26143)" on page 566 for more information about TPFCS enhancements.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
TPF Collection Support – Continued	<p>APAR PJ26887 provides support for the ZBROW RECOUP command, which has been added to help manage recoup indexes.</p> <p>See “TPFCS Recoup Index Command Support (APAR PJ26887)” on page 717 for more information about the TPFCS recoup index command.</p> <p>APAR PJ27380 provides the following TPFCS enhancements:</p> <ul style="list-style-type: none"> • New APIs and commands for deleting, migrating, and re-creating data stores, and for retrieving and migrating collections have been added. • The ZBROW COLLECTION command now allows immediate processing of collections marked for deletion and also allows emptying of collections. <p>See “PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)” on page 1269 for more information about APAR PJ27380 and see “TPF Collection Support Enhancements (APAR PJ26143)” on page 566 for more information about other TPFCS enhancements.</p> <p>APAR PJ28386 provides the following TPFCS enhancements:</p> <ul style="list-style-type: none"> • The ZBROW ALTER command has been updated to allow you to: <ul style="list-style-type: none"> – Add new elements to a collection in the data store – Modify elements in a collection – Delete elements from a collection. • The ZBROW DISPLAY command has been updated to allow you to display an element of a collection based on the qualification of ZBROW. • The ZBROW QUALIFY command has been updated to allow you to: <ul style="list-style-type: none"> – Set additional parameters for subsequent ZBROW ALTER and ZBROW DISPLAY command requests – Reset the parameters of the ZBROW qualification. <p>See “PUT 16 Interface Changes by Authorized Program Analysis Report (APAR)” on page 1249 for more information about TPFCS enhancements and see <i>TPF Operations</i> for more information about the ZBROW commands.</p>
TPF Data Event Control Block (DECB) Support	<p>Before TPF DECB support, the TPF 4.1 system restricted the number of entry control block (ECB) data levels (D0–DF) that were available for use to 16 (the number of data levels defined in the ECB). With TPF DECB support, that restriction has been removed. TPF DECB support also provides the following:</p> <ul style="list-style-type: none"> • 8-byte file addressing in 4x4 format, which provides standard 4-byte file addresses (FARF3, FARF4, or FARF5) to be stored in an 8-byte field • New interfaces to allow TPF programs to access file records with a DECB instead of a data level in an ECB • New macros for managing DECBs • The ability for you to associate symbolic names with each DECB; this allows different components of a program to easily pass information in core blocks attached to a DECB. <p>See “TPF Data Event Control Block Support (APAR PJ27393)” on page 923 for more information about TPF DECB support.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
TPF Internet Server Support	<p>TPF Internet server support enables the TPF 4.1 system to run Internet servers, such as a Web server, by providing:</p> <ul style="list-style-type: none"> • An Internet daemon that manages inbound Internet traffic for Internet servers on the TPF 4.1 system; Internet servers are referred to as Internet server applications in the TPF publications • A Trivial File Transfer Protocol (TFTP) server as a file transfer server to send and receive files, such as Web site contents • The ability to retrieve data from the TPF 4.1 system by starting TPF applications from the Internet • A process model to assist with the porting of Internet server applications that are compliant with Portable Operating System Interface for Computer Environments (POSIX) standards from other platforms such as UNIX. <p>See "TPF Internet Server Support (APARs PJ25589 and PJ25703)" on page 504 for more information about TPF Internet server support.</p>
TPF Internet Mail Server Support	<p>TPF Internet mail server support provides a set of servers that implement the standard Internet mail protocols on the TPF 4.1 system. Users, or mail clients, interact with the TPF Internet mail servers to send and retrieve Internet mail, also known as electronic mail (e-mail).</p> <p>The TPF 4.1 system supports the following standard Internet protocols:</p> <ul style="list-style-type: none"> • Simple Mail Transfer Protocol (SMTP) • Internet Message Access Protocol (IMAP) Version 4 • Post Office Protocol (POP) Version 3. <p>See "TPF Internet Mail Server Support (APARs PJ27784 and PJ27865)" on page 973 for more information.</p> <p>TPF Internet mail server enhancements for PUT 15 improve the performance and functionality of TPF Internet mail server support as follows:</p> <ul style="list-style-type: none"> • The number of I/O requests and the path length for processing each piece of mail were reduced significantly, improving the overall performance of the TPF Internet mail servers. • The SYSLOG parameter was added to the ZMAIL command to allow you to start or stop logging mail messages to the syslog daemon. • The mail function was expanded to allow you to access Internet mail through the use of file addresses on the TPF database. Previously, you could only access mail through the use of files on the TPF file system. These changes make it easier for you to access Internet mail with TPF applications that are written in assembler language. <p>See "TPF Internet Mail Server Enhancements for PUT 15 (APAR PJ27966)" on page 1104 for more information.</p> <p>APAR PJ28396 continues to improve the performance of TPF Internet mail server support as follows:</p> <ul style="list-style-type: none"> • Additional reductions in the number of I/O requests and the path length for processing each piece of mail were made to further improve the overall performance of the TPF Internet mail servers. • The MAX_HANGING_RECEIVE_MANAGERS parameter was added to the TPF configuration file <code>/etc/tpf_mail.conf</code>. This parameter reduces overhead by starting a specified number of permanent mail ECBs to accept mail items and put them on the delivery queue. <p>See "PUT 16 Interface Changes by Authorized Program Analysis Report (APAR)" on page 1249 for more information about APAR PJ28396. See <i>TPF Transmission Control Protocol/Internet Protocol</i> for more information about TPF Internet mail server support.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
TPF MQSeries Clear Queue Support and Display Enhancements	<p>TPF MQSeries clear queue support and display enhancements includes the following:</p> <ul style="list-style-type: none"> • The ZMQSC CLEAR QL command was created to allow you to remove all messages from a local normal queue. • The ZMQSC DISPLAY command was updated to allow you to display a channel or queue that has certain characteristics. <p>See "TPF MQSeries Clear Queue Support and Display Enhancements (APAR PJ28339)" on page 1230 for more information.</p>
TPF MQSeries Local Queue Manager Support	<p>TPF MQSeries local queue manager support implements a local queue manager on the TPF 4.1 system. A message queue interface (MQI) client was implemented previously to allow applications to interact with queue managers that are remote to the TPF 4.1 system. See "Message Queue Interface (MQI) Client (APAR PJ22434)" on page 268 for more information about the MQI client. With TPF MQSeries local queue manager support, TPF applications can now interact with the local queue manager or with the remote queue manager server.</p> <p>See "TPF MQSeries Local Queue Manager Support (APAR PJ25780)" on page 483 for more information.</p> <p>Additional TPF MQSeries local queue manager support enhancements include the following:</p> <ul style="list-style-type: none"> • Support for alias queues was added. • The trace function was enhanced. • Additional MQSeries application programming interface (API) functions were added. • You can now disable and enable TPF MQSeries receiver channels. <p>See "TPF MQSeries Local Queue Manager Support Enhancements (APAR PJ26156)" on page 614 for more information.</p> <p>Turbo enhancements for TPF support of MQSeries local queue manager include the following:</p> <ul style="list-style-type: none"> • A TPF resource manager to control MQSeries application programming interfaces (APIs) was created. • Processor unique queues now reside in memory and provide enhanced performance. <p>See "Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (APAR PJ27023 and APAR PJ27050)" on page 744 for more information.</p> <p>TPF MQSeries enhancements include the following:</p> <ul style="list-style-type: none"> • TPF MQSeries client Transmission Control Protocol/Internet Protocol (TCP/IP) support (APAR PJ27230) • TPF MQSeries user exit support (APAR PJ27231). • TPF MQSeries slow queue sweeper and move support (APARs PJ27351 and PJ27431) <p>See "TPF MQSeries Enhancements (APARs PJ27230, PJ27231, PJ27351, and PJ27431)" on page 937 for more information.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
TPF MQSeries Server Support	<p>TPF MQSeries server support provides the following:</p> <ul style="list-style-type: none"> • TPF MQSeries local queue manager server support • TPF MQSeries database rebuild support. <p>TPF MQSeries local queue manager server support allows an MQSeries client to connect to a TPF 4.1 system by using a server connection channel. MQSeries clients can now pass MQSeries application programming interfaces (APIs) to the TPF 4.1 system, which can act as the server, run the API, and return code to the client. TPF MQSeries user exits and APIs have been added and existing APIs have been enhanced as part of this support.</p> <p>TPF MQSeries database rebuild support provides the ZMQSC DBREBUILD command, which allows you to rebuild TPF MQSeries definitions in the current file address reference format (FARF) on the TPF system without losing those definitions and without losing any messages that are currently on queue.</p> <p>See "TPF MQSeries Server Support (APAR PJ28435)" on page 1235 for more information.</p>
TPF Performance Execution Trace Analyzer for VisualAge Client	<p>TPF Performance Execution Trace Analyzer for VisualAge Client is a workstation development environment that provides you, the C and C++ programmer, with a means of analyzing performance data for your TPF programs. Performance statistics are available as a detailed table by class, a dynamic call graph, a call nesting structure, and a time line.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
TPF Support for VisualAge Client	<p>TPF Support for VisualAge Client includes the following three small programming enhancements (SPEs) for program update tape (PUT) 11:</p> <p>Debug on system error (APAR PJ26600) helps you to recover after getting a system error while running an application program. When you see a problem in the program, debug on system error gives you the opportunity to correct the error and to continue testing the program.</p> <p>The universal data display (APAR PJ26581) provides a single interface to display entry control block (ECB) data for the TPF Assembler Debugger for VisualAge Client or TPF C Debugger for VisualAge Client. The ECB data is more comprehensive and more readable with the universal data display (UDD) than with displays that were previously available; the UDD provides for views of the ECB work areas, levels, and other selected fields. The UDD shows you a seamless view of the ECB no matter which debugger is active.</p> <p>Trace on production (APAR PJ26666) offers enhancements to the ZDEBUG command, including the ability to disable the TPF Assembler Debugger for VisualAge Client or TPF C Debugger for VisualAge Client. You can also display trace registration information for one or both of the trace-by-program and trace-by-terminal tables whether the entry status is active or nonactive. You can also clear the trace entry for a specified Internet Protocol (IP) address.</p> <p>See “TPF Support for VisualAge Client (APARs PJ26600, PJ26581, and PJ26666)” on page 700 for more information.</p> <p>Enhancements to TPF Support for VisualAge Client include the following items:</p> <ul style="list-style-type: none"> • Macro breakpoints entered in either the TPF C Debugger for VisualAge Client or the TPF Assembler Debugger for VisualAge Client are in effect for both C and assembler programs. • Deferred line breakpoints for the TPF Assembler Debugger for VisualAge Client are saved between debugging sessions so that you need to set them once only and they are available during any following debugging sessions. • Enter/back support for the TPF Performance Execution Trace Analyzer for VisualAge Client means that when a transaction is run through the performance analyzer, the analyzer will record information for assembler segments as well as C and C++ programs. • PRINT NOGEN support addresses the ability to generate assembler debugger ADATA files, which allow macro expansions to be suppressed. <p>See “Enhancements to TPF Support for VisualAge Client (APAR PJ27383)” on page 777 for more information.</p>
TPF Transaction Services	<p>Transaction Processing Facility (TPF) transaction services includes support for a transaction manager (TM), resource managers (RMs), log manager, and recovery log to ensure a consistent view of the database. Applications call a set of assembler macros or C functions to begin, commit, roll back, suspend, or resume a transaction in a commit scope.</p> <p>See “TPF Transaction Services (APAR PJ25094)” on page 423 for more information about TPF transaction services.</p> <p>Additional TPF transaction services enhancements include the ability for you to define the location of the recovery log to an application subsystem rather than to the basic subsystem (BSS).</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Transmission Control Protocol/Internet Protocol (TCP/IP)	<p>With TCP/IP support, socket application programs on the TPF 4.1 system can use the socket application programming interface (API) to communicate with remote socket applications. The TPF 4.1 system can connect to a TCP/IP network in the following ways:</p> <ul style="list-style-type: none"> • Through offload devices using TCP/IP offload support. The original support required an IBM 3172 Model 3 Interconnect Controller. See "Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)" on page 221 for more information about TCP/IP offload support. APAR PJ24746 added support that allows Cisco 7500 series routers to be connected to your TPF 4.1 system as offload devices. • Directly to 3745 and 3746 Internet Protocol (IP) routers using TCP/IP native stack support. See "TCP/IP Native Stack Support (APAR PJ26683)" on page 626 for more information about TCP/IP native stack support. • Through Open Systems Adapter (OSA)-Express cards. <p>Functions common to TCP/IP offload support and TCP/IP native stack support include:</p> <ul style="list-style-type: none"> • A socket sweeper program, which closes inactive sockets after a specified period of time • Trace tools, such as the PING and TRACEROUTE programs, which are activated by the ZDTCP command • User exits to allow you to perform functions such as activating your socket applications and deciding which remote connection requests will be accepted • Subsystem support, which allows socket applications running in all subsystems to issue socket API function calls. <p>TCP/IP native stack support also provides the following additional functions:</p> <ul style="list-style-type: none"> • Improved network throughput • Support for more socket options • Support for a new TPF-unique socket API function, <code>activate_on_accept</code> • Support for a full function IP trace facility. <p>TCP/IP PUT 12 Enhancements has support for both IP routing tables (APAR PJ26890) for TPF TCP client applications and TCP/IP network tools (APAR PJ26904).</p> <ul style="list-style-type: none"> • IP routing tables benefits TCP/IP native stack support by enabling TPF client socket applications to connect to remote servers without having to explicitly bind to a specific TPF local IP address or rely on a single default local IP address when TPF is connected to multiple networks. The IP address of the remote server can be associated with any local IP address defined on a given TPF processor. The ability of a TPF processor to connect to multiple IP networks is also enhanced. By removing the dependency on a single default local IP address, TPF processors have greater flexibility in connecting to multiple IP networks. The ZTRTE command manages the IP routing tables. • TCP/IP network tools benefits TPF TCP/IP native stack support by providing the ZSOCK command to display socket control block information or a summary report of sockets, or to selectively deactivate a specific socket or subset of sockets. <p>See "Transmission Control Protocol/Internet Protocol (TCP/IP) PUT 12 Enhancements (APARs PJ26890 and PJ26904)" on page 734 for more information about TCP/IP Put 12 enhancements.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Transmission Control Protocol/Internet Protocol (TCP/IP) – Continued	<p>Open Systems Adapter (OSA)-Express support is now enabled on the TPF 4.1 system. An Open Systems Adapter is integrated hardware (the OSA-Express card) that combines the functions of an IBM System/390 (S/390) input/output (I/O) channel with the functions of a network port to provide direct connectivity between IBM S/390 applications and remote Transmission Control Protocol/Internet Protocol (TCP/IP) applications on the attached networks. OSA-Express is the third generation of OSA and provides the following enhancements:</p> <ul style="list-style-type: none"> • You can dynamically configure an OSA-Express card by using the ZOSAE command to manage OSA-Express connections. • The queued direct I/O (QDIO) protocol is used to communicate between the TPF 4.1 system and an OSA-Express card by sharing memory and eliminating the need for real I/O operations (channel programs) for data transfer between them. The load on your I/O processor is reduced, path lengths in the TPF 4.1 system are reduced, and throughput is increased. • OSA-Express support enables the TPF 4.1 system to connect to high bandwidth TCP/IP networks such as the Gigabit Ethernet (GbE or GENET) network. • OSA-Express support provides virtual IP address (VIPA) support to eliminate single points of failure in a TCP/IP network. • Movable virtual IP address (VIPA) support provides the ability to balance TCP/IP workloads across processors in the same loosely coupled complex by using the ZVIPA command. <p>See “OSA-Express Support (APAR PJ27333)” on page 907 for more information about OSA-Express support.</p> <p>Domain Name System (DNS) support provides the following:</p> <ul style="list-style-type: none"> • Allows the TPF 4.1 system to process incoming DNS requests, enabling load balancing of the TCP/IP connections in a loosely coupled complex. • Allows you to customize the load balancing algorithms by using the UDNS user exit. • Enhances DNS client performance of your TPF 4.1 system by providing a cache to store information received from remote DNS servers. <p>See “Domain Name System (DNS) Support (APAR PJ27268)” on page 766 for more information about Domain Name System (DNS) support.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Transmission Control Protocol/Internet Protocol (TCP/IP) – Continued	<p>TCP/IP enhancements for PUT 14 increase the usability and effectiveness of TCP/IP native stack support and OSA-Express support with the following APARs:</p> <ul style="list-style-type: none"> • Display enhancements (APAR PJ27451), which adds the following: <ul style="list-style-type: none"> – The ZTTCP CLEAR command, to clear TCP/IP statistics. – The output of the ZTTCP DISPLAY command with the STATS parameter specified now includes the number of TCP sockets that have been cleaned up because of retransmit timeouts. – The output of the ZTTCP DISPLAY command with the ALL parameter specified now includes the symbolic device addresses (SDAs) for Open Systems Adapter (OSA)-Express connections. – The output of the ZVIPA command with the IP parameter specified now includes which CPUs have the specified movable virtual IP address (VIPA) defined to them. • Movable VIPA program interface (APAR PJ27491 and APAR PJ27714), which provides additional ways to move a VIPA from one processor to another by use of application programs. • Individual IP trace support (APAR PJ27617), which provides individual IP trace tables for tracing packets to and from specific remote nodes and also provides the option to turn off the tracing of Routing Information Protocol (RIP) messages. • Fast Ethernet OSA-Express support (APAR PJ27625), which allows the TPF 4.1 system to connect to Fast Ethernet (FENET) OSA-Express adapters. • Diagnostic tools (APAR PJ27650), which provides the operator with the ability to see if a given socket or an OSA-Express connection is hung. • TCP/IP activate on receipt load balancing (APAR PJ27679), which allows load balancing of applications that use the <code>activate_on_receipt</code> or <code>activate_on_receipt_with_length</code> function and can be run on all I-streams. <p>See “TCP/IP Enhancements for PUT 14 (APARs PJ27451, PJ27491, PJ27714, PJ27617, PJ27625, PJ27650, PJ27679, and PJ27859)” on page 960 for more information about TCP/IP enhancements for PUT 14.</p>
Transmission Control Protocol/Internet Protocol (TCP/IP) – Continued	<p>TCP/IP enhancements for PUT 15 increase the usability and functionality of TCP/IP native stack support, OSA-Express support, and DNS support with the following APARs:</p> <ul style="list-style-type: none"> • Internet daemon listen backlog support (APAR PJ28026) allows you to specify a listen backlog value for TCP Internet server applications. • An operator interface to resolve host names and IP addresses (APAR PJ28029) allows you to resolve a host name to an IP address or an IP address to a host name with the ZDTCP command. • IP packet network prioritization (APAR PJ28034) allows you to define a type of service (TOS) value for the network priority of outbound TPF IP packets. • OSA-Express polling enhancements (APAR PJ28064) improves the efficiency of the Open Systems Adapter (OSA) polling process to increase network throughput through OSA-Express connections. This enhancement also allows you to tune the number of OSA read buffers to maximize the message processing capacity of each OSA-Express connection. • The OSA-Express gateway selection enhancement (APAR PJ28067) improves the way an OSA-Express gateway is selected during IP routing table processing. • DNS server wildcard support (APAR PJ28093) allows you to specify a wildcard character at the beginning of a host name in the <code>/etc/host.txt</code> file that is used to build the TPF host name table. Using a wildcard character allows you to define multiple host names with a single entry in the <code>/etc/host.txt</code> file. • Greater than 32 KB socket send support (APAR PJ28087) allows you to send up to 1 GB of data on a TCP socket with each send API call. Previously, you could send a maximum of 32 KB of data. <p>See “TCP/IP Enhancements for PUT 15 (APARs PJ28026, PJ28029, PJ28034, PJ28064, PJ28067, PJ28093, and PJ28087)” on page 1094 for more information about TCP/IP enhancements for PUT 15.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Transmission Control Protocol/Internet Protocol (TCP/IP) – Continued	<p>TCP/IP enhancements for PUT 16 increase the usability and functionality of TCP/IP native stack support and Simple Network Management Protocol (SNMP) agent support with the following APARs:</p> <ul style="list-style-type: none"> • SNMP MIB display support (APAR PJ28168) allows you to use the ZSNMP command to display Management Information Base (MIB) variables from the TPF 4.1 system. You can also save the display information to a file. • TCP/IP network services database support (APAR PJ28195) allows you to: <ul style="list-style-type: none"> – Define TCP/IP server applications so that you can use the getservbyname socket API to retrieve the port number for an application and the getservbyport socket API to retrieve the name of an application. – Define a quality of service (QoS) differentiated services codepoint value for each application. – Identify the applications for which you want to collect data, such as message, byte, and packet counts. • TCP/IP packet filtering firewall support (APAR PJ28213) provides added security for your Internet server applications by allowing you to define a set of rules to filter inbound packets destined for TPF applications. You can also use the IP trace facility to identify packets that violate the packet filtering rules or cause other exception conditions. • Fast TCP retransmit support (APAR PJ28344) improves TCP/IP performance by detecting lost messages in the network faster. <p>See “TCP/IP Enhancements for PUT 16 (APARs PJ28168, PJ28195, PJ28213, and PJ28344)” on page 1216 for more information about TCP/IP enhancements for PUT 16.</p>
TCP/IP Support for the TPF Application Requester	<p>The TPF Application Requester (TPFAR) feature has been enhanced to support connectivity by using Transmission Control Protocol/Internet Protocol (TCP/IP). This adds an additional level of operability with relational databases that use Distributed Relational Database Architecture (DRDA) level 3. Data can now be shared between database servers that are compliant with DRDA level 3 and a TPF application using the TPFAR feature. The communication manager providing TCP/IP network protocol support (CMNTCPIP) and the security manager (SECMGR) are supported at DRDA level 5. No other features of DRDA level 3 have been added.</p> <p>An existing TPFAR application will continue to run without the need to recompile, reassemble, or reload. In addition, application programs that currently use the TPFAR feature can take advantage of new functions without recompiling, but rather by reconfiguring the internal Structured Query Language (SQL) database management system directory (SDD) by using the ZSQLD command to specify connection information.</p> <p><i>Hotcons</i> are now supported to include TCP/IP socket connections. Previously, only hot conversations for LU 6.2 were supported. The TPF socket sweeper is disabled while connections are in the hotcon table (HCT).</p> <p>Support is provided for both offload and native stack devices.</p> <p>See “Transmission Control Protocol/Internet Protocol Support for the TPF Application Requester (APAR PJ27079)” on page 725 for more information about TCP/IP support for the TPF Application Requester.</p>
Unlimited Pool Segment Support	<p>Unlimited pool segment support enhances the recoup, pool directory update (PDU), pool generation, pool reallocation, and pool deactivation utilities in a TPF 4.1 system environment by doing the following:</p> <ul style="list-style-type: none"> • Eliminating pool segment restrictions • Increasing performance • Simplifying pool generation and reallocation procedures.

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
Virtual File Access (VFA) Synchronization	<p>Virtual file access (VFA) is a storage management facility that dynamically allocates frequently referenced records to main storage. Adding VFA synchronization to your TPF 4.1 system enhances current VFA support by providing VFA synchronization candidacy support for fixed file records and pool records that are synchronized across processors.</p> <p>Before VFA synchronization:</p> <ul style="list-style-type: none"> • Very few records (except for read-only data records and processor-unique records) were good candidates for VFA in a loosely coupled environment. • Synchronization of records did not exist. If a record located in the VFA area of several processors is updated on one processor, the other processors then refer to old data until a FIND and HOLD macro is issued. Although you may find this process acceptable for records that are seldomly updated but frequently referenced (such as credit verification files that are updated only once a week), you may not find it acceptable for records that are accessed and updated frequently. Such records may include fare data in an airline application program. <p>With VFA synchronization:</p> <ul style="list-style-type: none"> • There is an effective way in a loosely coupled environment to support VFA synchronization candidacy for records that are updated by application programs during normal system operation. VFA synchronization provides the capability to synchronize updates to frequently referenced records in VFA across all processors in a complex. This synchronization ability allows a wider range of data, such as fare data in an airline application, to be accurately and quickly accessible to application programs on all processors in a loosely coupled environment. <p>Synchronization across processors occurs when each processor is notified as a record is modified; then, each processor referencing that record is notified to refresh its copy so that the record is always current. The synchronization is done by using the locking capabilities of the IBM 3990 Model 3 or later models with the multi-path lock facility (MPLF) installed.</p> <ul style="list-style-type: none"> • Overall TPF 4.1 system performance is improved by allowing increased use of VFA. This lowers the number of physical input/output (I/O) operations performed from the TPF 4.1 system to attached DASD control units and improves the effectiveness of accessing data and communication between application programs, which results in quick response times even during high system activity. <p>See "Virtual File Access (VFA) Synchronization (APAR PJ25094)" on page 386 for more information about VFA synchronization.</p>
Virtual Storage Access Method (VSAM) Database Support	<p>Virtual storage access method (VSAM) database support for the TPF 4.1 system permits you to access a VSAM database from an IBM multiple virtual storage (MVS) system in read-only format using TPF general data set (GDS) support. This allows TPF applications to access VSAM data sets.</p> <p>See "Virtual Storage Access Method (VSAM) Database Support (APAR PJ26150)" on page 606 for more information about VSAM database support.</p>
XML Parser	<p>The XML parser allows you to read (parse) Extensible Markup Language (XML) data on the TPF 4.1 system. The XML Parser for C++ (XML4C) Version 3.1.2 was ported to the TPF 4.1 system. This parser is XML Version 1.0 compliant and allows you to do the following:</p> <ul style="list-style-type: none"> • Parse XML documents using the Document Object Model (DOM) Version 1.0 specification • Parse XML documents using the Simple API for XML (SAX) Version 1.0 specification • Parse XML documents with or without validation against a specified Document Type Definition (DTD). <p>See "XML Parser (APAR PJ27634)" on page 1000 for more information about the XML parser.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
XML4C Parser 3.5.1	<p>XML4C parser 3.5.1 allows your applications to read (parse) and write Extensible Markup Language (XML) data on the TPF 4.1 system. XML Parser for C++ (XML4C) Version 3.5.1 was ported to the TPF 4.1 system, is XML Version 1.0 compliant, and allows TPF 4.1 applications written in C++ language to do the following:</p> <ul style="list-style-type: none"> • Parse XML documents using the Document Object Model (DOM) Level 1.0 or 2.0 specification. You can also parse XML documents using the experimental IDOM API, but this is not formally supported by the XML4C parser and, therefore, not formally supported on the TPF 4.1 system. • Parse XML documents using the Simple API for XML (SAX) Version 1.0 or 2.0 specification. • Parse XML documents with or without validation against a specified Document Type Definition (DTD). • Parse XML documents with or without validation against a document written in the XML Schema language. <p>Note: XML Schema support is experimental and only includes a subset of the W3C Schema language.</p> <p>See "XML4C Parser 3.5.1 (APAR PJ28176)" on page 1244 for more information about XML4C parser 3.5.1.</p>
8-Byte File Address Support	<p>FARF6 is the exploitation of 7 of the 8 bytes in the file address field, which expands addressing capacity to a maximum of 64 petabytes, or PB (64 PB equals 72 057 594 037 927 936 records or 2⁵⁶). 8-byte file address support includes the following:</p> <ul style="list-style-type: none"> • Two modes of 8-byte file addressing: 4x4 format and file address reference format 6 (FARF6). FARF6 addresses can be used when the TPF 4.1 system is in either stage FARF3/4 or stage FARF4/5. The FARF6 address format has a spare byte reserved for use by IBM in byte 0, which must be 0 and a fixed 2-byte universal format type (UFT) (bytes 1 and 2). • An 8-byte standard header (c\$std8.h). • Updated application programming interfaces (APIs) and macros that handle 8-byte file addresses. • The definition of a new 4-K duplicated long-term FARF6 (4D6) pool type. • The increase of pool ordinal numbers (PSONs) and counts of available pools to 8 bytes. • Changes to commands that handle file addresses and record type ordinals. • Updates to recoup for the processing of either 4- or 8-byte file addresses. • Updates to TPF collection support (TPFCS) so 8-byte file addresses can be used wherever pool addresses are stored. • Changes to the FACE table generator (FCTBG). • An optional input card (Path card) can now be included in the load deck portion of the offline loader job control language (JCL) that is used to run ALDR and TLDR. This card will specify the hierarchical file system (HFS) location of the FACE table (FCTB) in program object format. In addition, changes have been made to the Load FCTB card to specify the HFS location of the FCTB in program object format. • Changes to offline procedures, including new parameters on the RAMFIL and UFTFTI SIP macros that allow you to define FARF6 file addresses. • Changes to fixed file records. • Updates to database reorganization (DBR). • Updates to continuous data collection (CDC) to add additional columns for 4D6 pools. • Updates to exception recording and logging. • Support for test tools. <p>See "8-Byte File Address Support (APAR PJ28097)" on page 1111 for more information about 8-byte file address support.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
16-Way Tightly Coupled Multiprocessor	<p>To fully exploit the capacity of 10-way tightly coupled processors as well as future processors, the TPF 4.1 system has been modified to accommodate processors with as many as 16 central processing units (CPUs) or I-streams. The current restriction of 8 I-streams has been removed. In addition, to support the increase in I-streams, the FACE table (FCTB) has been modified to reduce its size and conserve space.</p> <p>See “16-Way Tightly Coupled Multiprocessor (APAR PJ26146)” on page 574 for more information about 16-way tightly coupled multiprocessor.</p>
32-Way Loosely Coupled Pool Support	<p>Currently, the TPF 4.1 system is limited to 8-way loosely coupled processors. 32-way loosely coupled pool support is another step toward having 32-way loosely coupled processors and provides the following:</p> <ul style="list-style-type: none"> • Pool data structure enhancements: <ul style="list-style-type: none"> – Expands processor unique data fields – Reserves additional space for future pool sections – Moves keypoint data to new fixed file records – Converts the short-term processor control record (STPCR) fixed file records from ordinal-based processor unique allocations to file address compute (FACE) program processor unique fixed file record types. • Extensions to pool data structure access functions and user exits. • Coexistence of processors running 32-way loosely coupled pool support and pool expansion (PXP). <p>The basic migration approach used is an extension of the techniques developed by PXP support in PUT 2.</p> <p>Note: 32-way loosely coupled pool support for PUT 14 does not remove the constraint of a maximum of 8 loosely coupled processors. Additional functions are required to complete support for 32-way loosely coupled processors.</p> <p>See “32-Way Loosely Coupled Pool Support (APAR PJ27686)” on page 1006 for more information.</p>

Table 3. Areas with Changes or New Functions Found on Program Update Tapes (PUTs) (continued)

Area with Changes or New Functions	Description of the Changes or New Functions
32-Way Loosely Coupled Processor Support	<p>32-way loosely coupled processor support removes the final restrictions that limit TPF 4.1 to 8-way loosely coupled processors. With 32-way loosely coupled processor support, a TPF 4.1 system can support as many as 32 processors in a loosely coupled configuration. 32-way loosely coupled processor support provides the following:</p> <ul style="list-style-type: none"> • Multi-Processor Interconnect Facility (MPIF) enhancements: <ul style="list-style-type: none"> – #HDREC record type to expand of the number of records and fields that contain processor information – #PDREU record type to expand path information for additional processors – ZMPIF PDR command ALL parameter to initialize all processors. • Internet daemon configuration file (IDCF) has been expand with the #IDCF1 record type to support additional processors. • The CLAW device table (CDT) and the TCP/IP configuration table (ITCPC) have been moved to the processor unique #IBMMP4 fixed file record type to support additional processors. • Routing control application table initialization (RCIT) record has been expanded for 32 processors. • Node control block (NCB) has been extended for 32 processors. • SNA dynamic resource definition processor masks have been extended for 32 processors. • Keypoint I (CTKI) subsystem state table has been moved to the #CN1ST record type to support additional processors. • Keypoint C (CTKC) table of terminals TPF has been expanded to allow additional entries for functional support consoles and alternate consoles • Super global storage allocation (GOA) records extended to support as many as 32 processors with 16 I-streams each. • General File (GF) and General Data Set (GDS) control structures have been moved to #IBMMP4 and #DSCRU processor unique fixed file record types. • Commit and rollback has been extended by increasing the number of #IBMM4 fixed file records for the control table (CRTB) checkpoint area and the number of log fixed file records to 32 (#RLOG1 – #RLOG32). • Interprocessor Communications (IPC) has been changed from using of 8-bit masks for representing destination processors to using lists of processors. • Keypoint accessing has been extended for 32 processors with the following: <ul style="list-style-type: none"> – #CTKX record type to support the additional processors – The keypoint status table has been reformatted so that additional processors can be supported – #KFBX0 – nnn fixed file records with a keypoint pointer record to support additional keypoint extents and copies for additional processors. • Recoup has increased the number of FC33 records, added the @@32BUSED field, and replaced #SONRPE processor unique fixed file records with #SONRPE0 – #SONRPE7 processor shared records. <p>See “32-Way Loosely Coupled Processor Support (APAR PJ27785)” on page 1168 for more information.</p>
3590 Support	<p>3590 support exploits the functions provided by the IBM 3590 control unit and the IBM 3590 device. IBM 3590 control units provide the following performance, capacity, and error rate improvements:</p> <ul style="list-style-type: none"> • Data rate of 9 MB for each second (3 times the data rate of a 3490E device) • Cartridge capacity of 10–40 GB (25 times the capacity of a 3490E cartridge) • 33 percent improved data compaction algorithm • Improved error rates because of improved media, recording techniques, error detection, and error correction methods. <p>See “3590 Support (APAR PJ24563)” on page 284 for more information about 3590 support.</p>

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs properly, you must establish the required operating environment. This chapter provides information about the minimum system configuration requirements necessary to operate the TPF 4.1 system, including:

- Hardware
- Software (programming requirements)
- Migrating from direct access storage device interprocessor communications (DASD IPC) to the Multi-Processor Interconnect Facility interprocessor communications (MPIF IPC).

Note: Some of the hardware or software products listed in this chapter may no longer be supported by IBM.

Hardware

This section contains information about the minimum hardware requirements necessary for operating the TPF 4.1 system. Additionally, the following are required:

- IBM ESA/370 or IBM ESA/390 for both the production systems and any IBM Virtual Machine (VM) system or Processor Resource/Systems Manager (PR/SM)-based test and production facilities
- Eight megabytes (8 MB) of main memory (also needed for a test system).

Note: Depending on your TPF 4.1 configuration, your results may vary.

Servers

This section discusses TPF 4.1 server support, as well as tightly coupled considerations and loosely coupled considerations for these servers.

Server Support

The TPF 4.1 system supports the following servers:

- IBM S/390 Parallel Transaction Servers (9672 E/P Models)
- IBM S/390 Parallel Enterprise Servers (9672 R Models)
- IBM S/390 Multiprise 2000 Server.

Tightly Coupled Considerations and Working Storage for These Servers

Tightly coupled considerations or working storage constraints are not unique to CMOS processors. The same considerations apply as they would for IBM 3090 or IBM ES/9000 systems. Because of the CMOS uniprocessor performance, you may give more thought to this than you might have otherwise.

Loosely Coupled Considerations for These Servers

For loosely coupled complexes, the 9672 model has the same requirements as IBM ES/9000 bipolar systems:

- Channel Redrive is required, which is activated by IMLing the processor in ESA TPF mode.

- Sysplex Timer attachment is required. For high availability Sysplex Timers, the dual port Sysplex Timer attachment card is required. For the 9672-EO1 model or the 9672-P01 model, the dual-port card is provided through RPQ 8P1656. The TOD-Sync RPQ is not supported.
- DASD control units require the limited lock facility (LLF) or concurrency filter lock facility (CFLF). If you have a coupling facility (CF), DASD control units do **not** require LLF or CFLF.

Storage Devices

This section discusses storage devices such as tape units and direct access storage devices (DASD) and DASD control units.

Tape Units

At least 4 tape units and 1 tape control unit are required by the TPF 4.1 system. The TPF 4.1 system supports all models of the following tape units and product features:

- Model 3480 Tape Unit and Model 3480 Control Unit
- Model 3490 Tape Unit and Model 3490 Control Unit.
- Model 3590 Tape Unit and Model 3590 Control Unit.

The preceding tape units and tape control unit models may provide the following product features:

- Improved Data Recording Capability (IDRC) feature
- Automatic Cartridge Loader feature (manual or automatic modes only), which maximizes your efficiency in automatic tape mounting
- Dual Control Unit Communications Coupler feature
- Multipathing
- IBM 3480 Model 2 XF Format (written and read by 3490E devices)
- IBM Enterprise Systems Connection (ESCON) channel adapter
- Enhanced Capacity Cartridge System Tape
- First-in-first-out (FIFO) control unit buffer recovery.

Notes:

1. The Model 3420 tape unit and associated 3803 control units are no longer supported.
2. The Models 3480 and 3490 tape units need at least a licensed internal code level 991862 (equivalent to A47862).
3. Model 3480 tape units do not support FIFO control unit buffer recovery. Model 3490 tape units require licensed internal code C34668K and Model 3490E tape units require licensed internal code C05568K to support FIFO control unit buffer recovery.

Tape Libraries

The TPF 4.1 system supports the following tape libraries:

- 3494 Tape Library
- 3495 Tape Library
- Magstar Virtual Tape Server (3494-B16 and 3494-B18).

Direct Access Storage Devices (DASD) and DASD Control Units

The TPF 4.1 system supports the following DASD and DASD control units:

- IBM 3350 Direct Access Storage Facility (native mode only)
- IBM 3375 Direct Access Storage Facility

- IBM 3380 Direct Access Storage Facility
- IBM 3380 CJ2 Storage Control
- IBM 3390 Models 1, 2, and 3 Direct Access Storage Device (native and emulation modes)
- IBM 3880 Models 1, 2, and 3 Storage Control
- IBM 3880 Model 23 Storage Control with the 8B0035 Record Cache RPQ
- IBM 3990 Models 1 and 2 Storage Control
- IBM 3990 Model 3 Storage Control with the Record Cache Buffer Emulation RPQ (single central processing complex (CPC) environment)
- IBM 3990 Model 3 Storage Control with the Record Cache Buffer Emulation RPQ and Limited Lock Facility/Microcode Static Switch RPQ (loosely coupled environment)
- IBM 3990 Model 3 Storage Control with the Record Cache RPQ (single central processing complex (CPC) environment)
- IBM 3990 Model 3 Storage Control with the Record Cache and Limited Lock Facility/Microcode Static Switch RPQ (loosely coupled environment)
- IBM 3990 Model 3 Storage Control with the Multi-Path Record Cache RPQ
- IBM 3990 Model 6 with Record Cache and Multi-Path Lock Facility (MPLF)
- IBM 9345 Direct Access Storage Device subsystem, direct attach (single CPC environment)
- IBM 9390 Models 1 and 2 Storage Control
- IBM Enterprise Storage Server (ESS) Model 2105 (3990 Model 3 TPF mode)
- IBM RAMAC Array DASD Models 9391 and 9392
- IBM RAMAC Array Subsystem Models 9394 and 9395.

Notes:

1. The TPF 4.1 system requires at least 2 DASD devices and 1 DASD control unit.
2. Models 3880 or 3990 require the limited lock facility (LLF) or the concurrency filter lock facility (CFLF) when part of a loosely coupled complex. If you have a coupling facility (CF), DASD control units **do not** require LLF or CFLF.

Unit Record Devices

The TPF 4.1 system supports the following unit record devices:

- IBM 4248 Impact Line Printer Model 2 in 3211 emulation mode
- IBM 3505 Card Reader.

Interconnection Devices

The TPF 4.1 system supports the following interconnection devices:

- IBM 3088 Multisystem Channel Communication Unit (all models), which provides for interprocessor communications (IPC) over block multiplexer channels.
- IBM 3737 Remote Channel-to-Channel Unit Model 1, which allows IBM System/390 host systems to communicate with each other through public or private T1 facilities.
- IBM 9032 Enterprise Systems Connection Director (ESCD) Model 2, which provides for connectivity and switching among IBM Enterprise Systems Connection (ESCON) channels and control units. At least one IBM 9032 ESCD Model 2 port should be connected to an IBM MVS/ESA or IBM VM/ESA system for device support.

- IBM 9033 Enterprise Systems Connection Director (ESCD) Model 1, which provides connectivity and switching among ESCON channels and control units. At least one IBM 9033 ESCD Model 1 port should be connected to an IBM MVS/ESA or IBM VM/ESA system for device support.
- One IBM 9034 ESCON Converter Model 1 attached to 1 input/output (I/O) device with parallel channel adapters to ESCON channels. You can have more than one IBM 9034 ESCON Converter Model 1 to I/O device attachment in your complex.
- IBM 9035 ESCON Converter Model 2, which allows IBM 3990 Model 2 device units with ESCON adapters to be attached to parallel channels. The IBM 9035 provides a migration path to the ESCON architecture environment without modifying the processor or the application software in most cases.

Control Units

This section provides information about the types of devices and control units that the TPF 4.1 system supports:

- Communication controllers
- Terminal interchange and control units.

Communication Controllers

Table 4 shows the communication controllers that the TPF 4.1 system supports.

Table 4. Communication Controllers Supported by the TPF 4.1 System

Controller	Notes
IBM 3172 Model 3	IBM TCP/IP Offload program must be installed.
IBM 3705	Applicable for synchronous link control (SLC) only.
IBM 3725	Locally attached VTAM CMC is a prerequisite.
IBM 3745	
IBM 3746	Connectivity subsystem for Enterprise Systems Connection (ESCON) support.
Open Systems Adapter (OSA)-Express Card	Use with Gigabit Ethernet (GbE) or Fast Ethernet (FENET) adapter.

Terminal Interchange (TI) and Control Units

The TPF 4.1 system supports the following terminal interchange and control units:

- IBM 1971 Terminal Control Unit
- IBM 2946-4 Terminal Control Subsystem
- IBM 2948 Display Terminal Interface
- IBM 3174 Control Unit Models 1L and 11L
- IBM 3174 Control Unit Model 151R
- IBM 3271 Control Unit Models 11 and 12
- IBM 3274 Control Unit Models 1B and 1C
- IBM 3276 Control Unit/Display Station Models 11 and 12
- IBM 3601, 3602 Finance Communication Controllers with attached devices
- IBM 3614, 3624 Consumer Transaction Facility
- IBM 4700 Finance Communication Controllers with attached devices

Note: The IBM 4700 is supported as a 3600 controller.

- 8100 DSC Information System
- SLU Type P must be a cross-domain resource (includes 3600, 4700, 8100, AS/400, IMS/VS, and CICS/VS).

Note: VTAM CMC is not required for emulation program (EP) support.

Terminals and Display Devices

The TPF 4.1 system supports the following terminals and display devices:

- IBM 1977-1 Terminal Unit
- IBM 1980-21/24 Terminal Printers
- IBM 2915-3 Display Terminal
- IBM 3179-1 Display Station
- IBM 3277 and 3278 Display Stations
- IBM 3279 Display Station
- IBM 3290 Display Station, single port
- IBM 3284, 3286, 3287, and 3289 Printers
- IBM 4505 Video Display
- IBM 5150 PC, 5160 XT, 5170 AT
- IBM 5271-3270 PC.

Consoles

The TPF 4.1 system requires one system console and supports the following consoles:

- IBM Extended Operations Console Facility/2 (EOCF/2) channel attached with an IBM MicroChannel to Mainframe Connection (MMC) card for IBM 3215 and 3270 console support
- IBM 3036-1 Console
- IBM 3191 Display Station (with the 4224 Printer)
- IBM 3210-1 Console Printer-Keyboard
- IBM 3215 Console Printer-Keyboard
- IBM 3277 Display Station (with the 328x Printer)
- IBM 3278-IIA Display Station (with the 328x Printer).

Central Processing Complexes (CPCs)

Table 5 shows the central processing complexes (CPCs) that the TPF 4.1 system supports and whether there is loosely coupled processing support for them. If loosely coupled processing is supported, the table also provides the processor Requests for Price Quotations (RPQs) that are required.

Table 5. Central Processing Complexes (CPCs) and Loosely Coupled Support

Central Processing Complex (CPC)	Loosely Coupled	Clock Sync Support	Channel Redrive Support
IBM 3090 Models 120E, 150E	No		
IBM 3090 Models 180E, 200E, 280E, 300E, 400E, 500E, 600E	Yes	RPQ 8P1189	RPQ 8P1189
IBM ES/3090 Models 110J, 120J, 150J, 170J, 250J	No		
IBM ES/3090 Models 180J, 200J, 280J, 300J, 380J, 400J, 500J, 600J	Yes	RPQ 8P1189 Sysplex Timer (STR)	RPQ 8P1189 RPQ 8P1441
IBM ES/3090 Models 170JH, 250JH	No		
IBM ES/3090 Models 100S, 120S, 150S, 170S, 250S	No		

Table 5. Central Processing Complexes (CPCs) and Loosely Coupled Support (continued)

Central Processing Complex (CPC)	Loosely Coupled	Clock Sync Support	Channel Redrive Support
IBM ES/3090 Models 180S, 200S, 280S, 300S, 380S, 400S, 500S, 600S	Yes	RPQ 8P1189	RPQ 8P1189
IBM ES/3090-9000T Models 15T, 17T, 18T, 25T, 28T	Yes	Sysplex Timer (STR)	See Note 1.
IBM ES/9000 9021 Model 330	Yes	Sysplex Timer (STR)	See Note 1.
IBM ES/9000 9021 Models 340, 500, 580, 620, 720	Yes	RPQ 8P1189 Sysplex Timer (STR)	RPQ 8P1189 FC 9593/1593
IBM ES/9000 9021 Models 520, 640, 660, 711, 740, 820, 821, 822, 831, 860, 900, 941, 942, 952, 962, 972, 982, 9x2	Yes	Sysplex Timer (STR)	FC 9593/1593
IBM ES/9000 9121 (All Models)	Yes	Sysplex Timer (STR)	RPQ 8P1189
IBM ES/9221 Models 191, 201, 211, 221, 421	No		
IBM Parallel Servers 9672	Yes	Sysplex Timer (STR)	Standard
Notes: 1. Before adding a system that does not support channel redrive in a loosely coupled complex, input/output (I/O) configurations and I/O loads should be analyzed to project effective performance. 2. In this table, a Yes printed in the Loosely Coupled column indicates that the CPCs may participate in a loosely coupled processor complex when all required RPQs or feature codes (FC) are installed. A No printed in the Loosely Coupled column indicates that the required features or RPQs are not available for the CPCs and they cannot participate in a loosely coupled environment.			

Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs)

Table 6 provides a brief description of the Requests for Price Quotations (RPQs) and product features that are required for the various central processing complexes (CPCs) for the TPF 4.1 system.

Table 6. Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs)

RPQ/Product Feature	Description
Sysplex Timer (STR)	<p>The IBM 9037 Sysplex Timer (STR) is a common time source for clock synchronization across central processing complexes (CPCs). It is part of the IBM Enterprise Systems Connection (ESCON) Architecture.</p> <p>STR and RPQ 8P1189 are mutually exclusive.</p> <p>Note: Time-of-Day (TOD) Synchronization Compatibility (TSC) Hardware (RPQ 8K1731) provides the ability to operate the TOD RPQ (RPQ 8P1189) CPCs and STR CPCs in the same loosely coupled complex.</p>
TOD Clock Sync	<p>This RPQ synchronizes the time-of-day (TOD) clocks in a loosely coupled complex.</p> <p>Note: TOD Synchronization Compatibility (TSC) Hardware (RPQ 8K1731) is required when there are TOD RPQ (RPQ 8P1189) central processing complexes (CPCs) and Sysplex Timer (STR) CPCs in the same loosely coupled complex.</p>

Table 6. Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs) (continued)

RPQ/Product Feature	Description
8P1189	<p>For the IBM 3090 and IBM ES/9000 9021 models, the TPF Enabler RPQ provides the following functions:</p> <ul style="list-style-type: none"> • Channel Redrive • Time-of-Day (TOD) Clock Synchronization. <p>For the IBM ES/9000 9121 models, the TPF Enabler RPQ provides the Channel Redrive function.</p> <p>In a loosely coupled environment, when TPF Enabler RPQ 8P1189 is active and multipathing is used, the central processing complex (CPC) must be an IBM ES/3090 Model S at SEC 852 or later SEC level, an IBM ES/3090 Model J or later model, or an IBM ES/9000 9021 model or 9121 model.</p>
8P1269	<p>For the IBM ES/3090 and IBM ES/9000 9021 models, the TPF Enabler RPQ is required to run the TPF 4.1 system on the B side of any processor that can be physically partitioned. RPQ 8P1189 is a prerequisite for this RPQ.</p> <p>Note: RPQ 8P1269 is not applicable to the IBM ES/9000 9121 models.</p>
8P1441	This is the Channel Redrive RPQ for selected models of the IBM ES/3090 Model J.
9021 (FC 9593/1593)	The TPF ESA (Channel Redrive) Enabler.

Single Central Processing Complex (CPC) Environment

Table 7 on page 42 summarizes the IBM 3380 and IBM 3390 direct access storage device (DASD) models that are supported by various control units and Requests for Price Quotations (RPQs) in only a single central processing complex (CPC) environment.

Notes:

1. These control units and RPQs are **not** supported in a loosely coupled environment.
2. Multipathing is supported in the TPF 4.1 system in a single CPC environment and only on the configurations shown in Table 7.

Table 7 also provides information for those who have not previously installed any 3990 RPQs or functions. These are called new installation RPQs or functions. If you have already installed one of the new installation RPQs or functions and would like to convert to a different new installation RPQ or function, conversion RPQs are available. For more information about the new installation RPQs or functions and the conversion RPQs, see *3990 Transaction Processing Facility Support RPQs*.

Table 7. New Installation RPKs or Functions. IBM 3380 and 3390 DASD and control units supported by the TPF 4.1 system in a single central processing complex (CPC) environment.

[illegible]

Loosely Coupled Complex

In a loosely coupled complex for the TPF 4.1 system:

- Clock synchronization is required and can be achieved with any of the following:
- Transaction Processing RPQ 8P1189
- Sysplex Timer (STR).
- Channel Redrive is required except where noted in Table 5 on page 39. Channel Redrive allows the channels to redrive start subchannel (SSCH) instructions that failed because of device or control unit busy conditions. Channel Redrive is recommended for tightly coupled TPF environments to achieve the announced performance.

Table 8 on page 44 summarizes which IBM 3380 and IBM 3390 models are supported by various control units and RPQs in a loosely coupled complex. In addition, Table 8 provides information for those who have not previously installed any 3990 RPQs. These are called new installation RPQs. If you have already installed one of the new installation RPQs and would like to convert to a different new installation RPQ, conversion RPQs are available. For more information about new installation RPQs and conversion RPQs, see *3990 Transaction Processing Facility Support RPQs*.

Note: Multipathing is supported in a loosely coupled environment with the multi-path lock facility (MPLF) RPQ attached.

Table 8. New Installation RPQs. IBM 3380 and 3390 DASD and control units supported by the TPF 4.1 system in a loosely coupled complex.

Control Unit	Required Requests for Price Quotations (RPQs)	IBM 3380 Model					IBM 3390 Model			IBM RAMAC Array DASD	
		A	D	E	J	K	1	2	3	9392	9395
IBM 3880 Model 3	MM2741 Airline Buffer and Extended Limited Lock Facility (ELLF), and Speed Matching Buffer Feature. (This RPQ does not support general files or general data sets (GDSs).) The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4.	X									
IBM 3880 Model 3	8S0026 Extended Limited Lock Facility (ELLF). The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4.	X									
IBM 3880 Model 3	8B0050 Extended Limited Lock Facility (ELLF). The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4 or 8S0141 for the IBM 3380 Model AD4/AE4.	X	X	X							
IBM 3880 Model 23	8B0035 Record Cache and Extended Limited Lock Facility (ELLF). The Static Switch RPQ is also required: MR0352 for the IBM 3380 Model AA4 or 8S0141 for the IBM 3380 Model AD4.	X	X								
IBM 3990 Model 2	8B0071 Extended Limited Lock Facility (ELLF) and Microcode Static Switch (MSS).	X	X	X	X	X					
IBM 3990 Model 2	8B0150 Limited Lock Facility (LLF) and Microcode Static Switch (MSS).	X	X	X	X	X	X	X			
IBM 3990 Model 3	8B0077 Record Cache Buffer Emulation with Extended Limited Lock Facility (ELLF) and Microcode Static Switch (MSS). (This RPQ does not support general files or general data sets.)	X	X	X	X	X					
IBM 3990 Model 3	8B0079 Record Cache Buffer Emulation with Extended Limited Lock Facility (ELLF) and Hardware Static Switch. (This RPQ does not support general files or general data sets.)	X	X	X							
IBM 3990 Model 3	8B0156 Record Cache Buffer Emulation with Limited Lock Facility (LLF) and Microcode Static Switch (MSS). (This RPQ does not support general files or general data sets.)	X	X	X	X	X	X	X			
IBM 3990 Model 3	8B0159 Record Cache RPQ with Limited Lock Facility (LLF) and Microcode Static Switch (MSS).	X	X	X	X	X	X	X			
IBM 3990 Model 3	8B0178 Record Cache RPQ with Multi-Path Lock Facility (MPLF).						X	X	X		
IBM 3990 Model 3	8B0179 Record Cache RPQ with Multi-Path Lock Facility (MPLF) and 3380 Record Format.						X	X	X		

Table 8. New Installation RPQs (continued). IBM 3380 and 3390 DASD and control units supported by the TPF 4.1 system in a loosely coupled complex.

		IBM 3380 Model					IBM 3390 Model			IBM RAMAC Array DASD	
Control Unit	Required Requests for Price Quotations (RPQs)	A	D	E	J	K	1	2	3	9392	9395
IBM 3990 Model 6	Using Record Cache with Multi-Path Lock Facility (MPLF).						X	X	X	X	

High Performance Option (HPO) Feature

To run in a loosely coupled complex under the High Performance Option (HPO) feature, Multi-Processor Interconnect Facility interprocessor communications (MPIF IPC) is required because direct access storage device interprocessor communications (DASD IPC) is no longer supported. The hardware needed is:

- Model 3088, or
- IBM Enterprise Systems Connection (ESCON) Channel-to-Channel (CTC).

See “Migrating from DASD IPC to MPIF IPC” on page 52 for more information.

Software (Programming Requirements)

This section contains information about the minimum software requirements necessary for operating the TPF 4.1 system.

OS/390 or MVS Requirements

- IBM MVS/DFP Version 3 Release 3 or later releases or IBM MVS/ESA Version 4.2 or later releases is required for virtual storage access method (VSAM) database support.
- Either an IBM OS/390, IBM MVS/XA or IBM MVS/ESA system is required for offline batch and utility functions.

C and C++ Compiler Requirements

The TPF 4.1 system now ships all ISO-C load modules with each program update tape (PUT) to eliminate the need for having the proper level compiler available to build the PUT. You can continue to compile all of your existing user-written applications using your existing compiler. The only code affected by the compiler upgrade is IBM system code.

If you do not have any modifications to the ISO-C load modules shipped by IBM, you can take the ISO-C load modules shipped on the PUT and load to them to your TPF 4.1 system without any impact. If you do have modifications to the ISO-C load modules shipped by IBM and the ISO-C load modules do not contain any code that is object code only, you can continue to use your current compiler to build those ISO-C load modules; however, you must understand that IBM is not compiling or testing the code shipped on the PUT using the compiler level you may have, so IBM recommends that you stay current with the compiler level for each PUT to avoid any compiler-related problems.

Table 9 on page 47 outlines the different compiler levels used for each PUT. Small programming enhancements (SPEs) shipped on the more recent PUTs require functions from a specific C and C++ compiler level. As new versions of these compilers are required, support for the older compilers are dropped. To install the later C and C++ compilers, updated versions of IBM OS/390 are required. For example, IBM OS/390 Version 2 Release 4 is required to run the IBM OS/390 C/C++ Version 2 Release 4 compiler.

To use this table, locate the PUT level applied to your TPF 4.1 system; the C and C++ compiler supported by that PUT is found to the right of the PUT level. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.

Table 9. C and C++ Compilers Supported by PUT

PUT Level	Compiler	System Support Compiler
PUT 2 through PUT 4	IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2. IBM SAA AD/Cycle Language Environment (LE/370) Version 1 Release 3. IBM SAA AD/Cycle Language Environment (LE/370). IBM SAA AD/Cycle C/370 Compiler Version 2 Release 1. IBM SAA AD/Cycle C/370 Compiler Version 3 Release 1.	Not Applicable
PUT 5	IBM C/C++ for MVS/ESA Version 3 Release 1 (C/MVS compiler component only) compiler.	Not Applicable
PUT 6 through PUT 8	IBM C/C++ for MVS/ESA Version 3 Release 2 compiler. IBM OS/390 C/C++ Version 1 Release 2 compiler. IBM OS/390 C/C++ Version 1 Release 3 compiler.	Not Applicable
PUT 9	IBM OS/390 C/C++ Version 2 Release 4 compiler or later release.	Not Applicable
PUT 10	IBM OS/390 C/C++ Version 2 Release 4 compiler or later release.	Not Applicable
PUT 11	IBM OS/390 C/C++ Version 2 Release 6 compiler or later release.	Not Applicable
PUT 12	IBM OS/390 C/C++ Version 2 Release 8 compiler or later release.	Not Applicable
PUT 13	IBM OS/390 C/C++ Version 2 Release 9 compiler or later release.	Not Applicable
PUT 14	IBM OS/390 C/C++ Version 2 Release 10 compiler.	IBM OS/390 C/C++ Version 2 Release 10
PUT 15	IBM OS/390 C/C++ Version 2 Release 10 compiler.	IBM OS/390 C/C++ Version 2 Release 10 IBM z/OS Version 1 Release 1
PUT 16	IBM OS/390 C/C++ Version 2 Release 10 compiler.	IBM OS/390 C/C++ Version 2 Release 10 IBM z/OS Version 1 Release 1 IBM z/OS Version 1 Release 2

Note: The TPF 4.1 system does not support the XPLINK compiler option.

SNA-Based Communication Requirements

For Systems Network Architecture (SNA)-based communication with remote users (terminal and application programs), the TPF 4.1 system requires channel-attached controllers. Channel-to-channel (CTC) or Enterprise Systems Connection (ESCON) CTC can also be used for communication between the TPF 4.1 system and adjacent hosts.

PU 5 Communication Requirements

Connecting the TPF 4.1 system as a PU 5 node to the SNA network requires channel-attached IBM 3745 Communications Controllers. The TPF 4.1 system can also be channel-attached to IBM 3746 Model 900 (3746-900) Communications Controllers, which are connected to an IBM 3745. IBM ACF/VTAM or OS/390 is also required to load and manage the IBM 3745 Communication Controllers.

CTC or ESCON CTC can also be used for communication between the TPF 4.1 system and adjacent hosts.

APPN Communication Requirements

Connecting the TPF 4.1 system as an Advanced Peer-to-Peer Networking (APPN) node to the SNA network requires channel-attached routers that support the channel data link control (CDLC) protocol, such as:

- IBM 3745 Communications Controllers running IBM ACF/NCP Version 6 Release 2 or later release. IBM ACF/VTAM Version 4 Release 1 or later release, or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.
- IBM 3746 Model 900 (3746-900) or Model 950 (3746-950) Communications Controllers
- IBM RS/6000 with the SNA feature installed.

HPR Communications Requirements

Connecting the TPF 4.1 system as a high-performance routing (HPR) node to the SNA network requires channel-attached routers that support the CDLC protocol and the HPR automatic network routing (ANR) feature, such as:

- IBM 3745 Communications Controllers running IBM ACF/NCP Version 7 Release 1 or later release. IBM ACF/VTAM Version 4 Release 3 or later release, or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.
- IBM 3746 Model 900 (3746-900) or Model 950 (3746-950) Communications Controllers.

X.25 Communication Requirements

Connecting the TPF 4.1 system to remote X.25 devices requires channel-attached IBM 3745 Communications Controllers with the IBM NPSI or IBM FTPI feature installed. IBM ACF/VTAM or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.

ALC Communication Requirements

Connecting the TPF 4.1 system to remote airlines line control (ALC) devices requires channel-attached IBM 3745 Communications Controllers with the IBM Airlines Line Control Interconnectoin (ALCI) feature installed. ALCI requires that the 3745 be equipped with the appropriate RPQs and Licensed Internal Code (LIC) level for ALC. See “3745 ACF/NCP RPQs by Protocol” on page 51 for information about the required RPQs and LIC level. IBM ACF/VTAM or OS/390 is also required to load and manage the IBM 3745 Communications Controllers.

TCP/IP-Based Communication Requirements

The TPF 4.1 system can connect to Transmission Control Protocol/Internet Protocol (TCP/IP) networks through TCP/IP offload support or TCP/IP native stack support.

TCP/IP Offload Support

TCP/IP offload support requires one of the following:

- An IBM 3172 Model 3 Interconnect Controller with the IBM 3172 Offload Feature installed. The IBM 3172 Model 3 Interconnect Controller can be attached to the TPF 4.1 system using either a parallel channel adapter or an Enterprise Systems Connection (ESCON) channel adapter.
- A Cisco 7500 series router.

See the following for more information about TCP/IP offload support:

- “Programming Request for Price Quotation (PRPQ) for TCP/IP Support” on page 51 for information about ordering programming request for price quotations (PRPQs) for TCP/IP offload support
- *TPF Migration Guide: Program Update Tapes* for more information about TCP/IP offload support provided with program update tape (PUT) 4 and Transmission Control Protocol/Internet Protocol full-duplex socket support provided with program update tape (PUT) 5.

TCP/IP Native Stack Support

With TCP/IP native stack support, the TPF 4.1 system can connect to the following devices:

- IBM 3745 Communications Controller with IBM NCP Version 7 Release 2 or later release.
- IBM 3746 Model 900 (3746-900) or Model 950 (3746-950) Communications Controller with the IP feature installed.
- Open Systems Adapter (OSA)-Express card.

Non-SNA-Based Communication Requirements

To use the binary synchronous communications (BSC) protocol, a 3745 partitioned emulation program (PEP) and emulation program (EP) Version 6 Release 1 or later release with IBM NCP Version 7 Release 1 or later release is required.

To use the synchronous link control (SLC) protocol, the emulation program (EP Version 3 Release 1 or later release) in the 3705 Communication Controller is required.

Miscellaneous Requirements

- IBM High-Level Assembler Version 1 Release 1 or Version 1 Release 2 or higher for IBM MVS, IBM VM, and IBM VSE (5696-234) systems is required for TPF 4.1 program assemblies.

Note: IBM program services for Version 1 Release 1 are available only until December 29, 1995. At that time, only IBM High-Level Assembler Version 1 Release 2 or higher will be supported.

- The PL/1 Optimizing Compiler & Libraries (5668-910) is required for compilation of TPF 4.1 data reduction, offline pool utilities, and directory generation programs.
- STLport Standard Template Library Version 3.01 compiled with the IBM OS/390 C/C++ Version 2 Release 4 compiler.

TPF 4.1 Product Information Requirements

You can access all TPF product information in Hypertext Markup Language (HTML) format and Portable Document Format (PDF) from the IBM TPF Product Information Center. The IBM TPF Product Information Center is available from the TPF Web site (go to <http://www.ibm.com/tpf/pubs/tpfpubs.htm>) and the *IBM TPF Product Information Center* CD-ROM. Although IBM encourages you to use an information

source that best matches your working style and environment, the IBM TPF Product Information Center is the preferred information source. **You will always find the most recent version of the TPF product information on the TPF Web site.** See *TPF Library Guide* for more information about the IBM TPF Product Information Center.

The IBM TPF Product Information Center has been tested on the Microsoft Windows 2000 and Windows NT operating systems using Microsoft Internet Explorer browser version 5.0 or later. If you are using Microsoft Internet Explorer browser version 5.0 with service pack 2 or later, use Adobe Acrobat Reader 5.0 to avoid experiencing difficulties with PDFs.

PDF and HTML Format

The TPF 4.1 books are available in portable document format (PDF) and hypertext markup language (HTML) format at: <http://www.ibm.com/tpf/>

Follow the instructions provided to view or print the books.

Requests for Price Quotations (RPQs) and Programming Requests for Price Quotations (PRPQs) by Protocol

This section provides information about Requests for Price Quotations (RPQs) and Programming Requests for Price Quotations (PRPQs), by protocol.

3705 EP/VS RPQs by Protocol

Table 10 shows the 3705 EP/VS RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 10. 3705 EP/VS RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Synchronous Link Control (SLC)	<ul style="list-style-type: none">• Link Control FDX IATA PRPQ 85027; one for each 3705 (3705-I only)• 3705 feature 1541 or 1544 Channel Adapter, Type 1 or 4 only• 3705 feature 1642, Communication Scanner Type 2 only• 3705 feature 4714 or 4718, Line Set Type 1D or 1H, one for each FDX line

3720 ACF/NCP RPQs by Protocol

Table 11 shows the 3720 ACF/NCP RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 11. 3720 ACF/NCP RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Airlines Line Control (ALC)	<ul style="list-style-type: none">• RPQ 7L1095• LC Expansion Unit 5971-L02

3725 ACF/NCP/VS RPQs by Protocol

Table 12 on page 51 shows the 3725 ACF/NCP/VS RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 12. 3725 ACF/NCP/VS RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Airlines Line Control (ALC)	<ul style="list-style-type: none"> • PRPQ 5799-CDX NEF2 • RPQs 8Q0407 and 8Q0408 • IBM 3725 Communications Controller

3745 ACF/NCP RPQs by Protocol

Table 13 shows the 3745 ACF/NCP RPQs, by protocol, that are supported by the TPF 4.1 system.

Table 13. 3745 ACF/NCP RPQs, by Protocol, Supported by the TPF 4.1 System

Protocol	RPQs Supported
Airlines Line Control (ALC)	<ul style="list-style-type: none"> • RPQ 7L1092 • ALC Scanner

Programming Request for Price Quotation (PRPQ) for TCP/IP Support

You must order PRPQ 5799-QWZ to obtain the software for the IBM 3172 Offload Feature mentioned in “TCP/IP-Based Communication Requirements” on page 48. Call TPF Systems to order PRPQ 5799-QWZ.

Table 14. Programming Request for Price Quotation (PRPQ) for TCP/IP Support

PRPQ and Product Feature	Description								
5799-QWZ for TCP/IP Support	<p>Contains the following features:</p> <table> <tr> <th>Feature Number</th><th>Description</th></tr> <tr> <td>9001</td><td>Asset registration on the TPF 4.1 system.</td></tr> <tr> <td>4003</td><td>IBM 3172 Offload Feature.</td></tr> <tr> <td>5805</td><td> <p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when you specify feature number 4003 when ordering. In addition, you will receive the following books:</p> <ul style="list-style-type: none"> • <i>TPF Transmission Control Protocol/Internet Protocol</i> • <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i> </td></tr> </table>	Feature Number	Description	9001	Asset registration on the TPF 4.1 system.	4003	IBM 3172 Offload Feature.	5805	<p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when you specify feature number 4003 when ordering. In addition, you will receive the following books:</p> <ul style="list-style-type: none"> • <i>TPF Transmission Control Protocol/Internet Protocol</i> • <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i>
Feature Number	Description								
9001	Asset registration on the TPF 4.1 system.								
4003	IBM 3172 Offload Feature.								
5805	<p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when you specify feature number 4003 when ordering. In addition, you will receive the following books:</p> <ul style="list-style-type: none"> • <i>TPF Transmission Control Protocol/Internet Protocol</i> • <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i> 								

IBM Extended Operations Console Facility/2 (EOCF/2) and IBM Transaction Processing Facility Database Facility (TPFDF)

This section contains the minimum software requirements for using IBM Extended Operations Console Facility/2 (EOCF/2) and IBM Transaction Processing Facility Database Facility (TPFDF) products with the TPF 4.1 system:

- For the IBM EOCF/2 product, you must have EOCF/2 Corrective Service Diskette 2 (CSD2) or later release installed. CSD2 supports IBM Operating System/2 (OS/2) Version 2.1 as well as the new message formats for the TPF 4.1 system.
- For the IBM TPFDF product, you must have program update tape (PUT) 2 or later release installed.
- For the Distributed Data Access (DDA) feature of the IBM TPFDF product, you must have authorized program analysis report (APAR) PN49945 installed.

Interprocessor Communications for the High Performance Option User

Before this release, the TPF system used two methods of interprocessor communications (IPC):

- DASD IPC (using the extended limited lock facility (ELLF), known previously as the System Interprocessor Communications Facility (SICF))
- MPIF IPC (using a channel-to-channel communication link).

Beginning with this release, DASD IPC is no longer supported. The TPF system supports IPC only through the Multi-Processor Interconnect Facility (MPIF) feature, which provides all of the function of DASD IPC with more throughput. MPIF IPC was changed and restructured.

You can use the new TYPE parameter of the SIPCC macro to specify an interprocessor communications (IPC) or inter-I-stream communication (IS) type of processing. Inter-I-stream communication lets you direct messages to I-streams on particular processors.

MPIF is now a required feature when using the High Performance Option (HPO) feature.

Migrating from DASD IPC to MPIF IPC

If you are using direct access storage device interprocessor communications (DASD IPC), which is **not** supported in the TPF 4.1 system, you must migrate to the Multi-Processor Interconnect Facility interprocessor communications (MPIF IPC).

To Migrate to MPIF IPC

1. Install the MPIF feature by coding

```
MPIF=YES
```

on the CONFIG macro, add RAMFIL statements for the #CB8HD and #PDREC record types, and run SIP.

2. Install a channel-to-channel device, such as a Model 3088 or IBM Enterprise Systems Connection (ESCON) Channel-to-Channel (CTC).
3. Define your MPIF complex, paths, devices, and so on, using the ZMPIF command.

See *TPF Operations* for more information about the ZMPIF command.

To make testing and debugging easier, you can migrate from DASD IPC to MPIF IPC on a TPF 3.1 system.

Changes to application programs are not required.

Program Update Tape 2 (PUT 2)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 2 (PUT 2).

SPE	Where to Go For More Information
ISO-C	"ISO-C Support (APAR PJ17852)" on page 54
Pool expansion (PXP) Support	"Pool Expansion (PXP) Support (APAR PJ17912)" on page 89
Shared PR/SM	"Shared PR/SM (APAR PJ17778)" on page 106

In addition, the following information is provided:

- The installation and migration procedures for installing PUT 2 in its entirety on your TPF 4.1 system. See "Recommended Migration for an Established TPF 4.1 System User" on page 114 for more information.
- The migration considerations for the following types of authorized program analysis reports (APARs):
 - Critical APARs shipped on PUT 2
 - Minor APARs shipped on PUT 2
 - APARs that correct incorrect APARs shipped on previous PUTs.

See "Additional Migration Considerations for Program Update Tape (PUT) 2" on page 112 for more information about the migration considerations for these APARs.

TPF 4.1 PUT 2 is compiled with the IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2, IBM SAA AD/Cycle Language Environment (LE/370) Version 1 Release 3, IBM SAA AD/Cycle Language Environment (LE/370), IBM SAA AD/Cycle C/370 Compiler Version 2 Release 1, and IBM SAA AD/Cycle C/370 Compiler Version 3 Release 1 compilers. See "C and C++ Compiler Requirements" on page 46 for more information about C compiler requirements for the TPF 4.1 system.

ISO-C Support (APAR PJ17852)

The following section discusses the migration considerations for ISO-C support.

ISO-C support brings with it new terminology. See *TPF Application Programming* for explanations of new terms and concepts.

ISO-C enhancements for program update tape 3 (PUT 3) include support for the E-type loader. See “ISO-C E-Type Loader Support (APAR PJ19966)” on page 127 for more information.

Additional ISO-C changes for PUT 3 include the migration of the ZIMAG and ZTPLD commands to ISO-C dynamic load modules (DLMs). See “Migration of TPF System Code to ISO-C Support (APAR PJ19938)” on page 138 for more information.

Prerequisite APARs

See the APEDIT for APAR PJ17852 for information about prerequisite APARs.

Functional Overview

With ISO-C support you can write applications using an ISO-C (equivalent to ANSI C) implementation of C. This brings TPF applications closer to open systems (UNIX).

- **Freedom from the 4 KB Program Limit**
The design of the program fetch mechanism and the use of load modules enables ISO-C program size to be as large as 16 MB.
- **New Functions for Globals**
ISO-C support provides 6 new functions that enhance application program access to globals. These functions allow global field and record manipulation. They provide keypointing; locking, synchronizing, and unlocking of records; field and record modification and updating.
- **High Performance C Language**
ISO-C support has been optimized for high performance, wherever possible. The various types of functions supported (inline, dynamic link module, internal function, and external function) provides a means for balancing appropriate levels of performance against anticipated on-going maintenance.
- **Multiple Libraries**
With ISO-C support more than 1000 function libraries, each with over 1000 functions, can be accessed by running programs.
- **Library Extensions**
ISO-C support has added more standard library functions and brought several to the standard interface. Functions added include packed decimal and wide character.
- **Program Portability**
ISO-C support represents widely used version of the C language. By using this version development and operations tools are possible that were not previously available in the TPF 4.1 system.
- **Loader Enhancements**
Developments have increased the usability of TPF loaders:

- A common load deck for ALDR and TLDR. Now a single loader TPFLDR is the interface for both loaders. Now that ALDR and TLDR share a common load deck there is no need to maintain 2 unique load decks.
- Improved output messages.
- The EXCP macro has been removed from ALDR.
- Additional TPF C Functions Added
The repertoire of TPF C functions has been expanded to include such functions as `face_facs`, `swisc_create`, `glob_update`, and so on.
- Offline Tools are Provided
New offline tools provide support for building the library interface, generating function stubs, and creating the files needed for ISO-C support.
- ISO-C Support Talks to Old Programs
ISO-C support has been designed for coexistence with TPF's previous version of C, which is called TARGET(TPF), in mind. Compatibility is so close ISO-C and TARGET(TPF) programs can call each other as functions.
- Adjustable Heap Memory
ISO-C support provides the ability to increase the heap size beyond the fixed maximum of 1 MB by using the ZCTKA command. The stack heap used during ISO-C processing can be controlled separately.
- New User Exits
User exits have been added to provide access to DLM call entry and exit, C library function, stack overflow processing entry and exit, environment initialization, and to report the number of #XPRGs remaining in the system after a load.
- Locales Made Easy
The procedures required to modify Locales have been made easier to follow.

Architecture

The architecture for ISO-C support is based on the C environment, as defined by the IBM SAA AD/Cycle C/370 family of compilers. The central structure for the compiler is the task communications area (TCA). The TCA is used by the compiler much the same as the ECB is used by the TPF 4.1 system. The layout of the fields and their usage is fixed by the compiler (and other tools) and is not changed by the TPF 4.1 system.

TPF 4.1 architecture for ISO-C support replaces that created for the TPF system's earlier C language support, called TARGET(TPF) where a distinction must be made. The ISO-C environment is considered to be separate from the TARGET(TPF) environment because the C structures used to support the ISO-C environment are different. From a C load module perspective, TARGET(TPF) programs run in the TPF environment. Although TARGET(TPF) has not been enhanced by this support, both C environments are supported.

Overall, the application development architecture is similar to architectures commonly found in non-TPF environments:

1. Build scripts are created.
2. A C program is compiled to produce an object file.
3. The object file is prelinked with stub and startup object files to produce a composite object file.
4. The composite object file is linked to produce a load module.

5. The load module is written on a storage medium by the TPF loader (the E-type loader does not support ISO-C load modules).

Note: ISO-C E-type loader support is provided with PUT 3. See “ISO-C E-Type Loader Support (APAR PJ19966)” on page 127 for more information.

6. The TPF online loader copies the program to the program database.
7. The system fetch mechanism retrieves the code and runs the user program under the TPF 4.1 system.

Installing the ISO-C code without initially exploiting its functions allows for a more stable TPF environment. TARGET(TPF) and basic assembly language (BAL) applications currently running on the TPF 4.1 system can be loaded to the TPF 4.1 system with ISO-C support installed and be run at the same time as ISO-C applications. An attempt was made to make the integration of ISO-C support and TARGET(TPF) as seamless as possible.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with ISO-C support, you must establish the required operating environment. The following section describes hardware and software requirements specific to ISO-C support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section provides information about software requirements.

Prerequisite software for this support includes one of the following C compilers:

- IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2 or later release (TARGET(TPF) only)
- IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2 or later release (ISO-C support or TARGET(TPF))
- IBM SAA AD/Cycle Language Environment (LE/370) Version 1 Release 3 or later release (ISO-C support or TARGET(TPF)).

In addition, ISO-C support takes advantage of instructions that are only provided by IBM High-Level Assembler for IBM MVS, IBM VM, and IBM VSE systems.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build and Interface Scripts: Table 15 on page 57 summarizes the scripts used for the library interface tool and the build tool. This information is presented in alphabetic order by the name of the segment.

See the *TPF Library Guide* for a complete list of segments in the TPF 4.1 system.

Table 15. Changes to Build and Interface Scripts for ISO-C Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CISO	Build	New	Build script for ISO-C standard C library.
CISOXV	Library Interface	New	Interface script for ISO-C standard C library.
CLLE	Build	New	ISO-C UK LOCALE definition build script.
CLLF	Build	New	ISO-C France LOCALE definition build script.
CLLG	Build	New	ISO-C Germany LOCALE definition build script.
CLLI	Build	New	ISO-C Italy LOCALE definition build script.
CLLS	Build	New	ISO-C Spain LOCALE definition build script.
CLLT	Build	New	ISO-C TPF LOCALE definition build script.
CLLU	Build	New	ISO-C USA LOCALE definition build script.
CTAL	Build	New	Build script for ISO-C TPF API C library.
CTALXV	Library Interface	New	Interface script for ISO-C TPF API library.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 16 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 16. Changes to General Use C Language Header Files for ISO-C Support

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
assert.h	Changed	No
bldtol.h	New	Not Applicable
c\$cinfc.h	Changed	No
c\$cklke.h	Changed	Not Applicable
c\$dadfq.h	Changed	Not Applicable
c\$eb0eb.h	Changed	No
c\$fb0.h	Changed	Not Applicable
c\$fer0.h	Changed	Not Applicable
c\$fva0.h	Changed	Not Applicable
c\$icili.h	New	Not Applicable
c\$icolr.h	Changed	Not Applicable
c\$idseat.h	Changed	Yes
c\$idseid.h	Changed	Yes
c\$idseiv.h	Changed	Yes
c\$idsepd.h	Changed	Yes
c\$idsldr.h	New	Not Applicable
c\$idsmvp.h	New	Not Applicable
c\$idsoild.h	Changed	Yes
c\$idspat.h	Changed	Yes
c\$idsprg.h	New	Not Applicable
c\$idsprv.h	Changed	Yes
c\$idssal.h	Changed	Yes

Table 16. Changes to General Use C Language Header Files for ISO-C Support (continued)

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$idsuxt.h	Changed	Yes
c\$stdhd.h	Changed	No
c\$tpldr.h	Changed	Yes
ctca.h	Changed	No
ctool.h	New	Not Applicable
ctype.h	Changed	No
errno.h	Changed	No
exlocal.h	Changed	No
float.h	Changed	No
format.h	Changed	No
libi.h	New	No
libopts.h	Changed	No
limits.h	Changed	No
locale.h	Changed	No
math.h	Changed	No
nldtci.h	New	No
nldtif.h	New	No
stdarg.h	Changed	No
stddef.h	Changed	No
stdio.h	Changed	No
stdlib.h	Changed	No
string.h	Changed	No
sysapi.h	Changed	No
sysdef.h	Changed	No
sys time.h	Changed	No
tca.h	Changed	No
time.h	Changed	No
timeinc.h	Changed	No
tpfapi.h	Changed	No
tpfctype.h	New	No
tpfeq.h	Changed	No
tpferrno.h	New	No
tpffloat.h	New	No
tpfglbl.h	Changed	No
tpfio.h	Changed	No
tpflimit.h	New	No
tpflink.h	Changed	No
tpflocal.h	New	No
tpfmap.h	Changed	No
tpfmath.h	New	No
tpfmcsll.h	Changed	No
tpfregs.h	New	No
tpfstarg.h	New	No

Table 16. Changes to General Use C Language Header Files for ISO-C Support (continued)

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
tpfstdef.h	New	No
tpfstdio.h	New	No
tpfstdlb.h	New	No
tpfstrng.h	New	No
tpftape.h	Changed	No
tpftime.h	New	No
tppc.h	Changed	No
wchar.h	New	No
zimageq.h	Changed	Yes
zimagmsg.h	Changed	Yes
ztpld.h	Changed	Yes

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Module Names: Table 17 summarizes the library module changes. This information is presented in alphabetic order by the name of the library module.

Table 17. Changes to Library Modules for ISO-C Support

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
C\$S370	New	CISO	Assembler
CABORT	New	CISO	Assembler
CABS	New	CISO	Object-Only
CACOS	New	CISO	Object-Only
CASCTM	New	CISO	Object-Only
CASIN	New	CISO	Object-Only
CASSRT	New	CISO	C Language
CATAN	New	CISO	Object-Only
CATAN2	New	CISO	Object-Only
CATOF	New	CISO	Object-Only
CATOIA	New	CISO	Object-Only
CATTAC	New	CTAL	Assembler
CATTX	New	CTAL	Assembler
CBDFMT	New	CISO	Object-Only
CBGETS	New	CISO	Assembler
CBPUTS	New	CISO	Assembler
CBSRCH	New	CISO	Object-Only
CCALOC	New	CISO	Assembler
CCBCBS	New	CTAL	Assembler
CCBCDB	New	CTAL	Assembler
CCBCRE	New	CTAL	Assembler
CCBCSA	New	CTAL	Assembler

Table 17. Changes to Library Modules for ISO-C Support (continued)

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
CCBCSS	New	CTAL	Assembler
CCEIL	New	CISO	Object-Only
CCIFRC	New	CTAL	Assembler
CCINFC	New	CTAL	Assembler
CCINT	New	CISO	Object-Only
CCLOCK	New	CISO	Assembler
CCLOCP	New	CISO	Object-Only
CCLOCS	New	CISO	Object-Only
CCNVRT	New	CISO	Object-Only
CCORHC	New	CTAL	Assembler
CCORUC	New	CTAL	Assembler
CCOS	New	CISO	Object-Only
CCREDC	New	CTAL	Assembler
CCREEC	New	CTAL	Assembler
CCREMC	New	CTAL	Assembler
CCRETC	New	CTAL	Assembler
CCRETL	New	CTAL	Assembler
CCREXC	New	CTAL	Assembler
CCROSC	New	CTAL	Assembler
CCRUSA	New	CTAL	Assembler
CCSID	New	CISO	Object-Only
CCSONC	New	CTAL	Assembler
CCTIME	New	CISO	Object-Only
CDECHX	New	CISO	Object-Only
CDEFRC	New	CTAL	Assembler
CDETAC	New	CTAL	Assembler
CDFTME	New	CISO	Object-Only
CDIV	New	CISO	Object-Only
CDLAYC	New	CTAL	Assembler
CDOECV	New	CISO	Object-Only
CDOFCV	New	CISO	Object-Only
CDTACX	New	CTAL	Assembler
CDTOP	New	CISO	Object-Only
CENTDC	New	CTAL	Assembler
CEVINC	New	CTAL	Assembler
CEVNQC	New	CTAL	Assembler
CEVNTC	New	CTAL	Assembler
CEVNWC	New	CTAL	Assembler
CEXIT	New	CISO	Assembler
CEXP2	New	CISO	Object-Only
CFABS	New	CISO	Object-Only
CFACE	New	CTAL	Assembler
CFACES	New	CTAL	C Language
CFACS	New	CTAL	Assembler

Table 17. Changes to Library Modules for ISO-C Support (continued)

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
CFILEC	New	CTAL	C Language
CFILEX	New	CTAL	Assembler
CFILNC	New	CTAL	C Language
CFILNX	New	CTAL	Assembler
CFILUC	New	CTAL	C Language
CFILUX	New	CTAL	Assembler
CFINDC	New	CTAL	C Language
CFINDX	New	CTAL	Assembler
CFINHC	New	CTAL	C Language
CFINHX	New	CTAL	Assembler
CFINWC	New	CTAL	C Language
CFINWX	New	CTAL	Assembler
CFIWHC	New	CTAL	C Language
CFIWHX	New	CTAL	Assembler
CFLIPC	New	CTAL	Assembler
CFLRCD	New	CTAL	C Language
CFLRCX	New	CTAL	Assembler
CFMOD	New	CISO	Object-Only
CFNRCD	New	CTAL	C Language
CFNRCX	New	CTAL	Assembler
CFREE	New	CISO	Assembler
CFREXP	New	CISO	Object-Only
CGDSNC	New	CTAL	Assembler
CGDSRC	New	CTAL	Assembler
CGETCC	New	CTAL	Assembler
CGETFC	New	CTAL	Assembler
CGETPC	New	CTAL	Assembler
CGLOB	New	CTAL	C Language
CGLOBA	New	CTAL	Assembler
CGLOBK	New	CTAL	Assembler
CGLOBL	New	CTAL	C Language
CGLOBM	New	CTAL	Assembler
CGLOBN	New	CTAL	Assembler
CGLOBS	New	CTAL	Assembler
CGLOBU	New	CTAL	C Language
CGLOCK	New	CTAL	Assembler
CGMTME	New	CISO	Object-Only
CGSCAN	New	CISO	Object-Only
CHEXDC	New	CISO	Object-Only
CHXDSM	New	CISO	Object-Only
CHXDTB	New	CISO	Object-Only
CINQRC	New	CTAL	Assembler
CISA	New	CISO	Object-Only
CISAN	New	CISO	Object-Only

Table 17. Changes to Library Modules for ISO-C Support (continued)

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
CISC	New	CISO	Object-Only
CISD	New	CISO	Object-Only
CISG	New	CISO	Object-Only
CISL	New	CISO	Object-Only
CISPR	New	CISO	Object-Only
CISPU	New	CISO	Object-Only
CISSP	New	CISO	Object-Only
CISU	New	CISO	Object-Only
CISXD	New	CISO	Object-Only
CKEYRC	New	CTAL	Assembler
CLABS	New	CISO	Object-Only
CLCLCO	New	CISO	Object-Only
CLCLDT	New	CISO	Object-Only
CLCTOD	New	CISO	Object-Only
CLDIV	New	CISO	Object-Only
CLDTPF	New	CISO	Assembler
CLLOAD	New	CISO	Object-Only
CLOCKC	New	CTAL	Assembler
CLOG10	New	CISO	Object-Only
CLOG2	New	CISO	Object-Only
CLONGC	New	CTAL	Assembler
CLVTST	New	CTAL	Assembler
CLWAID	New	CISO	Object-Only
CMACCP	New	CTAL	C Language
CMALLC	New	CTAL	C Language
CMALOC	New	CISO	Assembler
CMASKC	New	CTAL	Assembler
CMBINI	New	CISO	Object-Only
CMBLEN	New	CISO	Object-Only
CMBLN	New	CISO	Object-Only
CMBWC	New	CISO	Object-Only
CMBWCS	New	CISO	Object-Only
CMCFM	New	CTAL	C Language
CMCFMD	New	CTAL	C Language
CMCHR	New	CISO	Object-Only
CMCMP	New	CISO	Object-Only
CMCPY	New	CISO	Object-Only
CMCSLL	New	CTAL	Assembler
CMDEAL	New	CTAL	C Language
CMECS	New	CTAL	C Language
CMEMN	New	CTAL	C Language
CMEPLN	New	CTAL	C Language
CMESL	New	CTAL	C Language
CMFLUS	New	CTAL	C Language

Table 17. Changes to Library Modules for ISO-C Support (continued)

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
CMINIT	New	CTAL	C Language
CMKTME	New	CISO	Object-Only
CMMOVE	New	CISO	Object-Only
CMPTR	New	CTAL	C Language
CMRCV	New	CTAL	C Language
CMRTS	New	CTAL	C Language
CMSDT	New	CTAL	C Language
CMSD	New	CTAL	C Language
CMSEND	New	CTAL	C Language
CMSERR	New	CTAL	C Language
CMSET	New	CISO	Object-Only
CMSMN	New	CTAL	C Language
CMSPLN	New	CTAL	C Language
CMSPTR	New	CTAL	C Language
CMSRC	New	CTAL	C Language
CMSL	New	CTAL	C Language
CMSST	New	CTAL	C Language
CMSTPN	New	CTAL	C Language
CMTRTS	New	CTAL	C Language
CNLINF	New	CISO	Object-Only
CNLSET	New	CISO	Object-Only
CPADD	New	CISO	Object-Only
CPAUSC	New	CTAL	Assembler
CPCMP	New	CISO	Object-Only
CPDASM	New	CISO	Object-Only
CPDIV	New	CISO	Object-Only
CPMPY	New	CISO	Object-Only
CPOSTC	New	CTAL	Assembler
CPOW	New	CISO	Object-Only
CPROGC	New	CTAL	Assembler
CPTOD	New	CISO	Object-Only
CPTOSB	New	CISO	Object-Only
CPTOUB	New	CISO	Object-Only
CPVAL	New	CISO	Object-Only
CQSORT	New	CISO	Object-Only
CRAISA	New	CTAL	Assembler
CRALOC	New	CISO	Assembler
CRAND	New	CISO	Object-Only
CRCOMP	New	CISO	Object-Only
CREHKA	New	CTAL	C Language
CRELCC	New	CTAL	Assembler
CRELFC	New	CTAL	Assembler
CRELPC	New	CTAL	Assembler
CRERR	New	CISO	Object-Only

Table 17. Changes to Library Modules for ISO-C Support (continued)

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
CREXEC	New	CISO	Object-Only
CRFREE	New	CISO	Object-Only
CRIDCC	New	CTAL	Assembler
CRLCHA	New	CTAL	Assembler
CRMSG	New	CISO	Object-Only
CROUTC	New	CTAL	Assembler
CRPMTH	New	CISO	Object-Only
CRVTCC	New	CTAL	Assembler
CSBTOP	New	CISO	Object-Only
CSCAT	New	CISO	Object-Only
CSCHR	New	CISO	Object-Only
CSCMP	New	CISO	Object-Only
CSCNH	New	CISO	Object-Only
CSCNF	New	CISO	C Language
CSCOLL	New	CISO	Object-Only
CSCPY	New	CISO	Object-Only
CSCSPN	New	CISO	Object-Only
CSELEC	New	CTAL	Assembler
CSERRC	New	CTAL	Assembler
CSERRO	New	CTAL	C Language
CSERRS	New	CTAL	C Language
CSERRX	New	CTAL	C Language
CSFMON	New	CISO	Object-Only
CSFTME	New	CISO	Object-Only
CSIN	New	CISO	Object-Only
CSIPCC	New	CTAL	Assembler
CSLEN	New	CISO	Object-Only
CSNAPC	New	CTAL	Assembler
CSNCAT	New	CISO	Object-Only
CSNCMP	New	CISO	Object-Only
CSNCPY	New	CISO	Object-Only
CSONIC	New	CTAL	Assembler
CSPBRK	New	CISO	Object-Only
CSPRTF	New	CISO	Object-Only
CSPTME	New	CISO	Object-Only
CSQRT	New	CISO	Object-Only
CSRCHR	New	CISO	Object-Only
CSSCNF	New	CISO	Object-Only
CSSPN	New	CISO	Object-Only
CSSTR	New	CISO	Object-Only
CSTLCL	New	CISO	Object-Only
CSTOKA	New	CISO	Object-Only
CSTOLD	New	CISO	Object-Only
CSWSCC	New	CTAL	Assembler

Table 17. Changes to Library Modules for ISO-C Support (continued)

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
CSXFRM	New	CISO	Object-Only
CSYSTC	New	CTAL	Assembler
CTALL	New	CTAL	C Language
CTALLC	New	CTAL	Assembler
CTAN	New	CISO	Object-Only
CTANH	New	CISO	Object-Only
CTAOC	New	CTAL	Assembler
CTAOR	New	CTAL	Assembler
CTAPEC	New	CTAL	Assembler
CTAPEO	New	CTAL	Assembler
CTAPER	New	CTAL	Assembler
CTAPEW	New	CTAL	Assembler
CTASCN	New	CISO	Object-Only
CTASNC	New	CTAL	Assembler
CTBSPC	New	CTAL	Assembler
CTCFM	New	CTAL	Assembler
CTCFMD	New	CTAL	Assembler
CTCLSC	New	CTAL	Assembler
CTCNTL	New	CTAL	Assembler
CTCPOR	New	CTAL	Assembler
CTCPTR	New	CTAL	Assembler
CTDEAL	New	CTAL	Assembler
CTDSPC	New	CTAL	Assembler
CTDSPQ	New	CTAL	Assembler
CTDXPD	New	CISO	Object-Only
CTEXP	New	CISO	Object-Only
CTFLUS	New	CTAL	Assembler
CTGATT	New	CTAL	Assembler
CTGTYP	New	CTAL	Assembler
CTIMEF	New	CISO	Object-Only
CTLGNC	New	CISO	Object-Only
CTOD	New	CISO	Object-Only
CTOL	New	CISO	Object-Only
CTOPNC	New	CTAL	Assembler
CTOU	New	CISO	Object-Only
CTOURC	New	CTAL	Assembler
CTOUTC	New	CTAL	Assembler
CTRCV	New	CTAL	Assembler
CTRDC	New	CTAL	Assembler
CTREWC	New	CTAL	Assembler
CTRINT	New	CISO	Object-Only
CTRSVC	New	CTAL	Assembler
CTRT	New	CISO	Object-Only
CTRTS	New	CTAL	Assembler

Table 17. Changes to Library Modules for ISO-C Support (continued)

Library Module Name	New, Changed, or No Longer Supported?	Library	Type
CTSCSN	New	CISO	Object-Only
CTSEND	New	CTAL	Assembler
CTSERR	New	CTAL	Assembler
CTSRAZ	New	CISO	Object-Only
CTSYNC	New	CTAL	Assembler
CTTAT	New	CISO	Object-Only
CTTEST	New	CTAL	Assembler
CTWAIT	New	CTAL	Assembler
CTWRTC	New	CTAL	Assembler
CTZDIF	New	CISO	C Language
CUATBC	New	CTAL	Assembler
CUBTOP	New	CISO	Object-Only
CUNFRC	New	CTAL	C Language
CUNFRX	New	CTAL	Assembler
CUNHKA	New	CTAL	C Language
CUNLKC	New	CTAL	Assembler
CVSPTF	New	CISO	Object-Only
CWAITC	New	CTAL	Assembler
CWCMB	New	CISO	Object-Only
CWCMB5	New	CISO	Object-Only
CWCOLL	New	CISO	Object-Only
CWCSID	New	CISO	Object-Only
CWCTYP	New	CISO	Object-Only
CWCWDT	New	CISO	Object-Only
CWFTME	New	CISO	Object-Only
CWGTAC	New	CTAL	Assembler
CWISTY	New	CISO	Object-Only
CWLEN	New	CISO	Object-Only
CWNCPY	New	CISO	Object-Only
CWSMBS	New	CISO	Object-Only
CWSWDT	New	CISO	Object-Only
CWTOLW	New	CISO	Object-Only
CWTOPC	New	CTAL	Assembler
CWTOPT	New	CTAL	Assembler
CWTOUP	New	CISO	Object-Only
CWXFRM	New	CISO	Object-Only

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 18 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered alphabetically by the equate name.

ISO-C support has reserved all the CINFC equates from 315 to 324. Those currently defined are listed in Table 18.

Table 18. Changes to CINFC Tags for ISO-C Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMISOC	315	New
CMMICD	316	New
CMMEFC	319	New
CMMRTN	320	New

Copy Members

Table 19 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 19. Changes to Copy Members for ISO-C Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Changed	Add ISO-C comments.
CAPE	Control Program	CCNUCL	Changed	Support CCENBK.
CAPT	Control Program	CCNUCL	Changed	Support CCENBK.
CCIT	Control Program	CCNUCL	Changed	Support CCENBK.
CCPU	Control Program	CCNUCL	Changed	Support CCENBK.
CEET	Control Program	CCNUCL	Changed	Support CCENBK.
CHSZ	Control Program	CCNUCL	Changed	Create immediate/deferred entry control transfer.
CICR	Control Program	CCNUCL	Changed	Support CCENBK.
CICS	Control Program	CCNUCL	Changed	Macro Service Routines (2).
CTME	Control Program	CCNUCL	Changed	Changes external interrupt handler to tolerate ISO-C programs.
CCEB	Control Program	CCENBK	Changed	Handled program interface translations for ISO-C support. Moved to CCENBK.
CCEC	Control Program	CCENBK	Changed	Handled program interface translations for ISO-C support. Moved to CCENBK.
CCED	Control Program	CCENBK	New	Enter/Back routines for the ISO-C load module.
CCEF	Control Program	CCENBK	New	FETCH the ISO-C program from file.
CCEG	Control Program	CCENBK	New	Process program version records (PVRS).
CCE4	Control Program	CCIISC	Changed	Support CCENBK.
CDC1	Control Program	CCDCOL	Changed	Added collection data for DLMS.
CEFE	Control Program	CCTAPE	Changed	Updates made for error recovery.
CEFI	Control Program	CCFADC	New	CP \$FINDC macro to accept DELB and IOB set up.
CEFJ	Control Program	CCFADC	Changed	Fixed segment title.

Table 19. Changes to Copy Members for ISO-C Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CIDP	Control Program	CCCPSE	Changed	Internal static override bitmap table.
CPER	Control Program	CCCPSE	Changed	Change implementation of PER support to tolerate ISO-C programs.
CPSE	Control Program	CCCPSE	Changed	Change system error code to detect ISO-C register conventions.
CPSL	Control Program	CCCPSE	Changed	Change system error dump to format ISO-C structures.
CPSF	Control Program	CCCPSF	Changed	Incorrect R11, R12 contents check removed.
CIS0	Control Program	CCISOC	New	ISO-C data area and library support directory.
CIS1	Control Program	CCISOC	New	ISO-C environment data and support.
CIS2	Control Program	CCISOC	New	ISO-C static and stack routines.
CJIL	Control Program	CCSONA	Changed	Added new entry point EJFFINDC for IOBs.
CJIV	Control Program	CCRCSC	Changed	Support CCENBK.
CLHH	Control Program	CCSTOR	Changed	Heap storage management changes.
CLHV	Control Program	CCSTOR	Changed	GTSTK and related GMNBC changes.
CL02	Control Program	CCLANG	Changed	Commentary changes.
CMKH	Control Program	CCMCKH	Changed	Reload TPF registers.
CTIN	Control Program	CCCTIN	Changed	Variable size stack and heap, page and segment tables in ECB virtual memory (EVM).
CT00	Control Program	CCCTIN	Changed	Body of new stack and help related fields from keypoint.
CT38	Control Program	CCCTIN	Changed	Compute stack and heap size. Copy AOLA address into the ECB activation table (EAT) slots.
CT40	Control Program	CCCTIN	Changed	Stack and heap, page and segment tables carved.
CT81	Control Program	CCCTIN	Changed	Process DLM Enter/Back macro trace overlays.
CUSR	Control Program	CCUEXT	Changed	New user exit support. Support CCENBK.
CVF3	Control Program	CCVFAC	Changed	Bypass ECB counts for CP DASD I/O; enable MI0CPPIO bit; bypass core block allocation.
CRTT	Control Program	CCUTIL	Changed	DLM Enter/Back intercept routines.
IB01	Control Program	IPLB	Changed	Verify address range of virtual storage requirements plus real memory.

CSECTs

Table 20 summarizes CSECT changes. This information is presented in alphabetic order by the name of the CSECT.

Table 20. Changes to CSECTs for ISO-C Support

CSECT	New, Changed, or No Longer Supported?	Description of Change
CCENBK	New	Enter/back trace changes due to DLMs.
CCFADC	Changed	New CEFI copy member.
CCISOC	New	ISO-C support services.

Table 20. Changes to CSECTs for ISO-C Support (continued)

CSECT	New, Changed, or No Longer Supported?	Description of Change
CCNUCL	Changed	Moved enter/back trace to new CSECT.
CCSTOR	Changed	GTSTK service and GMNBC changes. Support for ISO-C stack.
CCUEXT	Changed	New user exit and library user exit activation; CCENBK support.
CPLKMP	Changed	Add new CSECTs.

Although the following CSECTs were **not** changed by ISO-C support, you must reassemble them. The CSECTs are CCSONS, CCMCDC, and CCCLHR.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 21 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 21. Changes to Data Macros for ISO-C Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
BK1RP	Changed	No
CK1KE	Changed	Yes
CS0CA	Changed	No
CV0CM	Changed	No
DC0DC	Changed	Yes
DBRREC	Changed	No
DCTBXP	Changed	No
DCTMIO	Changed	Yes
DCTMSG	Changed	No
DCTPFX	Changed	No
DCTUCL	Changed	Yes
IC0CV	Changed	No
IDR0CB	Changed	No
IDSCCA	New	Not Applicable
IDSCID	New	Not Applicable
IDSCSF	New	Not Applicable
ISDCS	New	Not Applicable
ISDEC	Changed	Yes
ISDSA	New	Not Applicable
IDSEAT	Changed	Yes
IDSELD	Changed	Yes

Table 21. Changes to Data Macros for ISO-C Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSFCT	Changed	No
IDSGLB	New	Not Applicable
IDSICD	New	Not Applicable
IDSLCS	New	Not Applicable
IDSLST	New	Not Applicable
IDSLWS	New	Not Applicable
IDSMXP	New	Not Applicable
IDSPAT	Changed	Yes
IDSPNL	Changed	Yes
IDSPRG	New	Not Applicable
IDSPVR	Changed	Not Applicable
IDSTCA	New	Not Applicable
IDSTTR	Changed	Yes
IPSTAT	New	Not Applicable
LDCRL	Changed	Yes
RUNID	Changed	No
SE0MS	Changed	Yes
TPLDR	Changed	Yes
UI2PF	Changed	Yes
UX1PL	Changed	No

General Macros: Table 22 summarizes general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 22. Changes to General Macros for ISO-C Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
ALASC	Changed	No
BACKC	Changed	No
BEGIN	Changed	No
CREDC	Changed	No
CREEC	Changed	No
CREMC	Changed	No
CRETC	Changed	No
CREXC	Changed	No
CROSC	Changed	No
EDCLOC	Changed	No
ENTDC	Changed	No
ENTNC	Changed	No
ENTRC	Changed	No
FINIS	Changed	No
GETLC	Changed	No
GETPC	Changed	No

Table 22. Changes to General Macros for ISO-C Support (continued)

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
GETSC	Changed	No
ICELOG	Changed	No
ICPLOG	Changed	No
MODEC	Changed	No
PROGC	Changed	No
RELPC	Changed	No
SONIC	Changed	No
SWISC	Changed	No
TMSEC	New	Not Applicable
TMSPC	New	Not Applicable
UXCMC	Changed	No
WAITC	Changed	No
WGTAC	Changed	No

Selected Equate Macros: Table 23 summarizes selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 23. Changes to Selected Equate Macros for ISO-C Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No
CMFEQ	Changed	No
CZOCP	Changed	No
CZ1SE	Changed	No
DADFQ	Changed	No
DLTEC	Changed	Yes
ICYCWB	Changed	No
IEQCE2	Changed	No
IEQCE3	Changed	Yes
RTTEQ	Changed	No
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Initialization Program (SIP) Skeleton, Stage I, and Internal Macros (Inner Macros): Table 24 on page 72 summarizes the system initialization program (SIP) skeleton, stage 1, and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck. If the SIP Stage I macro is changed, you must run the appropriate JCL jobs from the SIP Stage II deck.

Table 24. Changes to SIP Skeleton and Internal Macros for ISO-C Support

SIP Skeleton, Stage I, and Internal Macro	New, Changed, or No Longer Supported?
CORREQ	Changed
GENSIP	Changed
SKCTKA	Changed
SKCTKB	Changed
SPPBLD	Changed
SPPGML	Changed
SPCOMP	Changed
SPEDCC	Changed
SPGLB	Changed
SPREPT	Changed
SPTABS	Changed

System Initialization Program (SIP) Stage II Macros: Table 25 summarizes the system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 25. Changes to SIP Stage II Macros for ISO-C Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Macros: Table 26 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 26. Changes to System Macros for ISO-C Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$DCOLC	Changed	No
\$FINDC	New	Not Applicable
\$GSVAC	Changed	Yes
\$GTSTC	New	Not Applicable
DPROC	Changed	No
FTSTC	Changed	Yes
IBMSVC	Changed	Not Applicable
RPVRC	New	Not Applicable
SLNKC	Changed	No
UXITC	Changed	No
VCONC	New	Not Applicable

System Macros (IBM Use Only): Table 27 on page 73 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro.

Table 27. Changes to System Macros (IBM Use Only) for ISO-C Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes

Segments

Table 28 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 28. Changes to Segments for ISO-C Support

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
ACPL	Real-Time Assembler	Changed	Support for >4K load modules.
ALDR	Offline Assembler	Changed	Support for >4K load modules.
BMT3	Real-Time Assembler	Changed	Deactivate DLM enter/back intercepts.
BMT5	Real-Time Assembler	Changed	Set intercepts for DLM external function call.
CBLD	Offline C Language	New	Build tool to produce link decks and JCL.
CCLGER	Assembler	New	ISO-C Germany locale definition.
CELC	Real-Time C Language	Changed	Support program linkage type.
CELF	Real-Time C Language	Changed	Support program linkage type.
CELI	Real-Time C Language	No Longer Supported	Support program linkage type. Moved to CCEG.
CELK	Real-Time C Language	Changed	Support program linkage type.
CIKD	Real-Time C Language	Changed	ZIMAG COPY command (with the PROG parameter specified) support for #XPRG records.
CIKE	Real-Time C Language	Changed	New messages for the ZIMAG COPY command (with the PROG parameter specified).
CILA	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CILB	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CILC	Real-Time C Language	New	Support loading greater than 4K ISO-C load module.
CILD	Real-Time C Language	New	Support loading greater than 4K ISO-C load module.
CILE	Real-Time C Language	New	Support loading greater than 4K ISO-C load module.
CILF	Real-Time C Language	New	Support loading greater than 4K ISO-C load module.
CILG	Real-Time C Language	New	Support loading greater than 4K ISO-C load module.
CILH	Real-Time C Language	New	Support loading greater than 4K ISO-C load module.
CILI	Offline C Language	New	Offline loader common ISO-C functions to process C load modules.
CIL0	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CIL1	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CIL6	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CIPY	Real-Time Assembler	Changed	Do not allow the ZDPGM or ZAPGM command on ISO-C programs.

Table 28. Changes to Segments for ISO-C Support (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CLDF	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CLDJ	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CLDL	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module. Support CCENBK.
CLDZ	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module.
CLEF	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module. Copy AOLA address into ECB activation table (EAT) slots.
CLEM	Real-Time C Language	Changed	Support new record #XPRG.
CLE7	Real-Time C Language	Changed	Support loading greater than greater than 4K ISO-C load module.
CLE9	Real-Time C Language	Changed	Support loading greater than 4K ISO-C load module. Get program size from the program allocation table (PAT).
CLH0	Real-Time Assembler	Changed	Added ISO-C heap structures.
CLH2	Real-Time Assembler	New	Added ISO-C heap structures.
CLIB	Real-Time Assembler	New	Fetch ISO-C library.
CLENG	Assembler	New	ISO-C UK locale definition.
CLLFRN	Assembler	New	ISO-C France locale definition.
CLLITL	Assembler	New	ISO-C Italy locale definition.
CLLOAD	Assembler	New	ISO-C CISO internal C library function.
CLLSPA	Assembler	New	ISO-C Spain locale definition.
CLLTPF	Assembler	New	ISO-C TPF locale definition.
CLLUSA	Assembler	New	ISO-C USA locale definition.
COLO	Real-Time C Language	Changed	Support loading>4K ISO-C load module.
COLP	Real-Time C Language	Changed	Support loading>4K ISO-C load module.
COLR	Offline C Language	Changed	Support loading>4K ISO-C load module.
COLV	Real-Time C Language	Changed	Program version-related information to PVR record.
CPRE	Real-Time Assembler	Changed	Load ISO-C libraries that are allocated PREFETCH.
CPSU	Real-Time Assembler	Changed	Added a message that program size is truncated to 7FFF.
CREA	Offline C Language	Changed	Support CCENBK.
CRLW	Real-Time C Language	New	Resegmentation of CLEM.
CSTRTD	Assembler	New	ISO-C startup code for DLMS.
CSTRTL	Assembler	New	ISO-C startup code for libraries.
CTKS	Real-Time Assembler	Changed	Call CLIB to build ISO-C libraries. Added call to RPVRC to process PVR records.
CVAW	Real-Time Assembler	Changed	Display program allocation table (PAT) linkage and restrict PAT settings for ISO-C support. Display enhancements.
CVA6	Real-Time Assembler	Changed	Display PAT linkage and restrict PAT settings for ISO-C support (the ZDPAT and ZAPAT commands).

Table 28. Changes to Segments for ISO-C Support (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CVA8	Real-Time Assembler	New	Display PAT linkage and restrict PAT settings for ISO-C support (the ZDPAT and ZAPAT commands). Resegment CVAW.
CVOJ	Real-Time Assembler	Changed	Activation/deactivation of DLM enter/back trace overlay.
CYB1	Real-Time Assembler	Changed	Program size changes.
CYB2	Real-Time C Language	Changed	Do not allow the ZAPGM or ZDPGM commands in ISO-C programs.
CYB3	Real-Time Assembler	Changed	Program size changes.
DCR2	Offline Assembler	Changed	Add system errors.
DRVA	Assembler	Changed	Add support for non-TARGET(TPF) compiles.
FMTR	Offline Assembler	Changed	Added new data set type.
FTER00	Offline C Language	Changed	New error message.
FTVA02	Offline C Language	Changed	Program base definition checks.
FTVA03	Offline C Language	Changed	New XPRGn record and made PVRs required.
JRA2	Offline PL/I	Changed	Added DLM information to data collection reports.
JRP1	Offline PL/I	Changed	Added DLM information to data reduction reports.
JRP3	Offline PL/I	Changed	Added DLM information to data reduction reports.
LEDT	Offline Assembler	Changed	Support loading >4K ISO-C load module.
LIBI	Offline C Language	New	Library interface tool main segment.
MASM	Assembler	Changed	Compiles ISO-C source code. Add support for non-TARGET(TPF) compiles.
NLDT	Offline C Language	New	Support loading greater than 4K ISO-C load module.
NLDTRL	Offline C Language	New	Support loading greater than 4K ISO-C load module.
OLDR	Offline C Language	Changed	Support loading greater than 4K ISO-C load module.
RAISST	Offline C Language	New	Common uppercase function.
STUB	Offline C Language	New	Main segment for DLM stub generator tool.
TLDR	Offline Assembler	Changed	Support to load greater than 4K ISO-C load module.
TLDRMN	Offline C Language	New	C main () function for auxiliary loader (TLDR) and general file loader (ALDR)
TOKN	Offline C Language	New	Shared token function.
UELI	Real-Time Assembler	New	#XPRG user exit.
VMADD	Offline C Language	New	For the IBM VM system. Adds text file to textlib.

Although the following segments were **not** changed by ISO-C support, you must reassemble them.

CELA	CELB	CELD	CELE	CELH
CELJ	CELL	CELM	CELN	CELO
CELP	CELR	CELS	CELT	CELU
CELV	CELW	CELX	CELY	CELZ
CEL0	CEL1	CEL2	CEL4	CEL5
CEL6	CEL7	CEL8	CILB	CIL2
CIL3	CIL4	CIL5	CIL7	CLEJ
CLDY	COLC	COLK	COLM	COLN

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 29. Changes to Control Program (CP) User Exits for ISO-C Support

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CLMINT	UCCENV	New	DLM environment initialization.
CSTRTL	UCCCLE	New	Entry to a C library function.
CSTRTL	UCCCLX	New	Exit from a C library function.
CCISOC (CIS2)	UCCCSOE	New	Entry to C stack overflow processing.
CCISOC (CIS2)	UCCCSOX	New	Exit from C stack overflow processing.
CCNUCL (CHSZ)	UCCECB	Changed	The exit itself has not changed but the ECB now contains additional information available through the exit.
CCENBK (CCED)	UCCEFCE	New	DLM external function call exit.
CLMINT	UCCEFCX	New	Exit before DLM function is called.
CLMINT	UCCRTNE	New	DLM return processing entry.
CCENBK (CCED)	UCCRTNX	New	DLM return processing exit.

ECB User Exits: This information is presented in alphabetic order by user exit.

Table 30. Changes to ECB User Exits ISO-C Support

ECB User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
UELI	Not Applicable	Changed	Support new record #XPRG.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See “PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)” on page 1269 for a summary of functional and operational changes by APAR.

Commands

Table 31 on page 77 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 31. Changes to Commands for ISO-C Support

Command	New, Changed, or No Longer Supported?	Description of Change														
ZAPAT	Changed	This command is restricted to CLASS=SHARED for ISO-C programs, DLMs, and libraries.														
ZAPGM	Changed	This command cannot be used with C load modules.														
ZCTKA	Changed	<div>This command now supports the following parameters.</div> <table><tr><th>Parameter</th><th>Description</th></tr><tr><td>EMPS</td><td>Changes the page and segment table size of the maloc heap in EVMs. The size is in megabytes.</td></tr><tr><td>ESPS</td><td>Changes the page and segment table size of the ISO-C stack heap in EVMs. The size is in megabytes.</td></tr><tr><td>MMHS</td><td>Changes the maximum number of frames that an ECB can acquire in maloc heap. The maximum storage can not exceed the page and segment table size for maloc heap.</td></tr><tr><td>MSHS</td><td>Changes the maximum number of frames that an ECB can acquire in ISO-C stack heap. The maximum storage can not exceed the page and segment table size for the stack heap.</td></tr><tr><td>ISAS</td><td>Changes the number of frames acquired for initial stack allocation.</td></tr><tr><td>ISAI</td><td>Changes the number of frames acquired for ISO-C stack increment by the stack overflow routine.</td></tr></table>	Parameter	Description	EMPS	Changes the page and segment table size of the maloc heap in EVMs. The size is in megabytes.	ESPS	Changes the page and segment table size of the ISO-C stack heap in EVMs. The size is in megabytes.	MMHS	Changes the maximum number of frames that an ECB can acquire in maloc heap. The maximum storage can not exceed the page and segment table size for maloc heap.	MSHS	Changes the maximum number of frames that an ECB can acquire in ISO-C stack heap. The maximum storage can not exceed the page and segment table size for the stack heap.	ISAS	Changes the number of frames acquired for initial stack allocation.	ISAI	Changes the number of frames acquired for ISO-C stack increment by the stack overflow routine.
Parameter	Description															
EMPS	Changes the page and segment table size of the maloc heap in EVMs. The size is in megabytes.															
ESPS	Changes the page and segment table size of the ISO-C stack heap in EVMs. The size is in megabytes.															
MMHS	Changes the maximum number of frames that an ECB can acquire in maloc heap. The maximum storage can not exceed the page and segment table size for maloc heap.															
MSHS	Changes the maximum number of frames that an ECB can acquire in ISO-C stack heap. The maximum storage can not exceed the page and segment table size for the stack heap.															
ISAS	Changes the number of frames acquired for initial stack allocation.															
ISAI	Changes the number of frames acquired for ISO-C stack increment by the stack overflow routine.															
ZDPAT	Changed	This command displays program linkage type and base PAT address.														
ZDPGM	Changed	This command cannot be used with C load modules.														

Messages and System Errors

Table 32 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 32. Changes to Messages and System Errors for ISO-C Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ACPL0048E	Online	No Longer Supported
ACPL0049E	Online	No Longer Supported
ACPL0076E	Online	No Longer Supported

Table 32. Changes to Messages and System Errors for ISO-C Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ACPL0077E	Online	No Longer Supported
ACPL0097W	Online	New
ACPL0098E	Online	New
ACPL0099E	Online	New
ACPL0100E	Online	New
ACPL0101E	Online	New
ACPL0102E	Online	New
ACPL0103E	Online	New
ALDR0901E	Offline	New
ALDR0902E	Offline	New
ALDR0903E	Offline	New
ALDR0904E	Offline	New
ALDR0905E	Offline	New
APAT0015E	Online	New
CBLD0000I	Offline	New
CBLD0400W	Offline	New
CBLD0401W	Offline	New
CBLD0410W	Offline	New
CBLD0801E	Offline	New
CBLD0802E	Offline	New
CBLD1201T	Offline	New
CBLD1208T	Offline	New
CBLD1211T	Offline	New
CBLD1222T	Offline	New
CILC0101E	Online	New
CILD0104E	Online	New
CILD0105E	Online	New
CILD0106W	Online	New
CILE0102E	Online	New
CILE0103W	Online	New
CILF0107E	Online	New
CILF0108E	Online	New
CILF0109W	Online	New
CILF0110E	Online	New
CILG0111E	Online	New
CILH0111E	Online	New
CPSF0003E	Online	No Longer Supported
CTKA0003I	Online	New
CTKA0004I	Online	New
CTKA0059E	Online	New
DADF0102E	Online	No Longer Supported
DADF0126E	Online	New
DPAT0001I	Online	No Longer Supported
DPAT0002I	Online	No Longer Supported

Table 32. Changes to Messages and System Errors for ISO-C Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DPAT0003I	Online	New
DPAT0004I	Online	New
FCTB0107E	Offline	New
IMAG0079E	Online	New
IMAG0080E	Online	New
IMAG0081E	Online	New
IMAG0082E	Online	New
IMAG0083E	Online	New
LIBI0801E	Offline	New
LIBI0802E	Offline	New
LIBI0810E	Offline	New
LIBI0815E	Offline	New
LIBI0820E	Offline	New
LIBI0821E	Offline	New
LIBI0822E	Offline	New
LIBI0823E	Offline	New
LIBI0824E	Offline	New
LIBI1201T	Offline	New
LIBI1202T	Offline	New
LIBI1212T	Offline	New
LIBI1213T	Offline	New
LIBI1250T	Offline	New
LIBI1251T	Offline	New
LIBI1252T	Offline	New
LIBI1253T	Offline	New
LIBI1254T	Offline	New
LIBI1260T	Offline	New
STUB0001I	Offline	New
STUB0010W	Offline	New
STUB0100E	Offline	New
STUB0101E	Offline	New
STUB1200T	Offline	New
TLDR0200T	Offline	New
TLDR0201T	Offline	New
TLDR0202T	Offline	New
TLDR0210T	Offline	New
TLDR0211T	Offline	New
TPFL0002W	Offline	New
TPFL0003W	Offline	New
NOT LOADED — PGM CAN ONLY BE LOADED IN THE BSS	Offline	New
NOT LOADED — PGM NOT FOUND IN LIBRARY	Offline	New
NOT LOADED — PGM NOT REALTIME	Offline	New

Table 32. Changes to Messages and System Errors for ISO-C Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
PARS LIST vv NOT AVAILABLE — LOAD ENDS	Offline	New
WARNING — REP CARD NOT SUPPORTED FOR PROGRAM MODULE	Offline	New
WARNING — PROG-MOD-BASE CLEAR CARD INPUT, PROGRAM MODULE WILL BE CLEARED	Offline	New
00004D	System Error	New
00004F	System Error	No Longer Supported
000061	System Error	New
000062	System Error	New
000063	System Error	New
000064	System Error	New
000065	System Error	New
000066	System Error	New
000067	System Error	New
000068	System Error	New
000069	System Error	New
00006A	System Error	New
00006B	System Error	New
00006C	System Error	New
000077	System Error	New
000079	System Error	New
094000	System Error	New
094001	System Error	New
094002	System Error	New
094004	System Error	New
094005	System Error	New
094006	System Error	New
094007	System Error	New
094008	System Error	New
094009	System Error	New
09400A	System Error	New
09400B	System Error	New
09400C	System Error	New
09400D	System Error	New
09400F	System Error	New

Performance or Tuning Changes

The following packaging elements affect TPF performance with ISO-C support.

A TARGET(TPF) program with minimal changes can be transformed to a C load module but some further work will help performance. By linking together several segments rather than making a one-for-one conversion, functional calls between segments are avoided. The overhead of a function call within a load module is

significantly less than the overhead of a call to an external DLM. The process of linking several segments together reduces the number of external functions, therefore increasing performance.

Linking several segments together has a disadvantage: because each load module has only one entry point function, some functions within the load module will no longer be callable from outside the load module. If the functions of multiple entry points to the same segment are useful, you may consider using a common segment to serve the several ones that represent each entry point. You also may want to consider forming library functions out of commonly used routines.

TPF Application Programming discusses the performance trade offs for the ISO-C function types. In brief, inline functions perform faster than functions internal to the load module, internal faster than library functions, and library faster than DLMs.

The compiler does not distinguish between writable static and read-only static. There is a performance overhead for reentrant static, particularly when calling library functions. Use the RENT compile-time option when compiling writable static. Functions considered naturally reentrant do not need to be compiled using the RENT option and the overhead associated with reentrant static is avoided. The RENT parameter should be used judiciously for library functions, because it entails performance concerns. If a segment does not specify the RENT option and it does include writable static data a system error occurs.

Data Collection Changes

There are several new or changed data collection functions that provide new information about the TPF 4.1 system.

Enter/Back Trace: The new DLM linkage support added to enter/back trace invokes the program collector intercept for all:

- DLM enters to programs
- DLM returns to programs
- Program enters to DLMs
- Program returns to DLMs.

No new reduction reports are provided for ISO-C DLM enter/back trace activity, although a new field is provided under the current report.

Storage Management: Storage management routines have added the ISO-C stack frames to the heap frame usage data.

The usage of the CE2MPF field has changed. In the TPF 4.1 system this field was used to indicate how big the managed heap (MALOC) was able to grow. The check for the maximum number of frames has moved to \$GMNBC and this field now indicates the total heap storage size allowed which includes requests from both MALOC and \$GMNBC.

Core Resident Program Area (CRPA): All ISO-C programs and libraries are loaded into the 31-bit CRPA. This is reflected in the CRPA report.

Performance Critical Macro Area

TARGET(TPF) C support provided a C library macro area (CSTKSVCL) so performance critical TPF macros could be generated without the overhead of allocating a new C stack frame.

For ISO-C support the library work space (LWS) is mapped by the IDSLWS DSECT and replaces the performance critical macro area. To maintain compatibility, all user tags in DSECT ICS0TK have a corresponding tag in the IDSLWS DSECT. The LWS is used by the TPF API functions that issue TPF macro calls. Addressability to the area is established by TMSPC. Only the functions that update the area should access data stored in the area.

The TMSPC and TMSEC macros support performance critical macros by providing access to the LWS area, called CSTKSVCL. To use this area for ISO-C functions, code TMSPC LWS=Rx.

Because access to the LWS is different than access to the performance critical macro area, all C library functions that use this area must be modified. The tag names in the critical area are different and code that accesses the critical area must be removed.

As is the case with the performance critical macro area, the LWS can only be used for macros that can not directly or indirectly run another C function. The size of the LWS is accessed through the IDSLWS DSECT. You can make the user expansion area larger by coding a routine in the CENV user exit.

Optimization level 2 improves the performance of ISO-C programs.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The system initialization program (SIP) automatically builds ISO-C applications and libraries provided by IBM. You must customize the JCL and tools provided to build your own ISO-C libraries and applications.

Changes to CRPA

The size of the 31-bit core resident program area changes due to making all ISO-C programs and libraries core resident. This value must be reflected in CORREQ and CTKA. The minimum amount required for the shipped libraries CTAL and CISO is 403920 bytes. The libraries require 108 #XPRG records for storage on DASD.

	Size in memory (bytes)	Size on file (# XPRGs)
CTAL	87 056	25
CISO	316 864	83
	-----	---
TOTAL	403 920	108

Compiles and Builds

The following required activities are performed automatically by SIP:

- ISO-C programs and libraries provided by IBM are compiled or assembled (through MASM)
- C Stubs are generated for all programs called by ISO-C load modules (through the C stub generator tool)
- Library function stubs and LIBVECs for each library are built (through the library interface tool)
- ISO-C load modules are prelinked and link edited (through the C build tool).

You must customize the JCL and tools provided for your own libraries and applications.

SPPBLD Macro in SPPGML

The SPPBLD macro has 3 new program types:

- ISO-C source (ISC)
- ISO-C assembler source (ISA)
- ISO-C link module (ICL).

In addition to the program types there are parameters to specify program reentrancy and to generate a C stub:

- For an ISC type program, RENT=YES|NO specifies whether an ISO-C source program is to be compiled with the RENT or NORENT compiler option. The default is RENT=NO.
- For a real-time type program, STUB=YES|NO specifies whether a stub is to be created for a program. Stubs are required if a program will be called by another ISO-C program. The default is STUB=NO.

RAMFIL Macro

#PVR records are now required.

A new required record type has been added, which is #XPRG. This 4 KB record type holds executable ISO-C code. #XPRG records are pointed to by #PROG records. Ordinals for #XPRG records are kept in #PROG records associated with each load module. The number of #XPRG records required can be estimated using the following formula:

$$\begin{array}{lcl} \text{Number \#XPRGn} & \text{number of 4 KB} & \text{number of overflow} \\ \text{records for a} & \text{records for} & \text{directory records} \\ \text{program} & \text{machine code} & \text{needed} \\ \\ & = \frac{\text{size_of_module}}{4096} + \frac{(\text{size_of_module}) / 4096}{500} \end{array}$$

Allocation Changes

TARGET(TPF) C applications that currently span several program segments, if they are merged into one ISO-C program, will require only a single PAT entry for the ISO-C load module after migration to ISO-C support. Program segments linked to an ISO-C load module can have their IBMPAL or USRTPF entries reused or removed (changed to SPARE records). This is also true for multiple run-time library functions merged into a single ISO-C library.

The program allocation table entry for ISO-C DLMs and libraries should specify PATTYPE=SHARED. This means that a single copy of the program code is used instead of multiple copies. The PATTYPE=SHARED condition is forced during restart. Because ISO-C support is required to be reentrant, program sharing is not a problem.

The PATLINK field has been added to the program allocation table (PAT) to represent type of program (that is, whether it is basic assembler language, a dynamic link module, an ISO-C library, or TARGET(TPF)).

Allocator (SALO) Changes

Allocate new ISO-C libraries as shared with a 31-bit addressing mode and the PRELOAD option set. If an ISO-C DLM or library is loaded to the system using an existing SAL/PAT entry, it is not necessary to change the allocation characteristics. The main storage copy of each ISO-C DLM or Library PAT entry is treated as

shared. Restart interrogates all PVR entries (which now contain a field indicating the program type – BAL, TARGET(TPF), DLM, library) and updates the main storage copy PAT entries appropriately.

Loading Process Changes

There are the following changes to the loading process:

- The offline steps for creating and loading ISO-C applications and libraries differ slightly from those previously used to process E-type assembly language and TARGET(TPF) programs. ISO-C applications and libraries should be viewed as a new class of E-type programs. ISO-C applications and libraries must be link edited into load module format before they can be loaded onto a TPF 4.1 system. Previously, E-type programs could only be loaded if they were in object module format.
- The name of the offline program to run when executing the general file loader or the auxiliary loader has been changed. To share common code, the offline programs for these two loaders are linked into a common offline loader program, TPFLDR. The JCL used to run the general file loader and the auxiliary loader must be changed to specify the new common offline loader program. A parameter in the JCL is used to specify whether the general file loader is to be run or the auxiliary loader is to be run.
- The TPF loader has been enhanced to load ISO-C applications and libraries. This requires the addition of a new DD name card (//LOADMOD) to the JCL job stream. STEPLIB DD cards specifying the libraries are also required. The loader supports a block size of up to 32K, for data sets containing ISO-C load modules. The data sets containing the ISO-C load modules must be specified with this new DD name. The DS LOADMOD cards precede the object DS cards when loading E-type programs. The REGION size keyword on the EXEC card for both ALDR and TLDR must be updated. OLDR does not support ISO-C loading.

Note: ISO-C E-type loader support is provided with PUT 3. See “ISO-C E-Type Loader Support (APAR PJ19966)” on page 127 for more information.

- The load deck cards for the general file loader and the auxiliary loader have been made interchangeable. A common load deck can be maintained for use with either the general file loader or the auxiliary loader.

Online System Load Changes

There is a change to the ACPL message report.

Publication Changes

Table 33 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 33. Changes to TPF Publications for ISO-C Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C Language Support Application Programming</i>	Not Applicable	This publication is no longer part of the TPF library. The information that was found in this publication was merged into <i>TPF Application Programming</i> .
<i>TPF Application Programming</i>	GTPAPP02	Contains information from <i>TPF C Language Support Application Programming</i> and <i>TPF C Language Support User's Guide</i> .
<i>TPF C Language Support Reference Summary</i>	Not Applicable	Functions added and changed.

Table 33. Changes to TPF Publications for ISO-C Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF C Language Support User's Guide</i>	GTPCLU02	Functions added and first part merged.
<i>TPF Concepts and Structures</i>	GTPCON01	Architecture changed.
<i>TPF General Macros</i>	GTPGEN02	Macros added.
<i>TPF Library Guide</i>	GTPDOC02	Updated with definitions for new terminology in the master glossary.
<i>TPF Main Supervisor Reference</i>	GTPMSR01	Main processor changes.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for ISO-C support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG02	Updated with migration considerations for ISO-C support.
<i>TPF Operations</i>	GTPOPR02	Updated with information about the commands that were added and changed for ISO-C support.
<i>TPF Program Development Support Reference</i>	GTPPDR02	Tracing changed.
<i>TPF Programming Standards</i>	GTPPSM02	Prologs added and changed.
<i>TPF System Generation</i>	Installation parameters changed.	
<i>TPF System Installation Support Reference</i>	GTPINR02	User exits and loaders changed.
<i>TPF System Macros</i>	GTPSYS02	Macros added.

Coexistent Configuration Changes

Application level coexistence is supported (that is, ISO-C and TARGET(TPF) programs can exist in the same processor).

Existing applications do not need to be recompiled. TARGET(TPF) and BAL applications which currently run on the TPF 4.1 system, can be loaded to the TPF 4.1 ISO-C system without change.

Functions such as the auxiliary loader are written in TARGET(TPF) to allow the new support to be loaded using existing functions.

For ISO-C assembler segments code the BEGIN macro with the TPFISOC=YES parameter (the default is TPFISOC=NO).

Host System Changes

ISO-C support requires changes to your existing procedures for compiling C programs. In addition, new procedures for linking load modules and building libraries are required. Several tools are provided to help with these procedures:

- Build Tool

A build tool is provided to automate building ISO-C load modules. The tool takes a list of object modules to be contained in the load module. The prelinker should use the NONCAL option to link only the program stubs. Though the tool runs on IBM VM and IBM MVS systems, it only produces JCL to run on an IBM MVS system. If you want to maintain object libraries on the IBM VM system, you must modify the tool.

- Library Interface Tool

The library interface tool provides a means for defining libraries. Each library is assigned its own, unique library ordinal. These library ordinals must be managed carefully. When conflicts arise, the libraries must be rebuilt, the interface relinked, and the libraries reloaded.

- DLM Stub Generator Tool

The DLM stub generator tool adds DLM call stubs to an object library.

- Updates to Source and Object Libraries

Changes to your source library system may be needed. The name of the object modules within the load module can be 8 characters long (including a 2-character version code).

See *TPF Application Programming* for more information about these tools.

Application Programming Interface (API) Changes

There are the following changes to the application programming interface (API):

- Changes to Header Files

TPFEQ is not required for ISO-C support and does not `#include` the same headers as it did for `TARGET(TPF)`.

Header files and macros contain conditional compilation or assembly statements that allow double use for both non-ISO-C (`BAL` and `TARGET(TPF)`) and for ISO-C support.

- Changes to Prologs and Epilogs

The `TMSPC` macro in ISO-C support corresponds to the `ICPLOG` macro in `TARGET(TPF)`. The `TMSPC` macro is used to write assembly language routines. The interface begins by preserving the C environment and restoring the TPF register conventions. It can also allocate a stack frame for the function.

The `TMSEC` macro in ISO-C support corresponds to the `ICELOG` macro in `TARGET(TPF)`. It is required for writing C functions in assembly language. The `TMSEC` macro restores registers and returns the environment for the calling C language program. In addition if a stack frame is allocated by `TMSPC`, it is released by `TMSEC`.

The `PPANAME` parameter of the `TMSPC` macro provides a way to place a name in the name field (`PPA1`) in `TMSPC`. This is useful for debugging. See the `TMSPC` macro in *TPF General Macros* for more information.

- Several Changes to `TARGET(TPF)` are Required to Convert to ISO-C Support:

- Once ISO-C support has been added to your system, if a `TARGET(TPF)` program needs to be compiled, the `DEFINE(_TARGET_TPF)` C/370 compiler option must be specified. `DEFINE(_TARGET_TPF)` can either be specified as a command line parameter to the compiler or it can be added to the source code as `#DEFINE _TARGET_TPF`. Header files and macros will produce ISO-C compatible code unless `_TARGET_TPF` is defined.
- `TARGET(TPF)` functions that use the ECB field `CE1STK` must be changed to use the ECB field `CE3SPTR` instead for the address of the current stack frame.
- `TARGET(TPF)` functions that access fields `ICS0TK` tags other than `CSTKLBAS` and `CSTKMIN` must be changed to use the ISO-C stack frame. See the `IDSDSA DSECT` for more information.
- `TARGET(TPF)` functions that use the performance critical macro area or the user areas in the initial stack frame, or that access their caller's stack frame must be changed to use the library work space `LWS` and the ISO-C structures. See the `IDSLWS` and `IDSDSA DSECTs` for more information.

ISO-C support has a different but equivalent area for performance critical macros. TARGET(TPF) functions that use the performance critical area must be recoded when migrated to ISO-C support.

- TARGET(TPF) calls to FACE and FACS implemented using #pragma map, #pragma linkage, and function prototype can be migrated to ISO-C support by removing the #pragma linkage directive provided the call linkage stubs (for FACE and FACS) are available in an autocall library during prelinking.
- The length of programs and load modules should now be obtained from the PAT slot. The field name is PATPSIZE in the IDSPAT DSECT.

A minimal migration strategy can involve putting an ISO-C prolog and epilog macro around a call to an unmodified TARGET(TPF) function as long as the function uses structures unmodified by ISO-C support. The TMSPC prolog macro requires the MIGRATION=YES parameter in this case to handle the necessary register switching.

- Change to the @@TRT Module

The CTRT40 object module (OCO), found in the ACP.OBJ.RELv PDS, must be copied to the ACP.CLIB.RELv PDS and renamed to @@TRT. Failure to do this can cause the prelink step of an ISO-C DLM or Library to fail with RC=4 and the message

WARNING EDC4015: Unresolved references are detected: @@TRT

Database Changes

There are changes for the #PVR and #XPRG records.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration and Installation Considerations

This section provides information about migrating and installing ISO-C support.

Before You Install ISO-C Support

1. Obtain education about how ISO-C support works for TPF system programmers.
2. Ensure the proper C environment is set up.
3. Determine the impact to the offline/source library to accommodate new ISO-C segment types.
4. Analyze and adjust offline application program build procedures to include the prelink and link edit steps and creation of the C libraries (CTAL and CISO).

Note: CTAL is the TPF API library and CISO is the standard C library.

5. Do the following for an IBM MVS system only:
 - a. Load the ISO-C support tapes on DASD storage.
 - b. Copy the CTRT40 module from the ACP.OBJ.RELv PDS to the ACP.CLIB.RELv PDS and rename it to @@TRT.
 - c. Create the C libraries (CTAL and CISO) and the locales.

See *TPF Application Programming* for more information about creating C libraries.

6. Consider modifying gets and puts according to the requirements of your complex:
 - The ISO-C support implementation of scanf calls gets to receive text from the core block attached to data level D0. The ISO-C support implementation of gets reads each character of input text and returns EOF when it reaches the #EOM character.
 - The ISO-C support implementation of printf calls puts to send text to EBROUT. The ISO-C support implementation of puts runs the WTOPC macro to send an unsolicited message without a header each time it is passed a new-line character (-n) or its buffer is filled.
7. Migrate the user C libraries and TARGET(TPF) programs:
 - a. Educate application programmers about writing ISO-C applications for the TPF 4.1 system.
 - b. Investigate and perform the updates needed to migrate the user C library functions.
 - c. Investigate and perform the updates needed to migrate the TARGET(TPF) programs to ISO-C support.
 - d. Make the library function source updates and use new procedures to create the library load modules.
 - e. Make any needed source updates and use new procedures to create ISO-C load modules.
8. Provide new procedures for compiling ISO-C applications to your users.

Additional Information:

See *TPF Application Programming* for more information about the C libraries.

Pool Expansion (PXP) Support (APAR PJ17912)

The following section discusses the migration considerations for pool expansion (PXP) support (referred to as *new pool support* from this point forward).

Prerequisite APARs

See the APEDIT for APAR PJ17912 for information about prerequisite APARs.

Functional Overview

In the TPF 4.1 system today, the system is limited to 64-K file pool directories (where 64-K equals 65 536, which is the largest number that can be represented by a halfword field). With the new pool support you can:

- Expand your database capacity up to:
 - 65 536 file pool directories for each short-term pool section
 - 16 777 216 file pool directories for each subsystem.
- Exploit the file addressing range provided by the file address reference format 4 (FARF4) and file address reference format 5 (FARF5) that exists in the TPF 4.1 system today. See *TPF Database Reference* for more information about the file address reference formats provided by the TPF 4.1 system.
- Have a complex of 2 or more processors coexist indefinitely, as long as the limits of the pool format currently defined in your complex are not exceeded. Coexistence includes a mix of processors that have migrated from the pool format currently defined in your complex to the new pool support, as well as those processors still using your current pool format.
- Migrate all subsystems on a processor at the same time.
- Take advantage of an increase in offline performance because DYOPM now runs above 16 MB on an IBM MVS system.

Changes to the Pool Maintenance Package

Changes have been made to the following areas of the pool maintenance package for the new pool support:

- Halfword directory ordinals
- Functions that access halfword fields
- Offline pool maintenance program (DYOPM)
- Keypoint retrieval and filing
- Utilities and functions accessing keypoint 9 (CTK9) and the CY\$CR header record.

A discussion about these changes follows.

Halfword Directory Ordinals: The following changes have been made:

- The halfword directory ordinal field is found in keypoint 9 (CTK9) in an area described by the CY2KT data macro.
Some fields were expanded from halfword directory ordinal fields to fullword directory ordinal fields or 3-byte fields to improve ease-of-use.
- The CY\$CR short-term header records were expanded due to the new CY2KT data macro format.
- The CY1NTB recoup table entries were expanded from 2 bytes to 4 bytes. Therefore, the table size doubled.

Functions that Access Halfword Fields: You must modify any user-defined functions that access a halfword directory field to access a 3 or 4 byte field.

Offline Pool Maintenance Program (DYOPM): To support such a large number of file pool directories, the offline pool maintenance program (DYOPM) has been enhanced to use storage above 16 MB under the IBM Multiple Virtual Storage (IBM MVS) system. *DYOPM* is a program that runs under the IBM MVS system and contains those parts of the pool maintenance package that do not require direct access to the online directory records. DYOPM interfaces with the following programs through the pool maintenance general file (DGF):

- Online directory generation (DYDG)
- Online directory update (DYDU)
- Online pool area deactivation (DYDD)
- Online directory capture (DYDK)
- Reconcile file pool counts (DYDC).

Critical Information for Using DYOPM

- The TPF 4.1 system only uses the new version of DYOPM **after** converting to the new keypoint 9 (CKT9) format included with the new pool support.
- The existing version of DYOPM can only be used on an unmigrated processor.
- DYOPM cannot be run on a migrated processor in a complex that has not been converted.

See “Pool Conversion” on page 91 for more information about pool conversion.

See *TPF Database Reference* for more information about DYOPM and the pool maintenance package.

Keypoint Retrieval and Filing: The following changes have been made:

- The CYYM keypoint retrieval segment was modified to call the new REARRANGE_CTK9 function (CYH0).
- The CYA keypoint filing segment was modified to call the new DEARRANGE_CTK9 function (CYH1).

Utilities and Functions Accessing Keypoint 9 (CTK9): If you have any user-defined utilities or functions accessing keypoint 9 (CTK9) or the CY\$CR header record, you must modify those utilities or functions to use the following functions:

- REARRANGE_CTK9 (CYH0)
- DEARRANGE_CTK9 (CYH1)
- GET_CY\$CR (CYH2)
- FILE_CY\$CR (CYH3).

Once you make these modifications, you must put the changed segments in the same image as the new pool support. By doing so, you can take full advantage of the migration path provided by IBM to convert your complex to the new pool support.

Pool Conversion

To use the new pool support, you must convert your complex in 2 stages.

- **Stage 1:**

Stage 1 is performed on a processor-by-processor basis. In this stage you will migrate each processor from the pool format currently defined in your complex to the new pool support, one processor at a time, without a planned complexwide outage. During this migration, the pool format currently defined in your complex remains on file in DASD. This is called *pool migration*.

Critical Information for Using DYOPM

At this point:

- The existing version of DYOPM can only be used on an unmigrated processor.
- DYOPM cannot be run on a migrated processor in a complex that has not been converted. If you want to run DYOPM before conversion is completed, DYOPM must be run on an unmigrated processor. To do this, see “Scenario to Fall Back Migrated Processors” on page 104.

- **Stage 2:**

Stage 2 is performed complexwide on a subsystem-by-subsystem basis **after** you have completed Stage 1 for every active processor in your complex. In Stage 2 you will convert the pool data structures from the pool format currently defined in your complex to the new pool support. This is called *pool conversion*. When pool conversion is completed, the new pool data structures reside both in core on each migrated processor and on file in DASD.

Use the new ZPMIG commnd to start pool conversion. Using this command, you can:

- Convert the pool data structures from the pool format currently defined in your complex to the new pool support. Do this by entering the ZPMIG command with the CONVERT parameter specified.

Note: If your complex is loosely coupled, you must ensure that the core data structures are current on each processor in the complex **before** entering the ZPMIG command. Do this by entering the ZDFPC command from each processor. This will ensure that CTK9 is filed out to core with the appropriate migration bits set.

- Return the new pool support back to the pool format previously defined in your complex. Do this by entering the ZPMIG command with the FALLBACK parameter specified.
- Display the migration state of **each** processor in the complex. Do this by entering the ZPMIG command with the STATUS parameter specified.

Critical Information for Using DYOPM

At this point you must use the new version of DYOPM because keypoint 9 (CTK9) has been converted to the new format.

See *TPF Operations* for more information about the ZPMIG and ZDFPC commands.

See “Migration Scenarios” on page 102 for more information about the migration scenarios to consider when converting your complex to the new pool support.

Terminology Recap	
The following terminology has been introduced in this section.	
Term	Definition
<i>Pool migration</i>	To IPL a processor on an image that contains the new pool support. The new pool format will be used in core (main storage). The pool format previously defined in your complex remains on file in DASD until pool conversion is completed across the complex. Contrast with <i>pool conversion</i> .
<i>Pool conversion</i>	In pool file support, to convert the pool data structures from the pool format currently defined in your complex to the new pool format provided by the new pool support. When pool conversion is completed, the new pool data structures reside both in core (main storage) on each migrated processor and on file in DASD. Contrast with <i>pool migration</i> and <i>pool conversion fallback</i> . See “Pool Conversion Fallback” on page 93 for a definition of pool conversion fallback.

Migration Tools: The new pool support takes advantage of the TPF 4.1 system multiple TPF images functions to perform the pool migration. Any processors running in an unmigrated state can remain active and online without interruption during pool migration. *Unmigrated state* refers to a processor that has not been migrated to the new pool support.

Accessing keypoint 9 (CTK9) is unchanged and continues to be the serialization point for pool maintenance functions.

The new pool support allows a complex of 2 or more processors to coexist indefinitely, as long as the limits of the pool format currently defined in your complex are not exceeded. Coexistence can include a mix of processors—those migrated to the new pool support and those without the new support.

The pool data structures used by unmigrated processors must be kept current by those processors that are already migrated so that the 2 levels of support can coexist. In addition, no changes were made to the supporting code in the unmigrated processor, which means the new pool data structures are not updated by any processors that have not been migrated yet. Rather, both levels of pool data structures are updated by processors that have not been migrated with the migration tool provided by the TPF 4.1 system.

Terminology Recap

The following terminology has been introduced in this section.

Term	Definition
<i>Unmigrated state</i>	In pool file support, refers to a processor that is not IPLed on an image that contains the new pool support. See also <i>pool migration</i> and <i>pool conversion</i> . See “Pool Conversion” on page 91 for definitions of these terms.

Pool Conversion Fallback

Pool conversion fallback enables you to return the new pool format provided by new pool support back to the pool format previously defined in your complex once you have completed pool conversion. See “Pool Conversion” on page 91 for more information about pool conversion.

You will use the ZPMIG command with the FALLBACK parameter specified to perform pool conversion fallback. See *TPF Operations* for more information about the ZPMIG command and restrictions associated with pool conversion fallback.

See “Pool Conversion Fallback Scenarios” on page 103 for more information about fallback scenarios to consider when performing pool conversion fallback.

Terminology Recap

The following terminology has been introduced in this section.

Term	Definition
<i>Pool conversion fallback</i>	In pool file support, to return the new pool format provided by the new pool support back to the pool format previously defined in your complex. In core (main storage) the new pool format exists, while the pool format previously defined in your complex remains on file in DASD. All processors have been returned to a migrated state; the complex is not converted. See also <i>pool conversion</i> and <i>pool migration</i> in “Pool Conversion” on page 91 and “Migration Tools” on page 92 for definitions of these terms.

Architecture

The new pool support expands the ordinal fields to 3-byte ordinals. This expansion increases the CY2KT data macro. To keep the size of keypoint 9 (CTK9) within 4K, each set size array in CTK9 is halved. Currently, the set size arrays contain elements of 2 bytes each. The maximum set size array allowed is 255, which is represented by 1 byte. By reducing the set size array element size to 1 byte, space becomes available to expand the ordinal fields in the CY2KT data macro.

By retaining data in keypoint 9 (CTK9), all functions that need the data can use the same access methods as today. A processor running with the new pool support will have a different relative offset to the data in CTK9 as opposed to a processor running without the new pool support.

In addition, any other pool data structures that contain a CY2KT data macro are impacted in the following areas:

- New record structures
- New functions.

A discussion about these impacts follows.

New Record Structures

The following section discusses the new record structures:

- The CY2KT data macro was expanded from 13 fullwords in size to 17 fullwords in size. In addition, the offsets to each ordinal field are different than the old CY2KT data macro.
- In the CY1KR data macro, the following set size arrays were halved in size:
 - CY1ATV
 - CY1SBY
 - CY1NEW.

Coupled with the 36 expanded copies of the CY2KT data macro, the actual displacement of the data in the CY1KR data macro is different. The content is unchanged.

The CY1NTB recoup array was doubled in size.

- The CY\$CR data macro is for the short-term control header records. Each of the 12 control header records also contain a CY2KT data macro.
- Some obsolete fields were removed from the CY2KT data macro.

New Functions

The following functions were added to present the pool data structures in a way acceptable to processors running with the new pool support:

- The *REARRANGE_CTK9 function* (CYH0) is called from the CYYM keypoint retrieval segment. The pool maintenance package uses the CYYM segment to find, hold, and refresh the core copy of keypoint 9 (CKT9). This process allows the CYYM segment to find and hold CKT9 but also arranges the pool data structures to the new pool support.

The CYYM segment was modified to determine whether the TPF 4.1 system is in the process of pool conversion.

If the TPF 4.1 system has been converted, there is no need for the rearrangement to occur. If the TPF 4.1 system has **not** been converted, CYYM calls the REARRANGE_CTK9 function (CHY0) so that the rearrangement can occur.

- The *DEARRANGE_CTK9 function* (CYH1) is called from the CYYA keypoint filing segment. The pool maintenance package uses CYYA to file and hold the core copy of keypoint 9 (CTK9).

If CYH1 detects that the TPF 4.1 system has been converted, there is no need for the dearrangement to occur. However, if the TPF 4.1 system has **not** been converted, CHY1 will call the appropriate DEARRANGE_CTK9 function to dearrange CTK9 onto a data level and CYYA then files from that data level. This

ensures that any other processor running in the complex in an unmigrated state has a copy of CTK9 on file that can be used.

- The *GET_CY\$CR function* (CYH2) is called from any segment that needs a CY\$CR header record. This function:
 - Reads the header record from DASD
 - Arranges the header record into the new pool support
 - Presents the header record to the calling segment on data level E.

However, if the TPF 4.1 system is converted, the rearrangement is not performed. The header record is only retrieved.

- The *FILE_CY\$CR function* (CYH3) is called from any segment that needs to file a CY\$CR header record. The header record, on data level E, is transformed into a format that is understood by the processors that are running in an unmigrated state and then filed. If the TPF 4.1 system has been converted, there is no need for the dearrangement to occur. Instead, the header record is only filed.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 34 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 34. Changes to Data Macros for the New Pool Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CY1KR	Changed	Yes
CY2KT	Changed	Yes

Table 34. Changes to Data Macros for the New Pool Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CY9KP	Changed	Yes
CY\$CR	Changed	Yes
ICYCWB	Changed	Yes
IDR0CB	Changed	Yes
IRECBK	Changed	Yes

General Macros: Table 35 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See TPF General Macros for a complete description of all general macros.

Table 35. Changes to General Macros for New Pool Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
GENMSG	Changed	No

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): There are no changes.

System Initialization Program (SIP) Stage I Macros and Statements: Table 36 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 101 for a description of other system generation changes you must make for the new pool support.

Table 36. Changes to SIP Stage I Macros and Statements for the New Pool Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed
IBMPAL	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 37 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 37. Changes to Segments for the New Pool Support

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
BDBP	Online Assembler	Changed	Updated to support the new pool support.
BRPB	Online Assembler	Changed	Updated to support the new pool support.
BRYA	Online Assembler	Changed	Updated to support the new pool support.
BRYE	Online Assembler	Changed	Updated to support the new pool support.
BRYQ	Online Assembler	Changed	Updated to support the new pool support.
BRYU	Online Assembler	Changed	Updated to support the new pool support.
CTIN	Copy Segment	Changed	Updated to support the new pool support.
CT01	Copy Segment	Changed	Updated to support the new pool support.
CT10	Copy Segment	Changed	Updated to support the new pool support.
CT55	Copy Segment	Changed	Updated to support the new pool support.
CVAB	Online Assembler	Changed	Updated to support the new pool support.
CYAR	Online Assembler	Changed	Updated to support the new pool support.
CYA1	Online Assembler	Changed	Updated to support the new pool support.
CYA2	Online Assembler	Changed	<p>This segment finds and files the STCCR records. With the new pool support, the find and file functions have been moved into the following functions:</p> <ul style="list-style-type: none"> • REARRANGE_CTK9 (CYH0) • DEARRANGE_CTK9 (CYH1) • GET_CY\$CR (CYH2) • FILE_CY\$CR (CYH3).
CYA3	Online Assembler	Changed	Updated to support the new pool support.
CYA4	Online Assembler	Changed	Updated to support the new pool support.
CYC0	Online Assembler	Changed	Updated to support the new pool support.
CYC1	Online Assembler	Changed	<p>This segment finds and files the STCCR records. With the new pool support, the find and file functions have been moved into the following functions:</p> <ul style="list-style-type: none"> • REARRANGE_CTK9 (CYH0) • DEARRANGE_CTK9 (CYH1) • GET_CY\$CR (CYH2) • FILE_CY\$CR (CYH3).
CYC2	Online Assembler	Changed	Updated to support the new pool support.
CYC6	Online Assembler	Changed	<p>This segment finds and files the STCCR records. With the new pool support, the find and file functions have been moved into the following functions:</p> <ul style="list-style-type: none"> • REARRANGE_CTK9 (CYH0) • DEARRANGE_CTK9 (CYH1) • GET_CY\$CR (CYH2) • FILE_CY\$CR (CYH3).

Table 37. Changes to Segments for the New Pool Support (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
CYD4	Online Assembler	Changed	This segment finds and files the STCCR records. With the new pool support, the find and file functions have been moved into the following functions: <ul style="list-style-type: none"> • REARRANGE_CTK9 (CYH0) • DEARRANGE_CTK9 (CYH1) • GET_CY\$CR (CYH2) • FILE_CY\$CR (CYH3).
CYE2	Online Assembler	Changed	Updated to support the new pool support.
CYF8	Online Assembler	Changed	Updated to support the new pool support.
CYF9	Online Assembler	Changed	Updated to support the new pool support.
CYH0	ECB-Controlled Assembler Language	New	Added to support the new pool support.
CYH1	ECB-Controlled Assembler Language	New	Added to support the new pool support.
CYH2	ECB-Controlled Assembler Language	New	Added to support the new pool support.
CYH3	ECB-Controlled Assembler Language	New	Added to support the new pool support.
CYH4	ECB-Controlled Assembler Language	New	Added to support the new pool support.
CYYA	Online Assembler	Changed	This keypoint filing segment has been modified to call the new DEARRANGE_CTK9 function (the CYH1 segment).
CYYM	Online Assembler	Changed	This keypoint retrieval segment has been modified to call the REARRANGE_CTK9 function (the CYH0 segment).
DYDC	Online Assembler	Changed	Updated to support the new pool support.
DYDD	Online Assembler	Changed	Updated to support the new pool support.
DYDG	Online Assembler	Changed	Updated to support the new pool support.
DYDK	Online Assembler	Changed	Updated to support the new pool support.
DYDL	Online Assembler	Changed	Updated to support the new pool support.
DYDQ	Online Assembler	Changed	Updated to support the new pool support.
DYDS	Online Assembler	Changed	Updated to support the new pool support.
DYDU	Online Assembler	Changed	Updated to support the new pool support.
DYDX	Online Assembler	Changed	Updated to support the new pool support.
DYDY	Online Assembler	Changed	Updated to support the new pool support.
DYOM	Offline Assembler	Changed	Updated to support the new pool support.
DYO0	Offline Assembler	Changed	Updated to support the new pool support.
DYO1	Offline Assembler	Changed	Updated to support the new pool support.
DYO6	Offline Assembler	Changed	Updated to support the new pool support.
DYO7	Offline Assembler	New	This new segment has been added to the list of pool maintenance programs to be linked.
GRFS	Copy Segment	Changed	Updated to support the new pool support.
UPX0	ECB-Controlled Assembler Language	New	Added to support the new pool support.
UPX1	ECB-Controlled Assembler Language	New	Added to support the new pool support.

Table 37. Changes to Segments for the New Pool Support (continued)

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
UPX2	ECB-Controlled Assembler Language	New	Added to support the new pool support.
UXP3	ECB-Controlled Assembler Language	New	Added to support the new pool support.

Although the following segments were **not** changed by the new pool support, you must reassemble them.

BDBF	BDBL	BDBP	BRCM	BRCQ
BRTV	BRYD	CYAA	CYAB	CYAE
CYA7	CYA9	CYB0	CYD0	CYD1
CYD2	CYD3	CYF0	CYF1	CYF2
CYF3	CYF4	CYF6	CYF8	CYF9
CYGM	DYDE	DYDF	DYDI	DYDZ
JCDR				

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 38. Changes to ECB Control Program (CP) User Exits for the New Pool Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Pool Migration	CYH0	UPX0	New	REARRANGE_CTK9
Pool Migration	CYH1	UPX1	New	DEARRANGE_CTK9
Pool Migration	CYH2	UPX2	New	GET_CY\$CR
Pool Migration	CYH3	UPX3	New	FILE_CY\$CR

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See “PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)” on page 1269 for a summary of functional and operational changes by APAR.

Commands

Table 39 on page 100 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 39. Changes to Commands for the New Pool Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZPMIG	New	Use this command to: <ul style="list-style-type: none">Convert the pool data structures from the pool format currently defined in your complex to the new pool formatReturn the new pool format back to the pool format previously defined in your complex when fallback has been completedDisplay the migration state of each processor in the complex.

Messages and System Errors

Table 40 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 40. Changes to Messages and System Errors for New Pool Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CYC00001W	Online	Changed
CYC00003I	Online	Changed
DYDU0008I	Online	Changed
DYO01000W	Offline	New
DYO02000E	Offline	New
PMIG0001I	Online	New
PMIG0002I	Online	New
PMIG0003T	Online	New
PMIG0004I	Online	New
PMIG0005I	Online	New
PMIG0006W	Online	New
PMIG0007T	Online	New
PMIG0008T	Online	New
PMIG0009T	Online	New

Performance or Tuning Changes

There are improvements in offline pool maintenance because of the new pool support.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

Changes were made to the:

- Job control language (JCL) used to link-edit DYOPM
- GENSIP macro in the following areas:
 - The new DYO7 segment was added to the list of pool maintenance programs to be linked
 - A new PUNCH card was added to specify addressing mode control (MODE AMODE(31),RMODE(24)).

See *TPF Database Reference* for a sample JCL.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 41 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title.

See the *TPF Library Guide* for more information about the TPF library.

Table 41. Changes to TPF Publications for the New Pool Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Database Reference</i>	GTPDBR02	Added information for the new pool support.
<i>TPF Library Guide</i>	GTPDOC02	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for new pool support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG02	Updated with migration considerations for new pool support.
<i>TPF Operations</i>	GTPOPR02	Updated with information about the commands that were added and changed for new pool support.
<i>TPF System Generation</i>	GTPSYG02	Added information for the new pool support.
<i>TPF System Installation Support Reference</i>	GTPINR02	Added information for the new pool support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before You Begin

Before you begin the following migration scenarios it is recommended you read “Pool Conversion” on page 91 again, paying close attention to the information in the boxes labelled **Critical Information for Using DYOPM**.

There are 3 migration scenarios to consider when converting your complex to the new pool support:

- New users of the TPF 4.1 system
- Established users of the TPF 4.1 system
- Established users of the TPF 3.1 system.

A description of these scenarios follows.

Scenario for a New User of the TPF 4.1 System

If you are installing the TPF 4.1 system for the first time (in other words, you are not a previous TPF 4.1 or TPF 3.1 system user), use the following migration scenario.

Install the TPF 4.1 system using the system installation information provided in *TPF System Generation*, the *TPF System Installation Support Reference*, and the program directories. The new pool support will be installed and initialized automatically.

Scenario for an Established TPF 4.1 System User

If you already have the TPF 4.1 system installed in your complex and want to add the new pool support to that system, use the following migration scenario.

See “Pool Conversion” on page 91 for information about converting your complex in 2 stages.

To Convert Your Complex to the New Pool Support:

1. Do the following to migrate each active processor, one at a time. This is Stage 1 of pool conversion.
 - a. Determine the migration state of each active processor by entering **ZPMIG STATUS**.

An informational message is displayed indicating the migration state of each processor in your complex.
 - b. Use multiple TPF images to create a new image on the processor in your complex.
 - c. IPL the processor to 1052 state using the new image. The new pool support is now active for this processor.
 - d. Repeat step 1a through step 1c on each processor that you want to migrate.

When all the active processors in your complex are migrated, continue with step 2 to convert the entire complex.

Critical Information for Using DYOPM

At this point:

- The existing version of DYOPM can only be used on an unmigrated processor.
- DYOPM cannot be run on a migrated processor in a complex that has not been converted. If you want to run DYOPM before conversion is completed, DYOPM must be run on an unmigrated processor. To do this, see “Scenario to Fall Back Migrated Processors” on page 104.

2. Enter **ZPMIG CONVERT** to perform the pool conversion.

When the pool conversion process has completed, an informational message is displayed informing you of that completion.

Critical Information for Using DYOPM

At this point, you must use the new version of DYOPM because keypoint 9 (CTK9) has been converted to the new format.

Additional Information:

- See *TPF Operations* for more information about the ZPMIG and ZIMAG commands.
- See *TPF System Installation Support Reference*, *TPF System Generation*, and *TPF Operations* for more information about multiple TPF images.

Scenario for Established Users of the TPF 3.1 System

If you are an established user of the TPF 3.1 system migrating to the TPF 4.1 system for the first time, use the following migration scenario.

To Convert Your Complex to the New Pool Support:

1. Migrate the TPF 3.1 system to the TPF 4.1 system using the migration information and the system installation provided in:
 - *TPF Migration Guide: Program Update Tapes*
 - *TPF System Generation*
 - Program Directories.
2. Enter **ZPMIG CONVERT** to perform the pool conversion.

Additional Information:

See *TPF Operations* for more information about the ZPMIG command.

Pool Conversion Fallback Scenarios

Pool conversion fallback enables you to return the new pool format back to the pool format previously defined in your complex after pool conversion is completed.

There are 2 fallback levels to consider:

- Falling back a complex that has been converted
- Falling back migrated processors.

A description of these scenarios follows.

Scenario to Fall Back a Complex That Has Been Converted

If your complex has been converted to the new pool support and you want to return the pool data structures on DASD to the pool format previously defined in it, use the following scenario.

To Fall Back an Entire Complex:

1. Enter **ZPMIG FALLBACK** from any processor to perform the pool conversion fallback.

The pool data structures on DASD are returned to the pool format previously defined. The new pool support remains on the processor.

Critical Information for Using DYOPM

At this point:

- The existing version of DYOPM can only be used on an unmigrated processor.
- DYOPM cannot be run on a migrated processor in a complex that has not been converted. If you want to run DYOPM before conversion is completed, DYOPM must be run on an unmigrated processor. To do this, see “Scenario to Fall Back Migrated Processors”.

Additional Information:

See *TPF Operations* for more information about the ZPMIG command.

Scenario to Fall Back Migrated Processors

If any of the processors in your complex have been migrated to the new pool support and you want to remove the new pool support from a processor, use the following scenario.

To Fall Back a Migrated Processor:

1. Stop all functions that use the new pool format and cycle the TPF 4.1 system to 1052 state.
2. Determine the migration state of the processor to ensure it has been migrated to the new pool support by entering **ZPMIG STATUS**.

An informational message is displayed indicating the migration state of each processor in your complex.

3. IPL the processor to 1052 state using an old image. CTIN loads CTK9 from DASD into core and the processor is returned to the pool format previously defined on it.

The processor is no longer running with the new pool support.

Note: *When you return a migrated processor to the pool format previously defined on it, you must:*

- **Set the bit in CY1PMG to 0 for the migrated processor**
- **Use the existing version of DYOPM on an unmigrated processor.**

4. Repeat step 1 on page 104 through step 3 on page 104, as necessary, to fall back additional migrated processors.

Additional Information:

See *TPF Operations* for more information about the ZPMIG command.

Shared PR/SM (APAR PJ17778)

The following section discusses the migration considerations for shared PR/SM.

Prerequisite APARs

See the APEDIT for APAR PJ17778 for information about prerequisite APARs.

After applying shared PR/SM support and all prerequisite APARs in the data collection and reduction areas, the link-edited data reduction program will not successfully process data collection tapes created on a TPF 4.1 system at the PUT 2 level. If your complex has a requirement to continue running data reduction for such tapes, you must maintain a separate data reduction program.

Functional Overview

Shared PR/SM support allows tightly coupled TPF systems to run in shared PR/SM partitions. This support offers the following advantages:

- Decreased cost of computing because of a reduction in the amount of MIPs required to support customer systems.
- Increased effective CPU utilization because of the ability of all PR/SM guests to share all physical CPUs, eliminating wasted CPU processing time.
- Easier conversion from uniprocessor configurations running in shared PR/SM partitions to tightly coupled configurations.
- Increased flexibility in balancing the work loads of multiple systems that peak at different times.

Architecture

Shared PR/SM support is implemented by allowing logical CPUs in a shared PR/SM partition to load enabled wait-state PSWs when no work is available for the associated I-stream. When another I-stream places work on the cross list of the waiting I-stream, a SIGP instruction is executed, causing an external-call external interrupt condition to be generated for the CPU associated with the waiting I-stream. This external interrupt causes PR/SM to dispatch the logical CPU as soon as a physical CPU is available, thereby eliminating excessive wait times. Similar processing is performed when a CPU loads an enabled wait-state PSW during DEFRC or DLAYC macro processing.

Calculation of CPU utilization is enhanced by obtaining CPU utilization statistics directly from the shared PR/SM facility rather than using TPF-based logic that is unaware of the higher-level dispatching activity controlled by the shared PR/SM facility.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 42 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 42. Changes to General Use C Language Header Files for Shared PR/SM

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$dctist.h	Changed	No
c\$systc.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 43 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 43. Changes to Copy Members for Shared PR/SM

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCE7	Control Program	CCIISC	Changed	Modified the CPU utilization calculation for CPUs in a PR/SM environment.
CICR	Control Program	CCNUCL	Changed	Modified the conditions under which DEFRC and DLAYC macro service routines cause an enabled wait-state PSW to be loaded.
CLHL	Control Program	CCCLHR	Changed	Modified the \$CRISC service routine to execute a \$CPUC macro if the target I-stream is waiting; modified the conditions under which both the main and application CPU loops cause an enabled wait-state PSW to be loaded.
CPSE	Control Program	CCCPSE	Changed	Modified the Perch routines to set up the ECRC before issuing a \$CPUC macro.

Table 43. Changes to Copy Members for Shared PR/SM (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CTME	Control Program	CCNUCL	Changed	Modified the external interrupt handler to identify the reason for an external-call external interrupt and pass control to the appropriate routine.
CT38	Control Program	CCCTIN	Changed	Allocate storage for information returned by the DIAG X'204' instruction.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 44 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 44. Changes to Data Macros for Shared PR/SM

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
DCTIST	Changed	No
IBOCT	Changed	No

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): There are no changes.

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 45 on page 109 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 45. Changes to System Macros for Shared PR/SM

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$LOCKC	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 46 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 46. Changes to Segments for Shared PR/SM

Segment	Type	New, Changed, or No Longer Supported?	Description of Change
JCD4	Real-Time Assembler	Changed	Modified to collect information about the operating environment.
JRA1	Offline PL/I	Changed	Include the operating environment in the Environment Summary report.
JRA3	Offline PL/I	Changed	Redefine the data created by data collection to include operating environment information.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

There are no changes.

Performance or Tuning Changes

The following performance and tuning recommendations are made for TPF systems running in shared PR/SM partitions.

Item	Recommendation
Logical CPUs	Define a shared PR/SM partition with the minimum number of logical CPUs to satisfy the peak demands of the TPF system running in that partition. An excessive number of CPUs results in associated hardware performance penalties.
Processor Run Time	The processor run time is the maximum continuous amount of time that a logical CPU is assigned to a physical CPU. All shared PR/SM partitions are assigned the same processor run time. For TPF systems running in a shared PR/SM partition, the recommended processor run time is 5–10ms. A processor run time of less than 5ms can cause loss of throughput, while a processor run time of greater than 10ms can cause excessive response time.
Wait Completion	The wait completion setting controls whether a new logical CPU is assigned to a physical CPU when the logical CPU currently assigned to the physical CPU loads an enabled wait-state PSW. For TPF

systems running in a shared PR/SM partition, a wait completion setting of NO is recommended. A wait completion setting of YES can cause a significant increase in response time.

Processor Weights

The processor weights designate the proportion of the total CPC processor resources (excluding the dedicated processors) to which a shared PR/SM partition is entitled. The processor weights affect processing only when the number of logical processors that need processing time is greater than the number of physical processors available. Set the processor weights to give priority to the partitions running TPF systems.

Note: For capacity planning, it should be noted that a low-utilization effect is more apparent in shared PR/SM environments than in dedicated PR/SM environments. A low utilization effect causes a slight decrease in throughput at low CPU utilization levels.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 47 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 47. Changes to TPF Publications for Shared PR/SM

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for shared PR/SM.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG02	Updated with migration considerations for shared PR/SM.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR02	Updated by shared PR/SM.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

There are no migration scenarios.

Additional Migration Considerations for Program Update Tape (PUT) 2

This section discusses the migration considerations for authorized program analysis reports (APARs) other than the small programming enhancements (SPEs) discussed previously.

Information Provided	Where to Go For More Information
Critical APARs shipped on Program Update Tape (PUT) 2	"Critical APARs"
APARs that correct incorrect APARs shipped on previous PUTs	"APARs that Correct Incorrect APARs Shipped on Previous PUTs" on page 113

Critical APARs

Table 48 summarizes critical APARs shipped on PUT 2. These critical APARs are valid at the time PUT 2 ships and are subject to change later.

Please see the APAR response information that accompanies each APAR and your IBM service representative for more information about critical APARs.

This information is presented in numeric order based on the APAR number.

Table 48. Critical APARs Shipped on PUT 2

APAR Number	Description
PJ13765	Provide Access to Pool Records Through FACE/FACS/FACZC
PJ14843	Inefficient Processor Utilization under PR/SM
PJ15053	Incorrect Base PSON During Fallback from TPF 4.1 System to TPF 3.1 System
PJ15070	Pool Directory Update (PDUs) Rolled in Without Proper Checks
PJ15071	Multi-Processor Interconnect Facility (MPIF) May Use Wrong Size Block for Incoming Message
PJ15074	Multi-Processor Interconnect Facility (MPIF) Trace may Cause CTL-001
PJ15089	Enhancements to IBM TPF Database Facility (TPPDF) Dump Options
PJ15112	Data Reduction Reports Are Not Clear
PJ15213	CPSE Stack Corruption Will Occur With TPF 3.1 SNAPCs
PJ15332	CTL-001 in CCSONS Caused by Bad Base Register on CLNKC
PJ15482	Time-Initiated Keypointing Loops Forever With No Prime Modules
PJ15486	Auxiliary Loader (ALDR) Fails When Loading Large System Tables
PJ15508	Pool Address is Released Twice By a Release Chain Request

Table 48. Critical APARs Shipped on PUT 2 (continued)

APAR Number	Description
PJ15542	IPC OPR-2A3 Dump Does Not Dump Multi-Processor Interconnect Facility (MPIF) Tables
PJ15668	The ZPMIF STOP DEVICE Command Does Not Always Work
PJ15657	Excessive LOCK Contention on Channel and Device Tables
PJ15663	A CTL-572 is Taken During ZOLDR ACCEPT Processing
PJ15667	Multi-Processor Interconnect Facility (MPIF) Priming May Get Into an Infinite Loop
PJ15744	Working Storage Depletion (CTL-00C) Running Data Collection
PJ15752	Continuous CTL-RB Errors Running Exception Recording
PJ16082	Catastrophic Low Core Condition from Looping Message
PJ16175	CTL-001 Catastrophic Following a CTL-05A Tape I/O Error
PJ16206	Inefficient Module Selection Algorithm During Capture
PJ16589	Unable to Synchronize to STR Using TSC
PJ16746	Potential Loss of Data
PJ16774	CTL-001 Can Occur When CPSF Switches from ECB Virtual Memory (EVM) to System Virtual Memory (SVM)
PJ16978	Processor Hangs During Concurrency Filter Lock Facility (CFLF) Restart
PJ17416	Potential Database Corruption at End of Module Copy
PJ17568	Add Support to Allow Shared LU 6.2 Conversations
PJ18124	Possible Database Corruption

APARs that Correct Incorrect APARs Shipped on Previous PUTs

Table 49 summarizes APARs contained on PUT 2 that fix incorrect APARs shipped with the current PUT or previous PUTs. This table is ordered in ascending numeric order based on the correcting APAR number.

Table 49. APARs Correcting Incorrect APARs Shipped on Previous PUTs — PUT 2

Correcting APAR Number (PUT 2)	Incorrect APAR Number	PUT That Shipped the Incorrect APAR
PJ16331	PJ14078	PUT 1
PJ16478	PJ15271	PUT 2
PJ16517	PJ14605	PUT 1

Recommended Migration for an Established TPF 4.1 System User

This section provides information about migrating your existing TPF 4.1 system to program update tape 2 (PUT) 2.

Note: IBM recommends that you install PUT 2 in its *entirety* on your TPF 4.1 system rather than installing individual APARs.

There are 2 methods you can use to install PUT 2:

- You can use ALDR to perform a full load to image 1. If this method is used, note that the format of the general file has changed. See “Summary of Changes to the General File Format for PUT 2” on page 116 for more information.

Note: This method can be disruptive to your system.

- You can use TLDR to perform a full load to a new image. If this method is used, several steps must be taken to load the PUT 2 image. See “Installing PUT 2 on a New Image in an Existing TPF 4.1 System” for more information.

Before You Begin

Before you begin to install PUT 2 on your TPF 4.1 system, please read the following:

- “ISO-C Support (APAR PJ17852)” on page 54
- “Pool Expansion (PXP) Support (APAR PJ17912)” on page 89
- “Shared PR/SM (APAR PJ17778)” on page 106
- “Additional Migration Considerations for Program Update Tape (PUT) 2” on page 112.

Installing PUT 2 on a New Image in an Existing TPF 4.1 System

The following procedure enables you to install PUT 2 without requiring a complex-wide outage.

To Install PUT 2 on a New Image

1. Enter **ZIMAG** to define a new image. This image will be referred to as the PUT 2 image throughout this procedure.
2. Calculate the number of #XPRGn and #PVRn records that are needed for each image that will have PUT 2 loaded to it.
3. Define the appropriate RAMFIL statements in the SIP input deck.
4. Create a new FACE table (FCTB) using the updated SIP input deck. (This is the SIP input deck you updated in step 3.) Use a version of FCTBG that is compatible with the TPF 4.1 system at the PUT 1 level.

Note: ISO-C support and APAR PJ13765 made several changes to FCTBG.

5. Load the new FCTB to the image that is currently active.
6. Ensure that enough room exists for the CIMR components by running GTSZ and reassembling CTKX.
7. Reassemble and recompile all required programs against the PUT 2 libraries.
8. Load the following segments to the image that is currently active:

CILA	CILB	CILC	CILD	CILE
CILF	CILG	CILH	CIL0	CIL1

CIL2	CIL3	CIL4	CIL5	CIL6
CIL7	CLEM	CRLW	UELI	

You can load and activate these segments using E-type loaders.

Note: If you use E-type loaders to load these segments, E-type loaders handles unallocated programs for you. If you use another loader, such as TLDR/ALDR, you must allocate these segments (CILE, CILF, CILG, CILH, and CRLW).

9. Create or update keypoint A for each CPU ID that includes:
 - An increased 31-bit CRPA size
 - The additional halfword fields defined by ISO-C support starting at offset X'B6':
 - PAGE AND SEGMENT TABLES FOR HEAP IN MEGS
 - PAGE AND SEGMENT TABLES FOR STACK IN MEGS
 - HEAP IN FRAMES PER ECB
 - STACK IN FRAMES PER ECB
 - INITIAL STACK ALLOCATION FOR ISOC IN FRAMES
 - STACK INCREMENT FOR ISOC IN FRAMES
10. Create a new system allocator (SALO) that includes all newly created segments.
11. Recompile and run SALO against the PUT 2 libraries to create an updated IPAT and TABLE.
12. Relink all applicable programs.
13. Define a full load deck for TPFLDR/TLDR that includes the:
 - Updated programs
 - CIMR components
 - Control program
 - PROG-MOD-BASE-CLEAR statement.
14. Run TPFLDR/TLDR.
15. Perform a full load to the PUT 2 image.
16. Enable the PUT 2 image.
17. Hard IPL (IPL with CLEAR) the TPF 4.1 system and choose the PUT 2 image as the active image.
18. Hard IPL any other TPF 4.1 systems that are defined in your complex using the PUT 2 image as the active image.

Before you continue with the remainder of this step, see “Pool Expansion (PXP) Support (APAR PJ17912)” on page 89 for more information about pool conversion and pool conversion fallback.

Stage 1 of pool conversion is complete when the TPF 4.1 system is IPLed successfully. Stage 2 of pool conversion, which is performed by entering **ZPMIG CONVERT**, may be completed after all processors in your complex are IPLed with the PUT 2 image.

Attention: If it is necessary to IPL the original image (PUT 1 image) or to return to stage 1 of pool conversion, enter **ZPMIG FALLBACK**.

After stage 2 of pool conversion is complete, you can copy the PUT 2 image to the original (PUT 1) image.

19. PUT 2 migration is now complete.

Summary of Changes to the General File Format for PUT 2

This section provides information about the changes made to the loader general file (LGF) format JCL. These changes are required for the PUT 2 version of TPFLDR/ALDR to complete successfully. Your JCL or procedures may need to change.

Table 50 is for a sample BSS LGF that was built on a 3380 device. Each area is formatted by a separate job stream and each formatted area is now known by a unique DSN.

See *TPF System Generation* for samples of the FMTR40 jobs produced by the system initialization program (SIP).

Table 50. Sample Changes to the General File Format for PUT 2

Program Name	Statement	At PUT 1 Level	At PUT 2 Level
FMTR40	EXEC	L1A2E	(L1A2E, L1A3E, and so on)
FMTR40	FMTDD3	DSN=GNFLBSS	DSN=(GNFLBSS, GNF2BSS, and so on)
FMTR40	FMTDD1	FMT L N 0000001 0000001 3380 FMT 4 N 0000002 0003413 3380 FMT END	For job L1A2E: FMT L N 0000001 0000001 338L FMT END For job L1A3E: FMT 4 N 0000002 0003413 338L FMT END
DYOPM40	DGF	DSN=GNFLBSS	DSN=GNFzBSS
Notes: <ul style="list-style-type: none"> Prior to PUT 2, FMTR40 could process all FMT cards in one job stream. After installing PUT 2, FMTR40 allows one FMT and one FMT END statement to be included. Therefore, each area must be formatted by a separate job and each area that is formatted has a unique DSN. If DGF/RGF is located on the LGF, it will have a unique DSN. In this table, z is the next highest number after GNF2BSS. See <i>TPF System Generation</i> for sample JCL. 			

Problem Determination Table

Table 51 provides information about some common errors that may occur when trying to bring up a TPF 4.1 system after performing the full load.

Table 51. Sample Changes to the General File Format for PUT 2

Program Error	Possible Cause	Recommended Action
CTIN Failure, PSW=040A0000 00FFFFFF	<ul style="list-style-type: none"> SALO was compiled against a library that contains an old version of C\$IDSPAT. CTKA was not updated or was updated improperly. 	<ol style="list-style-type: none"> Create a new IPAT by recompiling SALO against the latest PUT 2 libraries. Review step 9 on page 115 of "To Install PUT 2 on a New Image" on page 114.
I000000D6	The PROGn area has a program base incompatible with the IPAT being loaded	Create and load the proper IPAT version.
CTIN - FACE ERROR BUILDING PAT	The FCTB version is incompatible with the IPAT version.	Create and load the proper FCTB or IPAT version.
CTIN0082E - CT00 INSUFFICIENT STORAGE FOR POOL	A TPF image without PXP support applied was IPLed but file pool directories are in a converted state.	<ol style="list-style-type: none"> IPL the PUT 2 image. Enter ZPMIG FALLBACK.
Note: Although many problem symptoms may occur if one or more TPF components are not created properly, the previous list presents some common errors.		

Program Update Tape 3 (PUT 3)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 3 (PUT 3).

SPE	Where to Go For More Information
C Function Trace	"C Function Trace (APAR PJ19422)" on page 118
ISO-C E-Type Loader Support	"ISO-C E-Type Loader Support (APAR PJ19966)" on page 127
Migration of TPF System Code to ISO-C Support	"Migration of TPF System Code to ISO-C Support (APAR PJ19938)" on page 138
TPF Advanced Peer-to-Peer Networking	"TPF Advanced Peer-to-Peer Networking (TPF/APPN) Support (APAR PJ19949)" on page 148

In addition, migration considerations are included for the following types of authorized program analysis reports (APARs):

- Critical APARs shipped on PUT 3
- APARs that correct incorrect APARs shipped on previous PUTs.

See "Additional Migration Considerations for Program Update Tape (PUT) 3" on page 167 for more information about the migration considerations for these APARs.

TPF 4.1 PUT 3 is compiled with the IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2, IBM SAA AD/Cycle Language Environment (LE/370) Version 1 Release 3, IBM SAA AD/Cycle Language Environment (LE/370), IBM SAA AD/Cycle C/370 Compiler Version 2 Release 1, and IBM SAA AD/Cycle C/370 Compiler Version 3 Release 1 compilers. See "C and C++ Compiler Requirements" on page 46 for more information about C compiler requirements for the TPF 4.1 system.

C Function Trace (APAR PJ19422)

The following section discusses the migration considerations for C function trace.

Prerequisite APARs

See the APEDIT for APAR PJ19422 for information about prerequisite APARs.

Functional Overview

C function trace provides tracing capabilities to ISO-C programs that have been compiled using the TEST option of one of the IBM C/370 family of compilers supported by the TPF 4.1 system. After implementing C function trace, ISO-C users have the ability to trace C internal functions, dynamic link modules (DLMs), and C library functions using commands, TPF macros, or unique user exit routines.

Migration Considerations

To use C function trace you must:

- Ensure Program Update Tape (PUT) 3 is installed on your TPF 4.1 system so you have the C function trace level code available to support the E-type loader.
- Recompile programs that are to be traced and then re-link
 - Use the TEST option of the compiler to generate breakpoints
 - Use the NOBLOCK suboption of the TEST option.
- Be aware of changes to data areas found in “Control Program Interface (CINFC) Tags” on page 120.
- If you post-process your dumps, you now need 3 MB for the postape PPCP JCL region size. Ensure that the REGION size on your JCL is now 3 M.

Increased Productivity for ISO-C Users

C function trace increases the productivity of ISO-C users by:

- Reducing problem determination time when running in a TPF environment
- Reducing the cost of developing and maintaining ISO-C programs on the TPF 4.1 system
- Expediting software development of ISO-C programs
- Helping you position your products in the market place as quickly as possible
- Minimizing and expediting maintenance
- Expediting enhancements.

Postprocessor Control Program (PPCP)

The TPF 4.1 system now supports function names greater than 8 characters in length. A postprocessor control program (PPCP) that does not contain changes for function names greater than 8 characters in length cannot be used to post process a TPF dump tape from a TPF 4.1 system containing these function name changes.

C Function Trace Table

The C function trace table now accommodates function names greater than 8 characters in length. Therefore, you should investigate any user exit or non-IBM product that relies on the format of the C function trace table or the format of the output from this table to determine if any changes are required.

IBM C/C++ for MVS/ESA Version 3 Release 1 Compiler Function Entries

C function trace and ISO-C now support the IBM C/C++ for MVS/ESA Version 3 Release 1 compiler function entries.

Question marks (????????) in the FUNCTION name field of the C function trace dump output indicate that C function trace code cannot determine the function name. Question marks (????????) in the ISO-C STACK FRAME FUNCTION field of the ISO-C dump output indicate that ISO-C code cannot determine the function name.

For C function trace, the ICID_FUNL IDSCID DSECT field contains the length of the function name. Previously, this field contained the address of the function name length.

Architecture

Most of the changes to the TPF 4.1 system for C function trace are modifications to existing CP segments and modules written in assembler language. The remainder are written in the PL/I language for data collection and reduction.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with C function trace, you must establish the required operating environment. The following section describes hardware and software requirements specific to C function trace.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Prerequisite software includes:

- Program update tape (PUT) 2 installed on your TPF 4.1 system
- One of the IBM SAA AD/Cycle C/370 family of compilers supported by the TPF 4.1 system.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 52 on page 120 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 52. Changes to General Use C Language Header Files for C Function Trace

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck1ke.h	X	X	Changed	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 53 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 53. Changes to Library Members (Object Files) for C Function Trace

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CTRINT	CISO	Changed	Object-Only	Added logic for C function trace initialization.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Although there are no changes to the control program interface (CINFC) tags, the following changes have been made in the CINFC area:

- C function trace adds additional fields to the CPRLIST entry.
- C function trace updates fields in the CID.
- C function trace creates new fields in CPMTTE in CAPT.
- C function trace adds equates to CZ3CP for the extended trace options.

Copy Members

Table 54 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 54. Changes to Copy Members for C Function Trace

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Changed	Add C function trace comments.
CAPT	Control Program	CCNUCL	Changed	Support C function trace.
CHSZ	Control Program	CCNUCL	Changed	Initialize C function trace ECB data.
CIS1	Control Program	CCISOC	Changed	C function trace environment data and support.
CLHV	Control Program	CCSTOR	Changed	Handle GSTACK frames.
CPSE	Control Program	CCCPSE	Changed	Save extended trace indicator byte.
CPSL	Control Program	CCCPSE	Changed	Change system error dump to format C function trace structures.
CT00	Control Program	CCCTIN	Changed	Get maximum heap size from CTKA.

Table 54. Changes to Copy Members for C Function Trace (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CTRY	Control Program	CCISOC	New	C function trace other breakpoint skeleton routine.
CTR0	Control Program	CCISOC	New	C function trace exception routine.
CTR1	Control Program	CCISOC	New	C function trace Debug Interface Module (DIM) routine.
CTR2	Control Program	CCISOC	New	C function trace entry and exit breakpoint routine.
CTR3	Control Program	CCISOC	New	C function trace update CID fields.
CTR8	Control Program	CCISOC	New	C function trace SETTC service routine.
CTR9	Control Program	CCISOC	New	C function trace ENATC service routine.
CUSR	Control Program	CCUEXT	Changed	New user exits support for C function trace.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 55 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 55. Changes to Data Macros for C Function Trace

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK1KE	Changed	No
DCTERI	Changed	No
DCTUCL	Changed	Yes
IDSCID	Changed	Yes
IDSCTO	New	Not Applicable
IDSCTR	New	Not Applicable
IDSTCA	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 56 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 56. Changes to Selected Equate Macros for C Function Trace

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZOCP	Changed	No

Table 56. Changes to Selected Equate Macros for C Function Trace (continued)

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ3CP	Changed	No
IEQCE2	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 57 summarizes the system initialization program (SIP) skeleton, and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 57. Changes to SIP Skeleton and Internal Macros for C Function Trace

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKA	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 58 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 58. Changes to System Macros for C Function Trace

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
ENATC	New	Not Applicable
IBMSVC	Changed	Not Applicable
SETTC	New	Not Applicable
UXITC	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 59 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 59. Changes to Segments for C Function Trace

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCISOC	CSECT	CPS0	Changed	ISO-C support services updated for C function trace.

Table 59. Changes to Segments for C Function Trace (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVOJ	Real-Time	Not Applicable	Changed	C function trace parameters for the ZSTRC command.
JRA1	Offline PL/I	DATAREAD	Changed	Added C function trace options at start to output.
JRA3	Offline PL/I	DATAREAD	Changed	Added C function trace options at end to output.
STPP	Offline	PPCP	Changed	Added support for C function trace.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 60. Changes to Control Program (CP) User Exits for C Function Trace

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CDEB	UCCCDEB	New	Customize the environment before it is set up for C function trace.
CEXP	UCCCEXP	New	Initialize storage after the user trace area storage is allocated.
CTRC	UCCCTRC	New	Allows you to insert additional trace data into the user data area.

ECB User Exits: There are no changes.

Data Collection Changes

There are no new data collection functions and no new data reduction reports for C function trace. However the Environment Summary Report indicates when C function trace, stack and static options are active at the start and end of data collection. See *TPF System Performance and Measurement Reference* for an example of the Environment Summary Report.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

Commands

Table 61 on page 124 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 61. Changes to Commands for C Function Trace

Command	New, Changed, or No Longer Supported?	Description of Change
ZSTRC	Changed	<p>This command now supports the following parameters.</p> <p>CDEBUG Enables C function trace for ISO-C programs compiled using the TEST option of the compiler.</p> <p>NOCDEBUG disables C function trace for ISO-C programs compiled using the TEST option of the compiler.</p> <p>STACK Places up to 68 bytes of the C function stack data in the trace table when CDEBUG is active. The information is displayed in the dump.</p> <p>If you specify NOSTACK, only the address of the stack area is placed in the trace table when CDEBUG is active.</p> <p>If CDEBUG is not active, STACK or NOSTACK will not trace any information.</p> <p>STATIC Places up to 68 bytes of the C function static data in the trace table when CDEBUG is active. The information is displayed in the dump.</p> <p>If you specify NOSTATIC, only the address of the static area is placed in the trace table when CDEBUG is active.</p> <p>If CDEBUG is not active, STATIC or NOSTATIC will not trace any information.</p>

Messages and System Errors

Table 62 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 62. Changes to Messages and System Errors for C Function Trace

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
STRC0001I	Online	No Longer Supported
STRC0002I	Online	No Longer Supported
STRC0003I (Replaces STRC0001I)	Online	New
STRC0004I (Replaces STRC0002I)	Online	New

Performance or Tuning Changes

The following changes have been made for C function trace.

Performance

There is an impact to performance for C function trace. However, it is possible to completely override the support for a given C module, eliminating the impact. This can be done by either:

- Not compiling with the TEST option
- Issuing the ENATC macro to turn off tracing when not desired.

C function trace results in a longer instruction path for the ECB. The increase in instructions may cause a system error CTL-000010 (an ECB-control program (CP) has been operating for 500MS). If this occurs, you can deactivate C function trace or issue a DEFRC or DLAYC macro in the CTRC user exit to give up ECB control.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 63 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 63. Changes to TPF Publications for C Function Trace

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP03	Brief overview of C function trace.
<i>TPF Library Guide</i>	GTPDOC03	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for C function trace.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG03	Updated with migration considerations for C function trace.
<i>TPF Operations</i>	GTPOPR03	Updated with information about the commands that were added and changed for C function trace.
<i>TPF Program Development Support Reference</i>	GTPPDR03	Tracing examples added.
<i>TPF System Generation</i>	GTPSYG03	Installation parameters changed.
<i>TPF System Installation Support Reference</i>	GTPINR03	User exits added.
<i>TPF System Macros</i>	GTPSYS03	Macros added.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR03	Updated Environment Summary Report.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

A migration scenario follows here that you should consider when using C function trace.

1. Any C programs that you want to trace must be compiled with the TEST option of one of the IBM SAA AD/Cycle C/370 family of compilers supported by the TPF 4.1 system. When you compile a program with the TEST option, the compiler generates a breakpoint (an EX instruction with a hook statement as its subject instruction). The hook statement is stored in the TCA and initialized to be a no-operation instruction.

You can generate breakpoints at various points in your program by specifying different compiler options. However, IBM recommends using the NOBLOCK suboption. If the BLOCK suboption is specified, C function trace results are unpredictable.

2. Include the C function trace APAR.
3. Relink the C programs that you want to trace with C function trace.
4. Establish the trace environment, which is used throughout the life of an ECB:
 - a. Create a new image if appropriate.
 - b. Load the program with the auxiliary loader (TLDR) to the appropriate image.
 - c. Set the trace options by entering the ZSTRC command at a system level or using the SETTC and ENATC macros for a specific ECB.
 - d. Change the trace table storage size using the SETTC macro, if desired.

Notes:

- a. After taking these preliminary steps, C function trace is started when an active break is issued by an ECB for the first time.
 - b. Subsequent attempts to alter or reset the trace environment using the SETTC macro or the ZSTRC command have no effect on the currently running ECB.
 - c. You can stop and start C function trace at any time using the ENATC macro.
 - d. You can also provide unique code at the C function trace user exits (UCCCDEB, UCCCEXP, and UCCCTRC) to customize your trace output.
5. Postprocess the tape to obtain trace data.

Note: Before you postprocess your dumps, code the region size as 3 M on the JCL for the postape PPCP. Then, assemble PPCP in step SIP13B of the SIP II job execution.

ISO-C E-Type Loader Support (APAR PJ19966)

The following section discusses the migration considerations for ISO-C E-type loader support.

Prerequisite APARs

See the APEDIT for APAR PJ19966 for information about prerequisite APARs.

Functional Overview

ISO-C E-type loader support is an enhancement of the ISO-C support described in “ISO-C Support (APAR PJ17852)” on page 54.

- ISO-C support now provides support for the E-type loader (OLDR) to load programs that are greater than 4 KB. These programs consist of one or more object modules linked together with C startup code to create a C load module.
- New versions of libraries, as well as new libraries, can be loaded and activated using the E-type loader.
- The E-type loader is now combined with the other offline loaders (the general file loader (ALDR) and the auxiliary loader (TLDR)), in 1 module called *TPFLDR*.

Architecture

The format of the C load module is one of the basic architectural foundations of ISO-C E-type loader support. Another is the array of library addresses (AOLA) for different activation levels and for ECBs that were selectively activated. Each ECB activation table (EAT) slot has a pointer to an AOLA that ECBs at that activation level need to use. As with the original ISO-C support provided for PUT 2, the ECB task communications area has a pointer to the AOLA. For ECBs that were selectively activated, the AOLA is not shared between ECBs. Each ECB has its own copy of the AOLA built from stack heap storage, which is released when the ECB exits.

See “Architecture” on page 55 for more information about ISO-C architecture.

Operating Environment Requirements and Planning Information

There are none. See “ISO-C Support (APAR PJ17852)” on page 54 for more information about ISO-C operating environment requirements and planning information.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 64 on page 128 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 64. Changes to General Use C Language Header Files for ISO-C E-Type Loader Support

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$eb0eb.h	X	X	Changed	No
c\$icili.h			Changed	Yes
c\$icolr.h			Changed	Yes
c\$idseat.h	X	X	Changed	No
c\$idseid.h	X	X	Changed	Yes
c\$idselv.h	X	X	Changed	No
c\$idsicd.h	X	X	New	Not Applicable
c\$idsldr.h	X	X	Changed	Yes
c\$idslst.h	X	X	New	Not Applicable
c\$idsmvp.h	X	X	Changed	No
c\$idsold.h			Changed	Yes
c\$idsprg.h	X	X	Changed	No
tpfapi.h	X	X	Changed	No
ztpld.h	X	X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 65 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 65. Changes to Library Members (Object Files) for ISO-C E-Type Loader Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CGETCC	CTAL	Changed	Assembler	The GETCC_PROTECTED parameter was added for obtaining a storage block.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags
There are no changes.

Control Program Interface (CINFC) Tags
There are no changes.

Copy Members

Table 66 on page 129 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 66. Changes to Copy Members for ISO-C E-Type Loader Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCED	Control Program.	CCENBK	Changed	Selective activate support.
CCEF	Control Program	CCENBK	Changed	Add I/O throttle.
CCEG	Control Program	CCENBK	Changed	Add I/O throttle.
CICR	Control Program	CCNUCL	Changed	Add COMMON=PROTECTED parameter to GETCC.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 67 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 67. Changes to Data Macros for ISO-C E-Type Loader Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSLST	Changed	No
IDSPRG	Changed	No

General Macros: Table 68 summarizes general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 68. Changes to General Macros for ISO-C E-Type Loader Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
GETCC	Changed	No

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 69 on page 130 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 69. Changes to SIP Skeleton and Internal Macros for ISO-C E-Type Loader Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 70 summarizes system initialization program (SIP) Stage I macro and statement changes. See *TPF System Generation* for a complete description of the SIP Stage I macros. This information is presented in alphabetic order by the name of the SIP Stage I macro. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 82 for a description of other system generation changes you must make for ISO-C E-type loader support.

Table 70. Changes to SIP Stage I Macros and Statements for ISO-C E-Type Loader Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 71 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 71. Changes to SIP Stage II Macros for ISO-C E-Type Loader Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 72 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 72. Changes to Segments for ISO-C E-Type Loader Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
ALDR	Offline Assembler	TPFLDR	Changed	Obtain link date of C load modules.
CCUEXT	Assembler	Not Applicable	Changed	Support selective activation of libraries.
CELE	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CELG	Assembler	Not Applicable	Changed	Support activating a library load module.
CELK	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CELL	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.

Table 72. Changes to Segments for ISO-C E-Type Loader Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CELU	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CEL2	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CEL4	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CEL8	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CILD	Real-Time C Language	Not Applicable	Changed	Support loading and accepting a C load module greater than 4 KB.
CILE	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CILF	Real-Time C Language	Not Applicable	Changed	Support loading and accepting a C load module greater than 4 KB.
CILG	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CILH	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CILI	Offline C Language	TPFLDR	Changed	Support loading a C load module greater than 4 KB.
CIL6	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CIL7	Real-Time C Language	Not Applicable	Changed	Fix problem where a single PARS list causes TLDR to delete program versions.
CLDJ	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CLDL	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CLDM	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CLDX	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CLDZ	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CLD0	Real-Time C Language	Not Applicable	Changed	Support loading a C load module greater than 4 KB.
CLEF	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
CLEQ	Real-Time C Language	Not Applicable	Changed	Support deactivating a library load module.
CLEW	Real-Time C Language	Not Applicable	Changed	Support deleting a C load module greater than 4 KB.
CLIB	Real-Time Assembler Language	Not Applicable	Changed	Support activating a library load module.
COLC	Real-Time C Language	Not Applicable	Changed	Support deactivating a library load module.
COLG	Real-Time C Language	Not Applicable	Changed	Add additional checking to the ZOLDR REINCLUDE command.
COLJ	Real-Time C Language	Not Applicable	Changed	Add additional checking to the ZOLDR EXCLUDE command.

Table 72. Changes to Segments for ISO-C E-Type Loader Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
COLK	Real-Time C Language	Not Applicable	Changed	Support excluding a library load module.
COLM	Real-Time C Language	Not Applicable	Changed	Support accepting a C load module greater than 4 KB.
COLO	Real-Time C Language	Not Applicable	Changed	Support accepting a C load module greater than 4 KB.
COLP	Real-Time C Language	Not Applicable	Changed	Support accepting a C load module greater than 4 KB.
COLR	Offline C Language	TPFLDR	Changed	Support loading a C load module greater than 4 KB.
COLT	Real-Time C Language	Not Applicable	Changed	Support activating a library load module.
COL0	Real-Time C Language	Not Applicable	Changed	Support reclaiming of C load modules greater than 4 KB.
COL2	Real-Time C Language	Not Applicable	Changed	Support reclaiming of C load modules greater than 4 KB.
COL6	Real-Time C Language	Not Applicable	Changed	Add commentary changes.
CRLB	Real-Time C Language	Not Applicable	Changed	Support accepting a C load module greater than 4 KB.
CRLC	Real-Time C Language	Not Applicable	Changed	Add additional checking to the ZOLDR EXCLUDE and REINCLUDE commands.
CRLQ	Real-Time C Language	Not Applicable	New	Support deactivating and excluding library load modules.
CRLX	Real-Time C Language	Not Applicable	New	Support accepting C load modules greater than 4 KB.
CRLY	Real-Time C Language	Not Applicable	New	Support accepting C load modules greater than 4 KB.
C177	Assembler	Not Applicable	New	Add the GETCC_PROTECTED parameter for obtaining a storage block.
OLDR	Offline C Language	TPFLDR	Changed	Support loading a C load module greater than 4 KB.
TLDR	Offline Assembler	TPFLDR	Changed	Obtain link date of C load modules.
TLDRMN	Offline C Language	TPFLDR	Changed	Support loading a C load module greater than 4 KB.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” on page 133 summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 73. Changes to Control Program (CP) User Exits for ISO-C E-Type Loader Support

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CLE	UCCCLE	Changed	User exit status is propagated across all versions of a library.

Table 73. Changes to Control Program (CP) User Exits for ISO-C E-Type Loader Support (continued)

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CLX	UCCCLX	Changed	User exit status is propagated across all versions of a library.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 74. Changes to ECB User Exits for ISO-C E-Type Loader Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Loaders	ENTRC	UELI	Changed	An additional caller was added.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

Table 75 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 75. Changes to Messages and System Errors for ISO-C E-Type Loader Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ALDR0905E	Offline	Changed
CILE0103W	Online	Changed
CILF0107E	Online	Changed
CILF0108E	Online	Changed
CILF0110E	Online	Changed
CILF0112E	Online	New
CILH011E	Online	New
CILH0112E	Online	New
CIL60111E	Online	New
OLDR0013T	Offline	No Longer Supported
OLDR0077I	Offline	New

Table 75. Changes to Messages and System Errors for ISO-C E-Type Loader Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR0078E	Offline	New
OLDR0079E	Offline	New
OLDR0080E	Offline	New
OLDR0081T	Offline	New
OLDR0082E	Offline	New
OLDR0083E	Offline	New
OLDR0084E	Offline	New
OLDR0085E	Offline	New
OLDR0086E	Offline	New
OLDR0087W	Offline	New
OLDR0088E	Offline	New
OLDR0089E	Offline	New
OLDR0211E	Online	Changed
OLDR0212E	Online	No Longer Supported
OLDR0214E	Online	New
OLDR2026T	Online	New
OLDR2028T	Online	New
OLDR2029T	Online	New
OLDR2030T	Online	New
OLDR2031T	Online	New
OLDR2032W	Online	New
OLDR3015T	Online	New
OLDR3016T	Online	New
OLDR3200T	Online	Changed
OLDR3212E	Online	Changed
OLDR3225T	Online	New
OLDR5822T	Online	New
TPFL0002W	Offline	Changed
TPFL0003W	Offline	Changed
TPFL0004W	Offline	New
000079	System Error	Changed

Performance or Tuning Changes

The best performance is obtained when there is no static in the library, the library user exits are not turned on, and the library is not in a selectively activated loadset. The performance of a library function in a library that is contained in a selectively activated loadset is not as good because LIBVEC2 processing is always used.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

You may need to increase the number of common blocks that are allocated for ISO-C support. Common blocks are used in ISO-C support to hold new versions of

arrays of library addresses (AOLAs) when a loadset that contains a library is activated by entering the ZOLDR ACTIVATE command. See *TPF System Generation* for more information about common blocks, including how to estimate the number of additional common blocks required.

You need to change the allocator by giving common block authorization (CMB) to program CLEF.

Loading Process Changes

The data sets that contain C load modules are specified with the new DD name card (//LOADMOD).

To share common code, the offline programs for the E-type loader are now linked into the common offline loader program (TPFLDR). The JCL used to run the E-type loader must be changed to specify TPFLDR. A parameter in the OLDR JCL is used to specify that the E-type loader is to be run.

When you enter the ZOLDR LOAD command to load the input device, a compatibility check is made between the offline allocator used to build the input and the allocator currently in use online to see if any shifts have occurred in the ordinal numbers of the programs in the program allocation table (PAT). If the 2 allocators are compatible, the loadsets specified in the ZOLDR LOAD command are read from the input device.

A new parameter (PATVERS=TIME) checks the time stamps of the offline SALTBL and the online PAT instead of the allocator information for each of the programs.

REP cards are not supported for C load modules.

Online System Load Changes

There are no procedural changes.

Publication Changes

Table 76 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 76. Changes to TPF Publications for ISO-C E-Type Loader Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP03	Updated by ISO-C E-type loader support.
<i>TPF C Language Support User's Guide</i>	GTPCLU03	Updated by ISO-C E-type loader support.
<i>TPF General Macros</i>	GTPGEN03	Updated by ISO-C E-type loader support.
<i>TPF Library Guide</i>	GTPDOC03	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for ISO-C E-type loader support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG03	Updated with migration considerations for ISO-C E-type loader support.
<i>TPF System Generation</i>	GTPSYG03	Updated by ISO-C E-type loader support.
<i>TPF System Installation Support Reference</i>	GTPINR03	Updated by ISO-C E-type loader support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The GETCC_PROTECTED parameter was added to the getcc function and the GETCC macro. See the *TPF C/C++ Language Support User's Guide* for more information about the getcc function; see *TPF General Macros* for more information about the GETCC macro.

Database Changes

You may need to define additional #OLDx records because C load modules use a minimum of 2 #OLDx records each and can be larger than 4 KB. See *TPF System Generation* for more information about how to estimate the number of additional #OLDx records that you will need.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Repeat the following procedure for all subsystems in a multiple database function (MDBF) environment. See *TPF Operations* for more information about the ZIMAG command.

1. Enter **ZIMAG** to define a new image using a new program base.
2. Initialize the new image by doing one of the following:
 - Copy the old image to the new image using the ZIMAG COPY command.
 - Perform a full load to the new image.
3. Reassemble and recompile all required programs. (Required programs refers to the programs affected by changes discussed earlier in the description of ISO-C E-type loader support.)

Notes:

- a. CELL must be compiled optimized to ensure that it is less than 4 KB.
 - b. CILF must be compiled unoptimized until you have applied APAR PN75488.
4. Create a new system allocator (SALO) that includes the newly created CRLQ, CRLX, and CRLY segments.
Give common block authorization to program CLEF.
 5. Recompile and run SALO to create an updated IPAT and TABLE.
 6. Link all applicable programs again.
 7. Define a load deck for TPFLDR/TLDR that includes the following:
 - Updated programs
 - Control program
 - All existing C load modules
 - LOADER PROG-MOD-BASE CLEAR statement
 - Updated IPAT.

Note: The requirements for the LOADER PROG-MOD-BASE CLEAR statement, and including all existing C load modules, are to ensure that base versions of C load modules can be overlaid during the E-type loader accept process.

8. Run TPFLDR/TLDR.
9. Perform a load to the new image.
10. Enable the new image.
11. IPL the TPF 4.1 system and choose the new image as the active image.
12. IPL any other TPF 4.1 systems that are defined in your complex using the new image as the active image.

Migration is completed.

Migration of TPF System Code to ISO-C Support (APAR PJ19938)

The following section discusses the migration considerations for the migration of TPF system code to ISO-C support.

Prerequisite APARs

See the APEDIT for APAR PJ19938 for information about prerequisite APARs.

Functional Overview

The segments that comprise the ZIMAG and ZTPLD commands were migrated from TARGET(TPF) to ISO-C dynamic load modules (DLMs). The TARGET(TPF) IPRSE_parse and IPRSE_bldprstr functions were also migrated to the ISO-C general purpose library (CTBX). This migration effort provides a model of one type of approach for DLM packaging, which is placing several object files, where possible, into one DLM.

The 4 KB constraint no longer exists for the ZIMAG and ZTPLD commands.

Architecture

There are no architectural changes to support the migration of TPF system code to ISO-C support. See “Architecture” on page 55 for more information about ISO-C architecture.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes the C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 77 summarizes changes to the build scripts used by the build tool (CBLD). This information is presented in alphabetic order by the name of the build script.

Table 77. Changes to Build Scripts for the Migration of TPF System Code to ISO-C Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CIKBBS	DLM	New	Build script for a ZIMAG DLM.
CILABS	DLM	New	Build script for a ZTPLD DLM.
CILBBS	DLM	New	Build script for a ZTPLD DLM.
CILDBS	DLM	New	Build script for a ZTPLD DLM.
CILEBS	DLM	New	Build script for a ZTPLD DLM.
CILFBS	DLM	New	Build script for a ZTPLD DLM.
CILGBS	DLM	New	Build script for a ZTPLD DLM.
CILHBS	DLM	New	Build script for a ZTPLD DLM.
CIMABS	DLM	New	Build script for a ZIMAG DLM.
CIMNBS	DLM	New	Build script for a ZIMAG DLM.

Table 77. Changes to Build Scripts for the Migration of TPF System Code to ISO-C Support (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CIMUBS	DLM	New	Build script for a ZIMAG DLM.
CIMYBS	DLM	New	Build script for a ZIMAG DLM.
CIM5BS	DLM	New	Build script for a ZIMAG DLM.
CIM6BS	DLM	New	Build script for a ZIMAG DLM.
CIM9BS	DLM	New	Build script for a ZIMAG DLM.
CISO	DLM	No Longer Supported	Build script for the CISO library.
CISOBS	DLM	New	Build script for the CISO library.
CLLE	DLM	No Longer Supported	Build script for the England locales.
CLLEBS	DLM	New	Build script for the England locales.
CLLF	DLM	No Longer Supported	Build script for the France locales.
CLLFBS	DLM	New	Build script for the France locales.
CLLG	DLM	No Longer Supported	Build script for the Germany locales.
CLLGBS	DLM	New	Build script for the Germany locales.
CLLI	DLM	No Longer Supported	Build script for the Italy locales.
CLLIBS	DLM	New	Build script for the Italy locales.
CLLS	DLM	No Longer Supported	Build script for the Spain locale.
CLLSBS	DLM	New	Build script for the Spain locale.
CLLT	DLM	No Longer Supported	Build script for the TPF locales.
CLLTBS	DLM	New	Build script for the TPF locales.
CLLU	DLM	No Longer Supported	Build script for the U.S. locales.
CLLUBS	DLM	New	Build script for the U.S. locales.
CRFABS	DLM	New	Build script for the CRFA DLM.
CRF1BS	DLM	New	Build script for the CRF1 DLM.
CTAL	LLM	No Longer Supported	Build script for the CTAL library.
CTALBS	DLM	New	Build script for the TPF API library.
CTBXBS	DLM	New	Build script for the CTBX library.
CVRIBS	DLM	New	Build script for a ZIMAG DLM.
CVZ3BS	DLM	New	Build script for a ZIMAG DLM.

Dynamic Load Module (DLM) Stubs: Table 78 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 78. Changes to Dynamic Load Module (DLM) Stubs for Migration of TPF System Code to ISO-C Support

DLM Stub	New, Changed, or No Longer Supported?
CEL6	New
CIKB	New
CILB	New
CILD	New
CILE	New
CILF	New
CILG	New
CILH	New

Table 78. Changes to Dynamic Load Module (DLM) Stubs for Migration of TPF System Code to ISO-C Support (continued)

DLM Stub	New, Changed, or No Longer Supported?
CIMN	New
CIMU	New
CIMY	New
CIM5	New
CIM6	New
CIM9	New
CLEI	New
CLEM	New
CLES	New
COLX	New
COLZ	New
CYYI	New
UELI	New
UELM	New

General Use C Language Header Files: Table 79 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 79. Changes to General Use C Language Header Files for the Migration of TPF System Code to ISO-C Support

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$idse1d.h	X	X	Changed	No
c\$idslst.h	X	X	Changed	No
c\$iduxt.h	X	X	Changed	No
tpfparse.h	X	X	Changed	No
zimagmc.h		X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 80 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 80. Changes to Library Interface Scripts for the Migration of TPF System Code to ISO-C Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTBXXV	New	Contains <i>IPRSE_parse</i> and <i>IPRSE_bldprstr</i> library functions with their respective ordinals.

Library Members (Object Files): Table 81 on page 141 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 81. Changes to Library Members (Object Files) Migration of TPF System Code to ISO-C Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CRFA	CTBX	Changed	C Language	Added compiler error and NORENT option, changed perror calls to serrc_op_ext.
CRFB	CTBX	Changed	C Language	Added compiler error and NORENT option, changed perror calls to serrc_op_ext.
CRFC	CTBX	Changed	C Language	Added compiler error and NORENT option, changed perror calls to serrc_op_ext.
CRFD	CTBX	Changed	C Language	Added compiler error and NORENT option; changed perror calls to serrc_op_ext.
CRFE	CTBX	Changed	C Language	Added compiler error and NORENT option; changed perror calls to serrc_op_ext.
CRFG	CTBX	Changed	C Language	Added compiler error and NORENT option; changed perror calls to serrc_op_ext.
CRFH	CTBX	Changed	C Language	Added compiler error and NORENT option; changed perror calls to serrc_op_ext.
CRFI	CTBX	Changed	C Language	Added compiler error and NORENT option.
CRFJ	CTBX	Changed	C Language	Added compiler error and NORENT option.
CRFK	CTBX	Changed	C Language	Added compiler error and NORENT option; changed perror calls to serrc_op_ext.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 82 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 82. Changes to Members (Object Files) for the Migration of TPF System Code to ISO-C Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CIKA	CIMA	Changed	C Language	Added compiler error.
CIKB	CIKB	Changed	C Language	Added compiler error; added RENT option.
CIKC	CIMA	Changed	C Language	Added compiler error.
CIKD	CIMA	Changed	C Language	Added compiler error.
CIKE	CIMU	Changed	C Language	Added compiler error.
CILA	CILA	Changed	C Language	Added compiler error.
CILB	CILB	Changed	C Language	Added compiler error; added RENT option.

Table 82. Changes to Members (Object Files) for the Migration of TPF System Code to ISO-C Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CILC	CILA	Changed	C Language	Added compiler error.
CILD	CILD	Changed	C Language	Added compiler error.
CILE	CILE	Changed	C Language	Added compiler error; added RENT option.
CILF	CILF	Changed	C Language	Added compiler error.
CILG	CILG	Changed	C Language	Added compiler error.
CILH	CILH	Changed	C Language	Added compiler error.
CIL0	CILA	Changed	C Language	Added compiler error.
CIL1	CILA	Changed	C Language	Added compiler error.
CIL2	CILA	Changed	C Language	Added compiler error.
CIL3	CILA	Changed	C Language	Added compiler error.
CIL4	CILA	Changed	C Language	Added compiler error.
CIL5	CILA	Changed	C Language	Added compiler error.
CIL6	CILA	Changed	C Language	Added compiler error.
CIL7	CILA	Changed	C Language	Added compiler error.
CIMA	CIMA	Changed	C Language	Added compiler error.
CIMB	CIMA	Changed	C Language	Added compiler error.
CIMC	CIMA	Changed	C Language	Added compiler error.
CIMD	CIMA	Changed	C Language	Added compiler error.
CIME	CIMA	Changed	C Language	Added compiler error.
CIMF	CIMA	Changed	C Language	Added compiler error.
CIMG	CIMA	Changed	C Language	Added compiler error.
CIMH	CIMA	Changed	C Language	Added compiler error.
CIMI	CIMA	Changed	C Language	Added compiler error.
CIMJ	CIMA	Changed	C Language	Added compiler error.
CIMK	CIMA	Changed	C Language	Added compiler error.
CIML	CIMA	Changed	C Language	Added compiler error.
CIMN	CIMN	Changed	C Language	Added compiler error.
CIMO	CIMA	Changed	C Language	Added compiler error.
CIMP	CIMA	Changed	C Language	Added compiler error.
CIMQ	CIMA	Changed	C Language	Added compiler error.
CIMS	CIMA	Changed	C Language	Added compiler error.
CIMT	CIMA	Changed	C Language	Added compiler error.
CIMU	CIMU	Changed	C Language	Added compiler error.
CIMV	CIMU	Changed	C Language	Added compiler error.
CIMW	CIMU	Changed	C Language	Added compiler error.
CIMX	CIMA	Changed	C Language	Added compiler error.
CIMY	CIMY	Changed	C Language	Added compiler error.
CIMZ	CIMA	Changed	C Language	Added compiler error.
CIM0	CIMA	Changed	C Language	Added compiler error.
CIM3	CIMA	Changed	C Language	Added compiler error.
CIM4	CIMA	Changed	C Language	Added compiler error.
CIM5	CIM5	Changed	C Language	Added compiler error.
CIM6	CIM6	Changed	C Language	Added compiler error.

Table 82. Changes to Members (Object Files) for the Migration of TPF System Code to ISO-C Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CIM7	CIMY	Changed	C Language	Added compiler error.
CIM8	CIMA	Changed	C Language	Added compiler error.
CIM9	CIM9	Changed	C Language	Added compiler error; added RENT option.
CRFAPR	CRFA	New	C Language	Added compiler error; acts as front-end DLM for TARGET(TPF) programs calling the IPRSE_parse library function.
CRF1PR	CRF1	New	C Language	Added compiler error; acts as front-end DLM for TARGET(TPF) programs calling the IPRSE_bldprstr library function.
CVRI	CVRI	Changed	C Language	Added compiler error.
CVZ3	CVZ3	Changed	C Language	Added compiler error.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 83 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 83. Changes to Data Macros for Migration of TPF System Code to ISO-C Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSLST	Changed	No

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 84 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 84. Changes to SIP Skeleton and Internal Macros for Migration of TPF System Code to ISO-C Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 85 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 82 for a description of other system generation changes you must make for the migration of TPF system code to ISO-C support.

Table 85. Changes to SIP Stage I Macros and Statements for the Migration of TPF System Code to ISO-C Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 86 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 86. Changes to SIP Stage II Macros for the Migration of TPF System Code to ISO-C Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 87 on page 145 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 87. Changes to Segments for the Migration of TPF System Code to ISO-C Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSTRTD	Assembler	See Description of Change.	Changed	Changed @@DLMENT (DLM entry point) from floating to a fixed location. CSTRTD is always linked with each ISO-C DLM when building (prelink/linkedit) a DLM.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes to the commands, however, the segments that comprise the ZIMAG and ZTPLD commands have been migrated to ISO-C dynamic load modules (DLMs).

Messages and System Errors

There are no changes.

Performance or Tuning Changes

The best performance is obtained when there is no static in the libraries.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The new CTBX library requires 33 862 bytes in the core resident program area (CRPA) and 12 ordinals.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 88 on page 146 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 88. Changes to TPF Publications for the Migration of TPF System Code to ISO-C Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP03	Updated by the migration of TPF system code to ISO-C support.
<i>TPF Library Guide</i>	GTPDOC03	Updated with definitions for new terminology in the master glossary.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG03	Updated with migration considerations for migration of TPF system code to ISO-C support.
<i>TPF Programming Standards</i>	GTPPSM03	Updated by the migration of TPF system code to ISO-C support.
<i>TPF System Generation</i>	GTPSYG03	Updated by the migration of TPF system code to ISO-C support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

See the APEDIT for APAR PJ19938 for more information about installation validation.

Migration Scenarios

Repeat the following procedure for all subsystems in a multiple database function (MDBF) environment.

1. Enter **ZIMAG** to define a new image.

Note: Because you are defining a new image, you must do one of the following:

- Copy the entire program base and core image restart area (CIMR) components from another image.
 - Perform a full load in step 8 on page 147.
2. Reassemble and recompile without TARGET(TPF) all required programs. (Required programs refers to the programs affected by changes discussed earlier in the description of the migration of TPF system code to ISO-C support)
 3. Generate the library stubs for the library functions in the newly created library (CTBX). This step is needed for the BSS only.
 4. Generate stubs for those programs that are called externally by the ZIMAG and ZTPLD DLMs.
 5. Create a new system allocator (SALO) that includes the following:
 - The newly created library (CTBX)
 - SPARE slots for those programs that are now members of a DLM
 - The modified entry for CRF1 (no transfer vector).
 6. Recompile and run SALO to create an updated IPAT and TABLE.

7. Link all applicable programs again, making sure that you pick up the updated CSTRTD (C startup code) for the ISO-C DLMs.
 8. Define a load deck for TPFLDR/TLDR that includes the following:
 - Updated IPAT
 - New C load modules (programs migrated from TARGET(TPF))
 - New CTBX library.
 9. Run TPFLDR/TLDR.
 10. Perform a load to the new image.
 11. Enable the new image.
 12. IPL the TPF 4.1 system and choose the new image as the active image.
 13. IPL any other TPF 4.1 systems that are defined in your complex using the new image as the active image.
- Migration is completed.

TPF Advanced Peer-to-Peer Networking (TPF/APPN) Support (APAR PJ19949)

The following section discusses the migration considerations for TPF Advanced Peer-to-Peer Networking (TPF/APPN) support.

Prerequisite APARs

See the APEDIT for APAR PJ19949 for information about prerequisite APARs.

Functional Overview

TPF/APPN support enables the TPF 4.1 system to connect to a Systems Network Architecture (SNA) network as an Advanced Peer-to-Peer Networking (APPN) end node (EN).

Before TPF/APPN support:

- The TPF 4.1 system could connect to the SNA network only as a low-entry networking (LEN) node.
- Resources (LUs) in the TPF 4.1 system had to be predefined to the network.
- The TPF 4.1 system could not initiate LU-LU sessions in most cases, and LU-LU sessions were restricted to only LU 6.2 with certain communications controllers.

With TPF/APPN support, the TPF 4.1 system can connect as an APPN end node (EN). The APPN architecture defines how to manage resources and establish LU-LU sessions in a PU 2.1 network environment. Resources in the TPF 4.1 system no longer need to be predefined; the TPF system will register its resources when the network is activated. The TPF 4.1 system as an APPN node is able to initiate LU-LU session activation, and all LU types (not just LU 6.2) are supported across the different communications controllers.

TPF/APPN support also includes the SNA printer sharing function, which allows an SNA printer to be shared between the TPF 4.1 system and a remote host. When a TPF processor adds a message to the queue for a printer that is not in session with any TPF processor in the loosely coupled complex, the TPF 4.1 system will now send a request to the APPN network to establish a session with the desired printer. If the printer is already in session with a remote host, that remote host will be asked to release the session at its earliest convenience, allowing a new session to be established between the TPF 4.1 system and the printer. Before TPF/APPN support, an SNA printer could be shared by all the processors in a TPF loosely coupled complex, but not between the TPF 4.1 system and a remote host (remote TPF processor or other data host).

Architecture

A node in a PU 2.1 network can connect as one of three types:

- Low-entry networking (LEN) node
- APPN end node (EN)
- APPN network node (NN).

Each APPN node in the network has a control point (CP). Each APPN network node (NN) has control sessions, called *CP-CP sessions*, with the control point in each adjacent APPN network node. Each APPN end node can be connected to multiple adjacent network nodes, but can have CP-CP sessions with only 1 network node. The network node with which an end node has CP-CP sessions is called the

network node server (NNS) for that end node. An APPN end node (EN) registers its resources with its NNS using the CP-CP sessions.

Because the TPF 4.1 system is an APPN EN, it communicates with its NNS during the LU-LU session activation process. For an LU-LU session initiated by the TPF 4.1 system, the NNS will locate the remote LU and calculate the best route (path) that can be used by the session. For an LU-LU session initiated by the remote LU or remote operator, the NNS for the TPF 4.1 system will use the information that the TPF 4.1 system registered to return the correct routing information to the NNS of the remote LU. After an LU-LU session is active, the control points are no longer involved with the operation of that session; an active session in a TPF 4.1 system that is an APPN node is no different than an active session in a TPF 4.1 system that is a LEN node.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF/APPN support, you must establish the required operating environment. The following section describes hardware and software requirements specific to TPF/APPN support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for SNA-Based Communication: The TPF 4.1 system as an APPN end node can connect (channel-attach) to the following devices:

- IBM 3745 Communications Controller with IBM NCP Version 6 Release 2 or later release. ACF/VTAM Version 4 Release 1 or higher is also required.
- IBM 3174 APPN Controller.
- IBM RISC System/6000 with AIX SNA Server/6000 Version 2 Release 1 or later release.

TPF/APPC support is required for TPF/APPN support because the TPF 4.1 system communicates with its network node server (NNS) using a pair of LU 6.2 sessions called control point to control point (CP-CP) sessions. See *TPF ACF/SNA Data Communications Reference* for information about installing TPF/APPC support.

Network Considerations: A TPF 4.1 system running loosely coupled in an APPN environment is viewed differently by the network than when it is running in a PU 5 or LEN environment. Table 89 summarizes the differences.

Table 89. TPF Loosely Coupled SNA Network Comparisons

TPF Node Type	How Network Views the TPF 4.1 system	Control Sessions
PU 5	Each TPF processor is viewed as a separate subarea node.	One CDRM-CDRM session exists with each TPF processor.

Table 89. TPF Loosely Coupled SNA Network Comparisons (continued)

TPF Node Type	How Network Views the TPF 4.1 system	Control Sessions
PU 2.1 LEN	Each link is viewed as connecting to a different TPF 4.1 system.	One CLU-CLU session exists for every active link in the loosely coupled complex.
PU 2.1 APPN EN	The entire complex is viewed as 1 node.	CP-CP sessions exist with only 1 TPF processor in the loosely coupled complex.

Load balancing LU-LU sessions among the active processors in the loosely coupled complex is an important consideration. In most cases a given TPF application resides in all processors in the loosely coupled complex, not only for load balancing purposes but for availability if a processor fails. When running TPF/APPN support, only 1 processor in the loosely coupled complex has control sessions (CP-CP sessions), therefore, all LU-LU session initiation requests will flow into that 1 TPF processor. When a session initiation request is received, the UAPN user exit is invoked to select the TPF processor for the new LU-LU session. See *TPF System Installation Support Reference* for a complete description of the UAPN user exit.

Note: For LU-LU sessions initiated by a remote primary LU (PLU), the network rather than the TPF 4.1 system will do the load balancing. The network will calculate the route for the session and the selected TPF processor will receive the BIND request.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 90 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 90. Changes to Copy Members for TPF/APPN Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CSX0	Control Program	CCSNA1	Changed	XID updated to process APPN links.
CSX1	Control Program	CCSNA1	Changed	XID updated to process APPN links.
CSX2	Control Program	CCSNA1	Changed	XID updated to process APPN links.
CS0A	Control Program	CCSNA1	Changed	Build parameter list for link failure messages.
CS0B	Control Program	CCSNA4	Changed	Process slowdown timers for NCP/ALS links.
CS0F	Control Program	CCSNA4	Changed	Changed building extended UNBIND.
CS0H	Control Program	CCSNA1	Changed	Set or reset NCP/ALS slowdown flags.
CS01	Control Program	CCSNA1	Changed	Build parameter list for link failure messages.

Table 90. Changes to Copy Members for TPF/APPN Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CS03	Control Program	CCSNA1	Changed	Reset NCP/ALS slowdown indicators.
CS05	Control Program	CCSNA1	Changed	Updated to process APPN links.
CS06	Control Program	CCSNA1	Changed	Search for CDRM alias name in an ACTCDRM.
CS08	Control Program	CCSNA1	Changed	Reset NCP/ALS slowdown indicators.
CS96	Control Program	CCSNA3	Changed	Allow message for a shared printer.
CT15	Control Program	CCCTIN	Changed	Carve out space for APPN TAPST.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 91 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 91. Changes to Communication Macros or Statements for TPF/APPN Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CDRM	Changed	No
RSC	Changed	No
SNAKEY	Changed	Yes

Data Macros: Table 92 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 92. Changes to Data Macros for TPF/APPN Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
CVTEQ	Changed	No
CW0CC	Changed	No
CZ1SE	Changed	No
DLTEC	Changed	No
IFMH5	Changed	No
IPCID	New	Not Applicable
ISCB	Changed	No
ITAPST	New	Not Applicable
NC0CB	Changed	No
PIUEQ	Changed	No
RC0AT	Changed	No

Table 92. Changes to Data Macros for TPF/APPN Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
RR0RT	Changed	No
RV1VT	Changed	No
SNAEQ	Changed	No
ST0TB	Changed	Yes

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 93 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 93. Changes to SIP Skeleton and Internal Macros for TPF/APPN Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKANTD	Changed
SPGLB	Changed
SYSEQ	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 94 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 159 for a description of other system generation changes you must make for TPF/APPN support.

Table 94. Changes to SIP Stage I Macros and Statements for TPF/APPN Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
MSGRTA	Changed

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 95 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 95. Changes to Segments for TPF/APPN Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCIM	Real-Time Assembler	Not Applicable	Changed	Add new ALS error messages.
CHEA	Real-Time Assembler	Not Applicable	Changed	Do not process CP-CP sessions.
CHNT	Real-Time Assembler	Not Applicable	Changed	Do not allow MODE=CPSVCMG.
CHNV	Real-Time Assembler	Not Applicable	Changed	Do not allow MODE=CPSVCMG.
CHPR	Real-Time Assembler	Not Applicable	Changed	Do not allow MODE=CPSVCMG.
CHRF	Real-Time Assembler	Not Applicable	Changed	Process APPN reserved TP names.
CHRR	Real-Time Assembler	Not Applicable	Changed	Process MODE=CPSVCMG as special case.
CHRS	Real-Time Assembler	Not Applicable	Changed	Process MODE=CPSVCMG as special case.
CHRY	Real-Time Assembler	Not Applicable	Changed	Process MODE=CPSVCMG as special case.
CHSB	Real-Time Assembler	Not Applicable	Changed	Process CP-CP sessions.
CHSD	Real-Time Assembler	Not Applicable	Changed	Do not echo unrecognized control vectors.
CMTK	Real-Time Assembler	Not Applicable	Changed	Check for printer sharing.
CMTQ	Real-Time Assembler	Not Applicable	Changed	Add printer sharing support.
CMTS	Real-Time Assembler	Not Applicable	Changed	Clear new field in the node control block (NCB).
CMTZ	Real-Time Assembler	Not Applicable	Changed	Check for printer sharing.
CNAB	Real-Time Assembler	Not Applicable	Changed	Invoke APPN cleanup when a TPF processor fails.
CONN	Real-Time Assembler	Not Applicable	Changed	Determine if the application is processor shared.
CSBA	Real-Time Assembler	Not Applicable	New	Activate CP-CP sessions.
CSBB	Real-Time Assembler	Not Applicable	New	Build an APPN BIND request.
CSBC	Real-Time Assembler	Not Applicable	New	CP capabilities TP.
CSBD	Real-Time Assembler	Not Applicable	New	PCID table handler.
CSBE	Real-Time Assembler	Not Applicable	New	TAPST core table handler.
CSBF	Real-Time Assembler	Not Applicable	New	Add TG to TAPST table.
CSBG	Real-Time Assembler	Not Applicable	New	TAPST file record handler.

Table 95. Changes to Segments for TPF/APPN Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSBH	Real-Time Assembler	Not Applicable	New	Request TG during link activation.
CSBI	Real-Time Assembler	Not Applicable	New	Receive network search TP.
CSBJ	Real-Time Assembler	Not Applicable	New	Request resource registration TP.
CSBK	Real-Time Assembler	Not Applicable	New	Topology update TP.
CSBL	Real-Time Assembler	Not Applicable	New	Build an APPN LOCATE.
CSBM	Real-Time Assembler	Not Applicable	New	APPN cycle-up processing.
CSBN	Real-Time Assembler	Not Applicable	New	Build GDS variables for LOCATE.
CSBO	Real-Time Assembler	Not Applicable	New	Send network search TP.
CSBP	Real-Time Assembler	Not Applicable	New	Process LOCATE from the network.
CSBQ	Real-Time Assembler	Not Applicable	New	Process LOCATE for new LU-LU session.
CSBR	Real-Time Assembler	Not applicable	New	Receive SIPCC requests.
CSBS	Real-Time Assembler	Not Applicable	New	Send SIPCC requests.
CSBT	Real-Time Assembler	Not Applicable	New	Process LOCATE from another TPF processor.
CSBU	Real-Time Assembler	Not Applicable	New	Interface to the UAPN user exit.
CSBV	Real-Time Assembler	Not Applicable	New	Validate LOCATE request.
CSBW	Real-Time Assembler	Not Applicable	New	Build LOCATE information.
CSBX	Real-Time Assembler	Not Applicable	New	Process newly activated or deactivated CP-CP session.
CSBZ	Real-Time Assembler	Not Applicable	New	APPN cleanup.
CSB0	Real-Time Assembler	Not Applicable	New	Process the ZNAPN command.
CSCA	Real-Time Assembler	Not Applicable	Changed	Pass RVT information to the CSCB segment.
CSCB	Real-Time Assembler	Not Applicable	Changed	Verify RVT information before scheduling the SNA command.
CSCD	Real-Time Assembler	Not Applicable	Changed	SNABBEGS processing updated for APPN.
CSCI	Real-Time Assembler	Not Applicable	Changed	Process a BIND for the APPN LU-LU sessions.
CSCQ	Real-Time Assembler	Not Applicable	Changed	Clean up APPN information.
CSDV	Real-Time Assembler	Not Applicable	Changed	Process BIND time out.
CSEA	Real-Time Assembler	Not Applicable	Changed	Add code for CP-CP sessions.

Table 95. Changes to Segments for TPF/APPN Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSEC	Real-Time Assembler	Not Applicable	Changed	Add code check for CP-CP sessions.
CSED	Real-Time Assembler	Not Applicable	New	Activate CP-CP sessions.
CSEF	Real-Time Assembler	Not Applicable	Changed	Add code for CP-CP sessions.
CSEL	Real-Time Assembler	Not Applicable	Changed	Add new APPN messages.
CSES	Real-Time Assembler	Not Applicable	Changed	Clear NCP/ALS slowdown indicators.
CSFQ	Real-Time Assembler	Not Applicable	Changed	Display control point (CP) information.
CSFR	Real-Time Assembler	Not Applicable	Changed	Display control point (CP) information.
CSFV	Real-Time Assembler	Not Applicable	Changed	Display control point (CP) information.
CSGA	Real-Time Assembler	Not Applicable	Changed	Invoke APPN cycle-up processing.
CSGB	Real-Time Assembler	Not Applicable	Changed	Process APPN links during restart.
CSGI	Real-Time Assembler	Not Applicable	Changed	Fill in APPN information in the resource vector table (RVT).
CSG0	Real-Time Assembler	Not Applicable	Changed	Invoke APPN restart processing.
CSG2	Real-Time Assembler	Not Applicable	Changed	Fill in APPN information in the resource vector table (RVT).
CSG9	Real-Time Assembler	Not Applicable	New	Build APPN tables during SNA restart.
CSJA	Real-Time Assembler	Not Applicable	Changed	Change ACTCDRM response processing.
CSJK	Real-Time Assembler	Not Applicable	Changed	Process APPN LU-LU sessions.
CSJO	Real-Time Assembler	Not Applicable	Changed	Do not echo unrecognized control vectors.
CSK0	Real-Time Assembler	Not Applicable	Changed	Add entries for the MAXPCID and SLOWTIME parameters.
CSN0	Real-Time Assembler	Not Applicable	Changed	Add entry for the ZNAPN command.
CSPA	Real-Time Assembler	Not Applicable	Changed	Check CP-CP session status during cycle down.
CSTC	Real-Time Assembler	Not Applicable	Changed	Changes for UNBIND rejecting a BIND.
CSTI	Real-Time Assembler	Not Applicable	Changed	Process APPN LU-LU sessions.
CSTJ	Real-Time Assembler	Not Applicable	Changed	Process APPN CP-CP sessions.
CSTK	Real-Time Assembler	Not Applicable	Changed	Assign SIDs based on PU type.
CSX3	Real-Time Assembler	Not Applicable	Changed	Add messages for APPN links.
CVYA	Real-Time Assembler	Not Applicable	Changed	Add entry for the ZNAPN command.

Table 95. Changes to Segments for TPF/APPN Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVYB	Real-Time Assembler	Not Applicable	Changed	Update help information for the ZNDLU and ZNETW commands.
CVYD	Real-Time Assembler	Not Applicable	Changed	Add help information for the ZNAPN command.
OSTGIP	Offline Assembler	OSTG	Changed	Process control points (CPs) and CDRM alias names.
OSTGP2	Offline Assembler	OSTG	Changed	New error processing added.
OSTGUP	Offline Assembler	OSTG	Changed	Process control points (CPs) and CDRM alias names.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 96 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 96. Changes to SYSEQ Tags for TPF/APPN Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#APPN	120	New

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 97. Changes to ECB User Exits for TPF/APPN Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
APPN CP-CP Session Activation	CSBA	UACP	New	Determines whether or not this TPF processor is allowed to have CP-CP sessions.
APPN LU-LU Session Activation	CSBU	UAPN	New	Selects the TPF processor for a new LU-LU session.
APPN LU Registration	CSBJ	UARG	New	Determines which LUs in the TPF 4.1 system should be registered with the APPN network.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See “PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)” on page 1269 for a summary of functional and operational changes by APAR.

Commands

Table 98 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 98. Changes to Commands for TPF/APPN Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZNAPN	New	Display or change the mode in which the TPF system is operating (LEN or APPN mode).
ZNDLU	Changed	Added support for APPN control points (CPs).
ZNETW ACT	Changed	Added support for CP-CP sessions and ALSNODES.
ZNETW INACT	Changed	Added support for CP-CP sessions and ALSNODES.
ZNKEY	Changed	Added support to display the value of MAXPCID. Added support to display or change the value of SLOWTIME.

Messages and System Errors

Table 99 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 99. Changes to Messages and System Errors for TPF/APPN Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
APPN0001I	Online	New
APPN0002I	Online	New
APPN0003I	Online	New
APPN0040W	Online	New
APPN0050E	Online	New
APPN0051E	Online	New
APPN0052A	Online	New
APPN0053A	Online	New
CCIM0092W	Online	New
CCIM0093W	Online	New
C62100	System Error	New
C62101	System Error	New
C62102	System Error	New
C62103	System Error	New
C62104	System Error	New

Table 99. Changes to Messages and System Errors for TPF/APPN Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
C62105	System Error	New
C62105	System Error	New
C62107	System Error	New
C62108	System Error	New
C62109	System Error	New
C6210A	System Error	New
C6210B	System Error	New
C6210C	System Error	New
C6210D	System Error	New
C6210E	System Error	New
C6210F	System Error	New
C62110	System Error	New
C62111	System Error	New
C62112	System Error	New
C62113	System Error	New
C62114	System Error	New
EM116	Offline	New
NAPN0001A	Online	New
NAPN0002I	Online	New
NAPN0003I	Online	New
NAPN0004I	Online	New
NAPN0005W	Online	New
NAPN0006E	Online	New
NAPN0007E	Online	New
NAPN0008E	Online	New
NAPN0009E	Online	New
NAPN0010E	Online	New
NAPN0012I	Online	New
NAPN0013E	Online	New
NAPN0014E	Online	New
NAPN0015I	Online	New
NETW0062I	Online	New
NETW0063I	Online	New
NETW0064I	Online	New
NETW0065I	Online	New
NETW0100I	Online	New
NETW0101I	Online	New
NETW0103E	Online	New
NETW0104E	Online	New
NETW0105E	Online	New
NETW0106E	Online	New
NETW0107E	Online	New
NETW0108E	Online	New
NETW0109E	Online	New

Table 99. Changes to Messages and System Errors for TPF/APPN Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NETW0110E	Online	New
NETW0111E	Online	New
NETW0112E	Online	New
NETW0113E	Online	New
NETW0114E	Online	New
NETW0115E	Online	New
NETW0116E	Online	New
NETW0117W	Online	New
NETW0118E	Online	New
NETW0119E	Online	New
NETW0120E	Online	New
XID30000I	Online	No Longer Supported
XID30001I	Online	No Longer Supported
XID30002I	Online	No Longer Supported
XID30003I	Online	No Longer Supported
XID30050E	Online	No Longer Supported
XID30051E	Online	No Longer Supported
XID30052E	Online	No Longer Supported
XID30053E	Online	No Longer Supported
XID30054E	Online	No Longer Supported
XID30055E	Online	No Longer Supported
XID30056E	Online	No Longer Supported
XID30060I	Online	New
XID30061I	Online	New
XID30062I	Online	New
XID30063I	Online	New
XID30070E	Online	New
XID30071E	Online	New
XID30072E	Online	New
XID30073E	Online	New
XID30074E	Online	New
XID30075E	Online	New
XID30076E	Online	New

Performance or Tuning Changes

“Network Considerations” on page 149 discusses load balancing LU-LU sessions in a loosely coupled complex that is connected to an APPN network.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The following section contains information about defining new SNA resources and parameters that are required for TPF/APPN support.

Defining the TPF Control Point (CP) Name

Specify ASNA=LOCP on an MSGRTA macro to define the name of the APPN control point (CP) for the TPF 4.1 system. The control point is a special LU 6.2 resource used by TPF/APPN support that must reside on all processors in the loosely coupled complex.

Note: If you do not define the name of the CP, the name of the default local TPF/APPC LU (the LU with ASNA=APPC specified on the MSGRTA macro) will also be the TPF control point name. If neither an APPN control point or a default local TPF/APPC LU exists, the TPF system will not be able to use TPF/APPN support.

See *TPF System Generation* for more information about the MSGRTA macro.

Defining Remote Control Point (CP) Names

Remote control point (CP) names must be defined to the TPF 4.1 system for each adjacent APPN network node (NN) that is capable of being the network node server (NNS) for the TPF 4.1 system. Define these remote CPs by coding LUTYPE=REMCP on the RSC statements in the offline ACF/SNA table generation (OSTG) program.

See *TPF ACF/SNA Network Generation* for more information about the OSTG process.

Defining Alias CDRM Names

If the TPF 4.1 system is connected to a VTAM interchange node using both PU 5 NCP connections and APPN connections, you must define an alias name for the VTAM CDRM to the TPF 4.1 system. The VTAM system, as an interchange node, supports PU 5 resources through its system service control point (SSCP) and APPN resources through its CP. The VTAM SSCP name and CP name are identical, but OSTG does not allow a resource to be defined as two different types (remote CDRM and remote CP). To allow both connections, define the CP name to the TPF 4.1 system using the real VTAM CP name, and define the CDRM to the TPF 4.1 system using an alias name as well as the VTAM SSCP name.

See *TPF ACF/SNA Network Generation* for more information about the OSTG process. See *TPF ACF/SNA Data Communications Reference* for sample OSTG statements that define VTAM resources to the TPF 4.1 system.

Defining Shared Printers

To use the SNA printer sharing function for a given printer, define the printer as shared by coding PRSHR=YES on the RSC statement in the OSTG program.

See *TPF ACF/SNA Network Generation* for more information about the OSTG process.

Creating the SNA Keypoint (CTK2)

Define the number of PCID table entries by coding the MAXPCID parameter on the SNAKEY macro in keypoint 2 (CTK2). One PCID table entry is needed for each LU-LU session in the loosely coupled complex that is being activated. Once the LU-LU session becomes active, the PCID table entry can be reused.

Define the PU 2.1 network identifier for the TPF 4.1 system by coding the LENNETID parameter on the SNAKEY macro in CTK2.

Define the maximum number of adjacent link station (ALS) resources that can be defined to the TPF 4.1 system by coding the MAXALS parameter parameter on the

SNAKEY macro in CTK2. Define the maximum number of LU-LU sessions for each ALS by coding the MAXSID parameter on the SNAKEY macro in CTK2.

Define the amount of time that an ALS can be in slowdown before the TPF 4.1 system deactivates the link by coding the SLOWTIME parameter on the SNAKEY macro in CTK2.

See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 100 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title.

See the *TPF Library Guide* for more information about the TPF library.

Table 100. Changes to TPF Publications for TPF/APPN Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Data Communications Reference</i>	GTPSNR03	Updated by TPF/APPN support.
<i>TPF ACF/SNA Network Generation</i>	GTPACF03	Updated by TPF/APPN support.
<i>TPF Library Guide</i>	GTPDOC03	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for TPF/APPN support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG03	Updated with migration considerations for TPF/APPN support.
<i>TPF Operations</i>	GTPOPR03	Updated with information about the commands that were added and changed for TPF/APPN support.
<i>TPF Program Development Support Reference</i>	GTPPDR03	Updated by TPF/APPN support.
<i>TPF System Generation</i>	GTPSYG03	Updated by TPF/APPN support.
<i>TPF System Installation Support Reference</i>	GTPINR03	Updated by TPF/APPN support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

The steps for migrating the TPF 4.1 system to an APPN node depend on how the TPF 4.1 system is currently connected to the SNA network. The TPF 4.1 system can connect to the network as both a PU 5 node and an APPN node at the same time; however, the TPF 4.1 system **cannot** operate as both a LEN node and APPN node connected to a VTAM system. TPF/APPN support provides an APPN-LEN migration switch that determines the mode in which the TPF 4.1 system operates when there are PU 2.1 links between the TPF 4.1 system and a VTAM system. The TPF 4.1 system can run in either LEN mode or APPN mode.

Common APPN Migration Tasks

There are certain tasks that you must perform to set up the TPF 4.1 system as an APPN node, regardless of how the TPF system is currently connected to the network.

To Convert Your Complex to the New TPF/APPN Support:

1. Install PUT 3, which contains APAR PJ19949 for TPF Advanced Peer-to-Peer Networking support.
2. Define the TPF control point (CP) name in the system initialization program (SIP). See “Defining the TPF Control Point (CP) Name” on page 160 for more information.
3. Run SIP Stage 1 to create the ANT deck that will be input to the OSTG program.
4. Define the remote control point names in the OSTG program. See “Defining Remote Control Point (CP) Names” on page 160 for more information.
5. If printer sharing will be used, define the shared printers in the OSTG program. See “Defining Shared Printers” on page 160 for more information.
6. If the TPF 4.1 system has PU 5 NCP connections to the VTAM system, define an alias name for the CDRM in the OSTG program. See “Defining Alias CDRM Names” on page 160 for more information.
7. Run the OSTG program to create an SNA pilot tape.
8. Define the size of the PCID table in the SNA keypoint (CTK2). See “Creating the SNA Keypoint (CTK2)” on page 160 for more information.
9. Load the updated SNA keypoint (CTK2) to the TPF 4.1 system.
10. Load the updated OSTG to the TPF 4.1 system using the ZNOPL command.
11. IPL the TPF 4.1 system.
12. Complete the tasks that follow, that apply to your current network environment. If you are migrating from PU 5 to APPN, complete the tasks in “Migrating from PU 5 to APPN” on page 163. If you are migrating from LEN to APPN, complete the tasks in “Migrating from LEN to APPN” on page 164.

Additional Information:

- See *TPF System Generation* for more information about running SIP Stage 1.
- See *TPF ACF/SNA Network Generation* for more information about the OSTG process and the SNAKEY macro.

- See *TPF Operations* for more information about the ZNOPL command.

Migrating from PU 5 to APPN

Migrating the TPF 4.1 system from a PU 5 node to an APPN node can be done gradually because application LUs in the TPF 4.1 system can be defined to the VTAM system as residing in both the PU 5 (subarea) network and the APPN network. Migrating the TPF 4.1 system from a PU 5 node to a LEN node does not have this dual LU definition capability; therefore, migration had to be done all at once.

Migration Planning – PU 5 to APPN: You must complete the following tasks before or as part of installing TPF/APPN support:

- Define the VTAM system as an interchange network node, allowing it to be an APPN network node (NN) while continuing to be a PU 5 host. Code the following VTAM start options:
 - NODETYPE=NN
 - HOSTSA.

See *VTAM Resource Definition Reference* for more information about VTAM start options.

- Create NCP load modules that define the channel adapters connected to the TPF 4.1 system as PU 2.1 APPN links rather than PU 5 links. Code the following parameters on the PU statements:
 - PUTYPE=2
 - CONNTYPE=APPN
 - CPCP=YES.

See *NCP/SSP/EP Resource Definition Reference* for information about defining NCP resources.

- Define the PU 2.1 NCP links to the TPF 4.1 system using ALS statements in the OSTG program. The name on the ALS statement in the OSTG program must match the name on the PU statement in the NCP generation definition.

See *TPF ACF/SNA Network Generation* for more information about the OSTG process.

- Define resources in the TPF 4.1 system that are used for PU 2.1 support by coding the following parameters on the SNAKEY macro on the SNA keypoint (CTK2):
 - LENNETID
 - MAXALS
 - MAXSID.

If you have any TPF applications that will be in session with remote LUs across both SNI NCP connections and APPN connections, the values of the NETID and LENNETID parameters on the SNAKEY macro **must** be identical if your VTAM system start option NQNMODE is set to NAME.

See *TPF ACF/SNA Network Generation* for information about the SNAKEY macro.

To Migrate Your Complex from PU 5 to APPN:

1. Enter **ZNAPN STATUS** to display the mode of operation for the TPF 4.1 system. If the response to the command indicates that the TPF 4.1 system is in LEN mode, enter **ZNAPN APPN** to switch the TPF 4.1 system to APPN mode.

If the response to the ZNAPN command indicates that the TPF 4.1 system is already in APPN mode, you do not need to enter any command.

2. Activate the network using the existing NCP load modules, which define the channel adapters connected to the TPF 4.1 system as PU 5.
3. Activate the LU-LU sessions in the network.
4. Deactivate one of the NCPs and then load it again using the new NCP load module, which defines the channel adapters connected to the TPF 4.1 system as PU 2.1.
5. If all the NCPs are being converted to PU 2.1, deactivate the CDRM-CDRM session between the TPF 4.1 system and the VTAM system to prevent new sessions from being established using PU 5 protocols. Use the SAVESESS option of CDRM deactivation so that active LU-LU sessions are not taken down when the CDRM-CDRM session ends.

Note: If all the NCPs are not being converted to PU 2.1, do *not* deactivate the CDRM-CDRM session because it is still needed for the PU 5 links.

6. From the VTAM system, activate the PU 2.1 channel adapters between the NCP and the TPF 4.1 system. After XID processing ends, the TPF 4.1 system will start CP-CP sessions with its network node server (NNS), which is the VTAM system. The TPF 4.1 system will then register its resources (LUs) with the NNS.
7. Activate an LU that is attached to the newly loaded NCP. This will cause the LU to send a session initiation request to the VTAM system. The VTAM system will exchange information with the TPF 4.1 system using the APPN CP-CP sessions. Next, the TPF 4.1 system will send a BIND command to establish the LU-LU session. Repeat this step for all of the LUs that are attached to the NCP.
8. Repeat steps 4–7 for each remaining NCP that you want to convert to PU 2.1.

Additional Information:

- See *TPF Operations* for more information about the ZNAPN command.
- See *VTAM Operation* for more information about activating and deactivating NCPs and CDRM-CDRM sessions.

Migrating from LEN to APPN

The procedure for migrating the TPF 4.1 system from a LEN node to an APPN node depends on whether or not the TPF 4.1 system is connected to a VTAM system that is using the VTAM Logon Manager application.

If the VTAM Logon Manager application is not being used, there are no special considerations. Simply change the LEN node definition to an APPN network node (NN) in the configuration file in the communications controller (3174 APPN Controller or RISC System/6000).

The remainder of this section applies only if you are using the VTAM Logon Manager application.

Migration Planning – LEN to APPN: The VTAM Logon Manager application requires that each application (LU) residing in the TPF 4.1 system be defined as an application that resides in the VTAM system. This enables the VTAM Logon Manager application to intercept logon requests for TPF applications and forward the session initiation request to the TPF 4.1 system over special sessions called *CLU-CLU* sessions. The definitions used by the VTAM Logon Manager application make the network think that the TPF LUs reside in the VTAM system when they really do not. When the TPF 4.1 system becomes an APPN node, the VTAM Logon

Manager application is no longer needed and the TPF LUs will be defined correctly to the network (as residing in the TPF 4.1 system, not residing in the VTAM system). During the actual migration, you must delete the APPL statements that define the VTAM applications that represent the TPF LUs in order for the TPF 4.1 system to be able to register (define) its resources (LUs) to the network.

You must complete the following tasks before or as part of installing TPF/APPN support:

- Group all the APPL statements that define the TPF LUs in 1 application program major node in the VTAM system.
See *VTAM Resource Definition Reference* for more information about VTAM APPL statements and VTAM application program major nodes.
- Create NCP load modules that define the channel adapters connected to the TPF 4.1 system as PU 2.1 APPN links rather than PU 2.1 LEN links. Code the following parameters on the PU statements:
 - CONNTYPE=APPN
 - CPCP=YES.

You **must** convert all PU 2.1 connections to the TPF 4.1 system from LEN links to APPN links.

See *NCP/SSP/EP Resource Definition Reference* for information about defining NCP resources.

- Define the VTAM system as an APPN network node. If the VTAM system also requires PU 5 support, define the VTAM system as an interchange network node. Code the following VTAM start options:
 - NODETYPE=NN
 - HOSTSA (only if PU 5 support is required).

See *VTAM Resource Definition Reference* for more information about VTAM start options.

To Migrate Your Complex from LEN to APPN:

1. Activate the network using the existing NCP load modules, which define the channel adapters connected to the TPF 4.1 system as PU 2.1 LEN links.
2. Activate the control sessions (CLU-CLU) between the TPF 4.1 system and the VTAM Logon Manager application.
3. Activate the LU-LU sessions in the network.
4. Deactivate one of the NCPs and then load it again using the new NCP load module that defines the channel adapters connected to the TPF 4.1 system as PU 2.1 APPN links.
5. From the VTAM system, activate the PU 2.1 APPN channel adapters between the NCP and the TPF 4.1 system. During XID processing the TPF 4.1 system will indicate that it is APPN-capable; however, the TPF 4.1 system will treat the link as a LEN link for now because the TPF 4.1 system is running in LEN mode. Repeat this step for each NCP that will have APPN links connected to the TPF 4.1 system.
6. Deactivate all the CLU-CLU sessions and then deactivate the VTAM Logon Manager application.

Note: Active LU-LU sessions are not affected by this action; however, no new LU-LU sessions can be started until APPN CP-CP sessions are activated between the TPF 4.1 system and the VTAM system.

7. Deactivate the VTAM application program major node that contains the APPL statements defining all the TPF LUs.
8. Enter **ZNAPN APPN** to switch the TPF 4.1 system from LEN mode to APPN mode.
9. Enter **ZNETW ACT ID-CPCP** to start CP-CP sessions between the TPF 4.1 system and the VTAM system. You can now establish new LU-LU sessions again.

Additional Information:

- See *VTAM Network Implementation Guide* for more information about the VTAM Logon Manager application.
- See *VTAM Operation* for more information about activating and deactivating NCPs, CLU-CLU sessions, and the VTAM Logon Manager application.
- See *TPF Operations* for more information about the ZNAPN and ZNETW ACT commands.

Fallback Scenarios

If the conversion to TPF/APPN support is not successful, you will need to fall back to your previous network environment, correct the problem, and then try the conversion again.

To Fall Back Your Complex from APPN to PU 5

1. Deactivate each NCP that contains the PU 2.1 definitions.
2. Activate the NCP again using the original NCP generation definition, which defines the channel adapters connected to the TPF 4.1 system as PU 5.
3. Activate the CDRM-CDRM session again.
4. Activate the LU-LU sessions.

Additional Information:

See *VTAM Operation* for more information about activating and deactivating NCPs and CDRM-CDRM sessions.

To Fall Back Your Complex from APPN to LEN

1. Enter **ZNETW INACT ID-CPCP,F** to deactivate the CP-CP sessions.
2. Enter **ZNAPN LEN** to switch the TPF 4.1 system from APPN mode to LEN mode.
3. Activate the VTAM application program major node that contains the APPL statements defining all the TPF LUs.
4. Activate the VTAM Logon Manager application.
5. Activate the CLU-CLU sessions between the TPF 4.1 system and the VTAM Logon Manager application. You can now bring up new LU-LU sessions using the VTAM Logon Manager application.

Additional Information:

- See *VTAM Network Implementation Guide* for more information about the VTAM Logon Manager application.
- See *TPF Operations* for more information about the ZNAPN and ZNETW INACT commands.

Additional Migration Considerations for Program Update Tape (PUT) 3

This section discusses the migration considerations for authorized program analysis reports (APARs) other than the small programming enhancements (SPEs) discussed previously.

Information Provided	Where to Go For More Information
Critical APARs shipped on Program Update Tape (PUT) 3	"Critical APARs"
APARs that correct incorrect APARs shipped on previous PUTs	"APARs that Correct Incorrect APARs Shipped on Previous PUTs"

Critical APARs

Table 101 summarizes critical APARs shipped on PUT 3. These critical APARs are valid at the time PUT 3 ships and are subject to change later. Please see the APAR response information that accompanies each APAR and your IBM service representative for more information about critical APARs.

This information is presented in numeric order based on the APAR number.

Table 101. Critical APARs Shipped on PUT 3

APAR Number	Description
PJ15116	CTL-573 Deactivating and E-Type Loader Loadset
PJ15728	Capture and Restore Problem with Tape Switching
PJ16335	Continuous System Recovery Table (SRT) Timeouts
PJ17036	Connectivity Support for IBM AIX SNA Server/6000
PJ17317	Heap Storage Management Improvements
PJ18041	Log Processor Infinite Loop
PJ18052	SNA Channel-to-Channel (CTC) Links Could Not Be Activated
PJ18106	System Error Causes Lost Entry Control Block (ECB)
PJ18368	New User Exit in CPSM
PJ18440	Possible CTL-001 With Cmalloc (ALLOCATE) TPPC Mapped Conversation Function
PJ18502	CTL-05A Catastrophic After Dump Tape Switch
PJ18509	Capture and Restore Does Not Restore All Records
PJ18660	New ZMEAS Q Function
PJ18916	System Message Processor (SMP) — ZFMSG ADD Command Processing
PJ18985	Multi-Processor Interconnect Facility (MPIF) — Possible CTL-001
PJ19039	Enable Shared PR/SM
PJ19103	ISO-C Support for attac_id and detac_id
PJ19688	LU 6.2 Design Change
PJ20386	ACPL Cannot Load ISO-C Module After Allocator Changes

APARs that Correct Incorrect APARs Shipped on Previous PUTs

Table 102 on page 168 summarizes APARs contained on PUT 3 that fix incorrect APARs shipped with the current PUT or previous PUTs. This table is ordered in numeric order based on the correcting APAR number.

Table 102. APARs Correcting Incorrect APARs Shipped on Previous PUTs — PUT 3

Correcting APAR Number (PUT 3)	Incorrect APAR Number	PUT That Shipped the Incorrect APAR
PJ16526	PJ14271	PUT 1
PJ17584	PJ14605	PUT 1
PJ18140	PJ14605	PUT 1
PJ18358	PJ17852	PUT 2
PJ18608	PJ16357	PUT 2
PJ18702	PJ15873	PUT 2
PJ19198	PJ17852	PUT 2
PJ19229	PJ14605	PUT 1
PJ19706	PJ17852	PUT 2
PJ19734	PJ17852	PUT 2
PJ19750	PJ17852	PUT 2
PJ19781	PJ17852	PUT 2
PJ19878	PJ17852	PUT 2
PJ19916	PJ17852	PUT 2
PJ20085	PJ17779	PUT 3

Program Update Tape 4 (PUT 4)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 4 (PUT 4).

SPE	Where to Go For More Information
ISO-C File Resident Support	"ISO-C File Resident Support (APAR PJ21167)" on page 170
Dynamic LU Support	"Dynamic LU Support (APAR PJ21044)" on page 180
Multiple I-Stream DASD I/O Support	"Multiple I-Stream DASD I/O Support (APAR PJ21313)" on page 213
Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support	"Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)" on page 221

In addition, migration considerations are included for the following types of Authorized Program Analysis Reports (APARs)

- Critical APARs shipped on PUT 4
- APARs that correct incorrect APARs shipped on previous PUTs
- APARs that correct incorrect APARs shipped on PUT 4.

See "Additional Migration Considerations for Program Update Tape (PUT) 4" on page 242 for more information about the migration considerations for these APARs.

TPF 4.1 PUT 4 is compiled with the IBM SAA AD/Cycle C/370 Compiler Version 1 Release 2, IBM SAA AD/Cycle Language Environment (LE/370) Version 1 Release 3, IBM SAA AD/Cycle Language Environment (LE/370), IBM SAA AD/Cycle C/370 Compiler Version 2 Release 1, and IBM SAA AD/Cycle C/370 Compiler Version 3 Release 1 compilers. See "C and C++ Compiler Requirements" on page 46 for more information about C compiler requirements for the TPF 4.1 system.

ISO-C File Resident Support (APAR PJ21167)

The following section discusses the migration considerations for ISO-C file resident support.

Prerequisite APARs

See the APEDIT for APAR PJ21167 for information about these prerequisite APARs.

Functional Overview

ISO-C file resident support allows infrequently used C programs to be released from storage, permitting a more effective use for main storage. ISO-C file resident programs are supported through the use of an expandable system heap storage. ISO-C file resident support improves the reliability of ISO-C applications because they are not limited by the availability of the core resident program area (CRPA). File resident support also provides an overflow area for ISO-C programs when the CRPA is full.

The system heap storage permits multiple ECBs to access large amounts of contiguous storage. This replaces the current method of allocating these storage areas during system initialization. Acquiring contiguous storage using the system heap storage does not require a change to the control program (CP). Storage can be allocated from E-type programs as well as the control program (CP). Storage can be returned to the system without doing an IPL.

Architecture

The system heap storage is very similar to the current implementation of the ECB heap. The difference between them is the system heap is defined in the system virtual memory (SVM) and is accessible by all ECBs. The maximum size of the system heap is defined in CTKA by the SSPS field. (The default size is 10 MB.) CTIN uses the value in CTKA to build the page/segment tables for the virtual address space. Enter/back processing allocates storage in the system heap storage to hold ISO-C file resident programs and ISO-C core resident programs that do not fit into the CRPA. A time-initiated flush routine determines when programs can be released from the system heap storage. Programs are released when the demand count is zero and they have not been entered for 2 cycles of the flush routine.

Data collection reports show the use of the system heap storage to indicate the number of additional frames that need to be allocated.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 103 on page 171 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 103. Changes to Build Scripts for ISO-C File Resident Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CLDFBS	DLM	New	Build script for PAT cleanup.
CRL0BS	DLM	New	Release ISO-C programs from storage.
CRL1BS	DLM	New	ISO-C file resident policing routine.
CTALBS	DLM	Changed	Added new C functions gsysc and rsysc.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 104 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 104. Changes to General Use C Language Header Files for ISO-C File Resident Support

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	X	X	Changed	No
c\$dadfq.h	X	X	Changed	No
c\$idsfrp.h		X	New	No
c\$idsicd.h	X	X	Changed	No
c\$idslst.h	X	X	Changed	No
c\$idspat.h	X	X	Changed	No
sysapi.h		X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 105 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 105. Changes to Library Interface Scripts for ISO-C File Resident Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Added the CGSYSC and CRSYSC library members.

Library Members (Object Files): Table 106 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 106. Changes to Library Members (Object Files) for ISO-C File Resident Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CGSYSC	CTAL	New	Assembler	GSYSC library function.
CRSYSC	CTAL	New	Assembler	RSYSC library function.
CSTRTL	All	Changed	Assembler	Added a version and updated the interface to the static exception routine.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 107 summarizes changes to member (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 107. Changes to Members (Object Files) for ISO-C File Resident Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFRPCR	CRL0 CRL1 CLDF	New	C Language	Release ISO-C program from system heap storage.
CLDF	CLDF	Changed	C Language	Changed from TARGET(TPF) to ISO-C.
CLE9	CRL0 CLDF	Changed	C Language	Changed from TARGET(TPF) to ISO-C.
CRL0	CRL0	New	C Language	Release ISO-C programs from storage.
CRL1	CRL1	New	C Language	Policing routine for ISO-C file resident programs.
CSTRTD	All	Changed	Assembler	Added a version and updated the interface to the static exception routine.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 108 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 108. Changes to CINFC Tags for ISO-C File Resident Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMISVH	318	New

Copy Members

Table 109 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 109. Changes to Copy Members for ISO-C File Resident Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Changed	Updated CP directory.
CAPT	Control Program	CCNUCL	Changed	Added CPMGHEAP.
CCEB	Control Program	CCENBK	Changed	Added program linkage for file resident ISO-C programs.
CCEC	Control Program	CCENBK	Changed	Added program linkage for file resident ISO-C programs.

Table 109. Changes to Copy Members for ISO-C File Resident Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCED	Control Program	CCENBK	Changed	Added program linkage for file resident ISO-C programs.
CCEF	Control Program	CCENBK	Changed	Added program linkage for file resident ISO-C programs.
CICR	Control Program	CCNUCL	Changed	Added system heap macro service routines.
CICS	Control Program	CCNUCL	Changed	Added system heap support to MOVEC.
CIS0	Control Program	CCISOC	Changed	Added system heap data fields.
CIS2	Control Program	CCISOC	Changed	Updated static initialization routine.
CLHP	Control Program	CCSTOR	Changed	Added system heap storage data area.
CLHV	Control Program	CCSTOR	Changed	Added system heap storage macro service routines.
CMIS	Control Program	CCNUCL	Changed	Added policing routine activation.
CPSE	Control Program	CCCPSE	Changed	Added emergency unlock routines.
CPSL	Control Program	CCCPSE	Changed	Format system heap storage in system error dump.
CT00	Control Program	CCCTIN	Changed	Initialize system heap storage data fields.
CT38	Control Program	CCCTIN	Changed	Initialize system heap storage data fields.
CT40	Control Program	CCCTIN	Changed	Initialize system heap storage data fields.
CT41	Control Program	CCCTIN	Changed	Added policing routine activation.
CTIN	Control Program	CCCTIN	Changed	Initialize system heap storage data fields.
IB01	Control Program	IPLB	Changed	Initialize system heap storage data fields.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 110 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 110. Changes to Data Macros for ISO-C File Resident Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK1KE	Changed	No
IDSCSF	Changed	No
IDSFCT	Changed	No
IDSFRP	New	Not Applicable
IDSICD	Changed	No
IDSLST	Changed	No
IDSPAT	Changed	No

Table 110. Changes to Data Macros for ISO-C File Resident Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSSVH	New	Not Applicable
IPSTAT	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 111 summarizes selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 111. Changes to Selected Equate Macros for ISO-C File Resident Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CLHEQ	Changed	No
CZOCP	Changed	No
CZ1SE	Changed	No
DADFQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 112 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 112. Changes to SIP Skeleton and Internal Macros for ISO-C File Resident Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKA	Changed
SKCTKB	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 113 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 113. Changes to SIP Stage II Macros for ISO-C File Resident Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 114 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 114. Changes to System Macros for ISO-C File Resident Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$GSYSC	New	Not Applicable
\$GSVAC	Changed	Yes, if you are using the system heap.
\$RSYSC	New	Not Applicable
CINFC	Changed	No
GSYSC	New	Not Applicable
IBMSVC	Changed	Yes
IDATB	Changed	Yes
RSYSC	New	Not Applicable

System Macros (IBM Use Only): Table 115 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 115. Changes to System Macros (IBM Use Only) for ISO-C File Resident Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes

Segments

Table 116 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 116. Changes to Segments for ISO-C File Resident Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
C275	Real-Time Assembler	Not Applicable	Changed	Fixed base assembly problem.
CLDJ	Real-Time C Language	Not Applicable	Changed	Added E-type loader program clean up for file resident ISO-C programs.
CLEK	Real-Time Assembler	Not Applicable	Changed	Added E-type loader program clean up for file resident ISO-C programs.
CLH0	Real-Time Assembler	Not Applicable	Changed	Added the SSPS parameter to the ZCTKA command.
CLH2	Real-Time Assembler	Not Applicable	Changed	Added the SSPS parameter to the ZCTKA command.
CLIB	Real-Time Assembler	Not Applicable	Changed	Removed load of file resident DLMs.
COLP	Real-Time C Language	Not Applicable	Changed	Updated accept processing.
CVAN	Real-Time Assembler	Not Applicable	Changed	Added ZACOR and ZDCOR support for system heap storage storage.

Table 116. Changes to Segments for ISO-C File Resident Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVAX	Real-Time Assembler	Not Applicable	Changed	Added ZACOR and ZDCOR support for system heap storage storage.
CVOR	Real-Time Assembler	Not Applicable	Changed	Added system heap storage frame usage to the ZSTAT command.
CVRN	Real-Time Assembler	Not Applicable	Changed	Added ZIDOT support for system heap storage address range.
CVZI	Real-Time Assembler	Not Applicable	Changed	Added ZIDOT support for system heap storage address range.
CYB6	Real-Time Assembler	Not Applicable	Changed	Added ZACOR and ZDCOR support for system heap storage address range.
JCD4	Real-Time Assembler	Not Applicable	Changed	Added system heap storage utilization to data collection.
JCS0	Real-Time Assembler	Not Applicable	Changed	Added system heap storage utilization to data collection.
JRA1	Offline PL/I	Not Applicable	Changed	Added system heap storage utilization to data reduction.
JRA2	Offline PL/I	Not Applicable	Changed	Added system heap storage utilization to data reduction.
JRA3	Offline PL/I	Not Applicable	Changed	Added system heap storage utilization to data reduction.
JRS3	Offline PL/I	Not Applicable	Changed	Added system heap storage utilization to data reduction.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 117 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 117. Changes to Commands for ISO-C File Resident Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZACOR	Changed	Added support for changing system heap storage storage that is currently in use.
ZCTKA	Changed	Added the SSPS (system heap size in MBs) parameter and output line.
ZDCOR	Changed	Added support for displaying system heap storage storage that is currently in use.

Table 117. Changes to Commands for ISO-C File Resident Support (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZSTAT	Changed	Added an output line for the number of frames used for the system heap storage.

Messages and System Errors

Table 118 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 118. Changes to Messages and System Errors for ISO-C File Resident Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
094003	System Error	New
09400A	System Error	Changed
09400E	System Error	New
094011	System Error	New
CTKA0003I	Online	No Longer Supported
CTKA0004I	Online	No Longer Supported
CTKA0005I	Online	New
CTKA0006I	Online	New
CTKA0059E	Online	Changed
DCOR0063E	Online	New
STAT0008I	Online	No Longer Supported
STAT0010I	Online	New

Performance or Tuning Changes

You must tune the TPF system so that ISO-C file resident programs perform correctly. The ISO-C file resident programs do not remain in main storage permanently nor should they degrade overall system performance by requiring a fetch for every execution. You must also define additional frames to back up the system heap storage.

ISO-C File Resident Programs

ISO-C file resident programs are released from storage by a policing routine that is run on a time-initiated basis. The time interval is set to 10 seconds, meaning that the minimum time an ISO-C file resident program is in storage is 20 seconds. (The time-initiated flush indicator is set after the first interval; if the program is still not in use during the second interval, the program is flushed.) If you need to release frames used for the ISO-C file resident program sooner, you can change the policing routine interval by updating the appropriate field in the ISO-C data area and

assembling CCISOC again. Conversely, if ISO-C file resident programs are being fetched too often, increase the increment. If ISO-C file resident programs are being kept in main storage because they are used frequently, consider changing the allocation to core resident.

Allocating Frames to Back up the System Heap Storage: You can determine the number of frames needed to back up the system heap by analyzing the data reduction reports. A new section called System Heap Storage Utilization appears in the System Summary Report. This section shows the utilization of the address space defined, the mean number of frames in use, and the size and number of failing requests.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 119 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 119. Changes to TPF Publications for ISO-C File Resident Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C Language Support Reference Summary</i>	Not Applicable	Functions added.
<i>TPF C Language Support User's Guide</i>	GTPCLU04	Functions added.
<i>TPF Concepts and Structures</i>	GTPCON04	Architecture changed.
<i>TPF Library Guide</i>	GTPDOC04	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for ISO-C file resident support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG04	Updated with migration considerations for ISO-C file resident support.
<i>TPF Operations</i>	GTPOPR04	Updated with information about the commands that were added and changed for ISO-C file resident support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR04	Performance measurements changed and added.
<i>TPF System Generation</i>	GTPSYG04	Changed installation considerations.
<i>TPF System Macros</i>	GTPSYS04	Macros added.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

ISO-C file resident support provides the ability to allocate systemwide variable-sized contiguous storage blocks through the use of the system heap storage. See *TPF Concepts and Structures* for a description of the system heap storage. See *TPF System Macros* and the *TPF C/C++ Language Support User's Guide* for more information about the interface for allocating system heap storage.

Database Changes

ISO-C programs defined as file resident are no longer loaded into the core resident program area (CRPA). If you have file resident ISO-C programs, verify that you still want them defined as such because the way they work will change. Therefore, the allocation of ISO-C programs must be examined; some ISO-C programs may be allocated as file resident.

Feature Changes

There are none.

Installation Validation

There are no changes.

Migration Scenarios

Before you install ISO-C file resident support, do the following:

1. Examine the allocation of all current ISO-C programs.
2. Set appropriate allocations of ISO-C programs.
3. Allocate a suitable size for the system heap storage address range. The default is 10 MB.
4. Link all ISO-C DLMs and libraries again.

Dynamic LU Support (APAR PJ21044)

The following section discusses the migration considerations for dynamic LU support.

Prerequisite APARs

See the APEDIT for APAR PJ21044 for information about prerequisite APARs.

Functional Overview

The following information describes the enhancements made to the TPF 4.1 system for dynamic LU support.

Defining SNA Network Resources

Currently in the TPF 4.1 system, you must use the offline ACF/SNA table generation (OSTG) program to define all of your SNA network resources, which requires significant effort and careful planning. If, after the TPF 4.1 system is generated, you want to define more resources or change existing resource definitions, you must update the OSTG input data sets, run the OSTG program again, and perform another fresh or dynamic load to incorporate the new or changed resource definitions. This requires additional effort and can impact system availability.

Now, with dynamic LU support, remote terminals (LU resources) can log on to applications in the TPF 4.1 system without first being defined using the OSTG program. Instead, when an LU resource that was not previously defined to the TPF 4.1 system tries to log on, the TPF 4.1 system automatically creates a resource definition for that LU resource, which allows the session to be started.

If the TPF 4.1 system is running in TPF Advanced Peer-to-Peer Networking (TPF/APPN) mode, the same is true for adjacent link station (ALS) resources; you no longer need to define ALS resources to the TPF 4.1 system using the OSTG program. When an ALS resource that was not previously known to the TPF 4.1 system tries to activate the PU 2.1 link, the TPF 4.1 system automatically creates a resource definition for that ALS resource, which allows the link to be activated.

You can also use new commands to create and change resource definitions online for ALS, cross-domain resource manager (CDRM), channel-to-channel (CTC), and network control program (NCP) resources. These new commands are the ZNDYN ADD and ZNDYN CHANGE commands.

Imagine the flexibility and capability that dynamic LU support provides you, especially when it is coupled with TPF/APPN support. With TPF/APPN support, the TPF 4.1 system automatically registers its LU resources with the remainder of the SNA network when the SNA network is activated. With dynamic LU support, the opposite is true. The TPF 4.1 system automatically creates resource definitions for remote LU resources when the remote LU resources log on, and for ALS resources when a PU 2.1 link is activated. Clearly, these enhancements simplify the process of defining and maintaining the SNA network resources.

See the following for more information:

- *TPF ACF/SNA Data Communications Reference* for information about defining SNA network resources.
- *TPF ACF/SNA Network Generation* for more information about the OSTG program.

- *TPF Operations* for information about the ZNDYN ADD and ZNDYN CHANGE commands.
- “TPF Advanced Peer-to-Peer Networking (TPF/APPN) Support (APAR PJ19949)” on page 148 and the *TPF ACF/SNA Data Communications Reference* for more information about TPF/APPN support.

Performing a Dynamic Load

Significant enhancements were also made to the SNA dynamic load function, which is performed using the ZNOPL commands. You are no longer required to perform an initial program load (IPL) on the TPF 4.1 system to incorporate the new resource definitions during a dynamic load. Now you can enter the new ZNOPL MERGE command in any TPF system state to incorporate the new resource definitions without disrupting the SNA network.

In addition, if the update function is not successful during a dynamic load, you are no longer required to enter the ZNOPL FALLBACK command and perform an IPL to fall back to the old resource definitions. The TPF 4.1 system will automatically fall back to the old resource definitions for you. Simply enter the new ZNOPL MERGE command to incorporate the old resource definitions in the TPF 4.1 system. No IPL is necessary.

See *TPF ACF/SNA Data Communications Reference* for more information about performing a dynamic load. See *TPF Operations* for more information about the ZNOPL commands.

Improving Expandability and Availability

Dynamic LU support, especially when it is used with TPF/APPN support, significantly reduces the planning required to expand your communication network. It also eliminates the need for scheduled outages.

For example, in a TPF 4.1 system without dynamic LU support, if 2 airlines want to merge their communication networks, they must increase the size of the resource vector table (RVT) and define more fixed file NCB records to accommodate the increased number of resources. Each of these tasks require you to perform a fresh load. The 2 airlines must also define all the new ALS, CDRM, CTC, NCP, and remote LU resources using the OSTG program and load these new resource definitions to the TPF 4.1 system. This requires an IPL and possibly a fresh load.

Dynamic LU support allows you to easily expand your communication network by offering the following:

- You are no longer required to perform a fresh load to increase the size of the RVT. Simply increase the value of the MAXRVT parameter in the SNAKEY macro, load a new version of the SNA keypoint (CTK2), and perform an initial program load (IPL) on the TPF 4.1 system.

Note: Be sure that you have enough #RV1RI records defined to accommodate the increased size of the RVT.

- A new command, ZNNCB REORG, is provided to increase the number of NCB directory records in the TPF 4.1 system, which allows you access to more NCB records for dynamic LU resources. Another command, ZNNCB RECON, is also provided to return unused NCB directory records and NCB records to the TPF 4.1 system. You can enter both of these commands in NORM state while the network is running.

See *TPF ACF/SNA Data Communications Reference* for more information about increasing the number of NCB directory records in the TPF 4.1 system and

returning unused NCB directory records and NCB records to the TPF 4.1 system. See *TPF Operations* for more information about the ZNNCB REORG and ZNNCB RECON commands.

- You are no longer required to define ALS and remote LU resources to the TPF 4.1 system using the OSTG program. Remote LU resources are automatically defined when they log on to the TPF 4.1 system. ALS resources are automatically defined to the TPF 4.1 system when the ALS links are activated.
In addition, if you want to define more ALS, CDRM, CTC, or NCP resources, or change the existing definitions for these resources, you can do so using the new ZNDYN ADD and ZNDYN CHANGE commands. You no longer need to use the OSTG program.
See *TPF ACF/SNA Data Communications Reference* for more information about defining resources to the TPF 4.1 system. See *TPF Operations* for more information about the ZNDYN ADD and ZNDYN CHANGE commands.
- If you choose to define the new resources to the TPF 4.1 system using the OSTG program, the dynamic load function no longer requires you to perform an IPL. Simply enter the new ZNOPL MERGE command in any TPF system state while the network is running to incorporate the new resource definitions.
See *TPF ACF/SNA Data Communications Reference* for more information about performing a dynamic load. See *TPF Operations* for more information about the ZNOPL MERGE command.

Customizing Dynamic LU Support

The dynamic LU user exit is provided with dynamic LU support. This user exit allows you to define certain characteristics of the dynamic LU resources that log on to the TPF 4.1 system. A *dynamic LU resource* is any remote LU resource that is defined to the TPF 4.1 system using dynamic LU support rather than the OSTG program.

You can also use this user exit to restrict specific dynamic LU resources from logging on to the TPF 4.1 system. You can even restrict all dynamic LU resources from logging on to the TPF 4.1 system and continue to define all of the remote SNA resources using the OSTG program.

See *TPF System Installation Support Reference* for more information about the dynamic LU user exit.

Architecture

The main objective of dynamic LU support is to allow the TPF 4.1 system to learn about new remote SNA resources and create the necessary control structures (RVT entries and NCB records) while the TPF 4.1 system is in any TPF system state. The following information describes the changes that were made to the TPF 4.1 system to meet these requirements.

The TPF 4.1 System Before Dynamic LU Support

Before dynamic LU support, the RVT was (and still is) divided into the following sections:

- The non-LU section (or ALS section), which contained entries for the ALS, CDRM, CTC, and NCP resources and the local system services control point (SSCP). The entries for the CDRM resources and the local SSCP were always first in the RVT, followed by the entries for the ALS, CTC, and NCP resources.
- The LU section, which contained entries for the LU resources. These entries were maintained in alphabetic order.

The size of the RVT was (and still is) defined by the MAXRVT parameter in the SNAKEY macro. The size of the non-LU section was determined by the number of non-LU resources loaded using the OSTG program (one RVT entry for each non-LU resource), and the remaining entries in the RVT became the LU section. There could be spare entries in the LU section of the RVT, but there were never spare entries in the non-LU section of the RVT.

SNA resources were assigned a resource ID (RID) when the resource definitions were created using the SNA fresh load or dynamic load function. Therefore, RID assignments were the same across all the processors in the loosely coupled TPF 4.1 system. That is, if the APPLA resource was assigned RID 23 on processor B, it was also assigned RID 23 on processor C and processor D.

RIDs were *not* a direct index into the RVT; that is, RID 3 did not necessarily correspond to the third entry in the RVT. Instead, a structure called the *RID table* was used to map RIDs with the appropriate entry in the RVT.

After a fresh load was performed, the RIDs did happen to be a direct index into the RVT. Figure 1 shows an example of what the RID table and RVT could look like after a fresh load.

Entry	RID Table	Storage Address	R V T		
			NAME	RID	
1	1000	1000	TPFB	000001	Non-LU Section
2	1050	1050	VTAM2	000002	
3	1100	1100	ALS0001	000003	
4	1150	1150	NCP0001	000004	
5	1200	1200	APPLA	000005	LU Section
6	1250	1250	APPLB001	000006	
7	1300	1300	TPFDB2T	000007	
8	1350	1350	ZZZZ0018	000008	
9	0	1400			
10	0	1450			

Figure 1. RID Table and RVT after a Fresh Load. The RVT1 delimiters are not included in this figure.

Notice the following in Figure 1:

- There are 10 entries in the RVT (that is, MAXRVT=10).
- Only 8 of the 10 RVT entries are in use.
- The non-LU section of the RVT contains 4 entries (TPFB, VTAM2, ALS0001, and NCP0001).
- The LU section of the RVT contains 4 entries (APPLA, APPLB001, TPFDB2T, and ZZZZ0018), and these entries are arranged in alphabetic order.

- There are 2 spare RVT entries in the LU section of the RVT, and these entries are not assigned an RID.
- The RIDs happen to be a direct index into the RVT.

Once a resource was assigned an RID, the RID for that resource never changed. Because the LU section of the RVT was kept in alphabetic order, adding new LU resources or deleting existing resources using the dynamic load function could easily cause the RIDs to no longer be a direct index into the RVT.

Figure 2 shows an example of what the RID table and RVT could look like after a dynamic load was performed to add 2 new LU resources (NEW001 and NEW002) to the TPF 4.1 system.

Entry	RID Table	Storage Address	R V T		
			NAME	RID	
1	1000	1000	TPFB	000001	Non-LU Section
2	1050	1050	VTAM2	000002	
3	1100	1100	ALS0001	000003	
4	1150	1150	NCP0001	000004	
5	1200	1200	APPLA	000005	LU Section
6	1250	1250	APPLB001	000006	
7	1400	1300	NEW001	000009	
8	1450	1350	NEW002	000010	
9	1300	1400	TPFDB2T	000007	
10	1350	1450	ZZZZ0018	000008	

Figure 2. RID Table and RVT after a Dynamic Load. The RVT1 delimiters are not included in this figure.

Notice the following in Figure 2:

- The new LU resources are added to the LU section of the RVT in alphabetic order.
- RIDs that are already assigned to a resource do not change.
- The RIDs are now no longer a direct index into the RVT.

The RID assigned to each resource was also the NCB ordinal number of the 381-byte fixed file NCB record that was also assigned to each resource. RIDs and NCB ordinals were identical because RIDs were the same across all the processors in a loosely coupled TPF 4.1 system.

The architecture described previously in this section presented the following problems for dynamic LU support:

- There was no way to define spare entries in the non-LU section of the RVT. Therefore, you had to increase the size of the non-LU section of the RVT each time you defined new non-LU resources to the TPF system.
- The LU section of the RVT was maintained in alphabetic order. However, you cannot rearrange RVT entries while the TPF 4.1 system is running. Therefore, you had to perform an IPL to create the new resource definitions.
- RIDs were the same across the processors in a loosely coupled TPF 4.1 system and were, therefore, used as the ordinal number for the NCB record. However, if different resources were defined using dynamic LU support or the ZNDYN ADD command on different processors in a loosely coupled TPF 4.1 system, the RIDs will no longer be consistent. This will cause a problem when the TPF 4.1 system tries to retrieve the correct NCB record for a resource. This will also cause a problem for the export ROUTC function because this function also assumes that RIDs are consistent across the processors in a loosely coupled TPF 4.1 system.

The following information describes the changes that were made to the TPF 4.1 system to resolve these problems for dynamic LU support.

Changes to the Non-LU Section of the RVT

You can now define the size of the non-LU section in the RVT and create spare entries using the new NUMALS parameter, which was added to the SNAKEY macro. Spare entries must exist in the non-LU section of the RVT if you want to use dynamic LU support or the ZNDYN ADD command to define SNA resources to the TPF 4.1 system.

See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro and the NUMALS parameter.

In addition, the entries for the CDRM resources and the local SSCP are not necessarily first in the RVT anymore. This change simplifies the organization of the non-LU section and eliminates the need to maintain 3 separate spare areas in the RVT (1 spare area for the CDRM and SSCP resources, 1 spare area for the other non-LU resources, and 1 spare area for the LU resources). Instead, only 2 spare areas are maintained in the RVT (1 spare area for the non-LU resources and 1 spare area for the LU resources).

Figure 3 on page 186 shows an example of what the RVT could look like with dynamic LU support.

R V T		
Storage Address	NAME	RID
1000	TPFB	000001
1050	NCP0001	000002
1100	ALS0001	000003
1150	VTAM2	000004
1200		000005
1250	TPFDB2T	000006
1300	APPLB001	000007
1350	APPLA	000008
1400	ZZZZ0018	000009
1450		00000A

Non-LU
Section

LU
Section

Figure 3. Layout of the RVT with Dynamic LU Support. The RVT1 delimiters are not included in this figure.

Notice the following in Figure 3:

- There are 10 entries in the RVT (that is, MAXRVT=10).
- There are 4 entries in the non-LU section of the RVT (that is, NUMALS=5).
- The CDRM resources and the SSCP are no longer necessarily first in the non-LU section of the RVT, followed by the ALS, CTC, and NCP resources.
- There is 1 spare entry in the non-LU section of the RVT (RID 000005).
- There is 1 spare entry in the LU section of the RVT (RID 00000A).
- If a new ALS was defined to the TPF 4.1 system using dynamic LU support, or if a resource definition was created for a new ALS, CDRM, CTC, or NCP resource using the ZNDYN ADD command, the TPF 4.1 system would use the spare RVT entry in the non-LU section (RID 000005).
- If a new LU resource was defined to the TPF 4.1 system using dynamic LU support, the TPF 4.1 system would use the spare RVT entry in the LU section (RID 00000A).

Changes to the LU Section of the RVT

The LU section of the RVT is no longer maintained in alphabetic order. This eliminates the need to rearrange the RVT entries when new LU resources are defined using dynamic LU support, and allows the TPF 4.1 system to define new LU resources in any TPF system state.

New LU resources are now simply assigned the next available spare entry in the LU section of the RVT. Each RVT entry, including the spare RVT entries, are assigned an RID in sequential order when the TPF 4.1 system is generated. Therefore, the RID is now a direct index into the RVT and the RID table is no longer used. That is, RID 3 always corresponds to the third entry in the RVT.

Figure 4 shows an example of how LU resources are added to the RVT when they are defined to the TPF 4.1 system using dynamic LU support.

R V T A			R V T B		
Storage Address	NAME	RID	Storage Address	NAME	RID
1200	TPFDB2T	000006	1200	TPFDB2T	000006
1250	APPLB001	000007	1250	APPLB001	000007
1300	APPLA	000008	1300	APPLA	000008
1350	ZZZZ0018	000009	1350	ZZZZ0018	000009
1400		00000A	1400	DYN002	00000A
1450		00000B	1450	DYN001	00000B
1500		00000C	1500		00000C
1550		00000D	1550		00000D
1600		00000E	1600		00000E
1650		00000F	1650		00000F

Figure 4. Creating RVT Entries for LU Resources Defined Using Dynamic LU Support. The RVT1 delimiters are not included in this figure.

Notice the following in Figure 4:

- Only the LU section of the RVT is included in the example.
- RVT A is an example of the RVT **before** the new LU resources are defined using dynamic LU support. RVT B is an example of the RVT **after** the new LU resources are defined using dynamic LU support.
- Spare RVT entries are assigned an RID when the TPF 4.1 system is generated.
- There is no longer an RID table. RIDs are now a direct index into the RVT.
- DYN002 is defined first using dynamic LU support and assigned the next available RVT entry, which has RID 00000A. DYN001 is defined next using dynamic LU support and assigned the next available RVT entry, which has RID 00000B.
- The RVT entries in the LU section are no longer rearranged to maintain alphabetic order.

RID Assignments across Processors in a Loosely Coupled TPF 4.1 System

Because different resources can be defined on different processors using dynamic LU support and the ZNDYN ADD command, RIDs are not necessarily consistent across the processors in a loosely coupled TPF 4.1 system. For example, consider the following scenario:

1. The OSTG program was used to define the following LU resources to the TPF 4.1 system:
 - TPFDB2T, which is assigned RID 000006

- APPLB001, which is assigned RID 000007
 - APPLA, which is assigned RID 000008
 - ZZZZ0018, which is assigned RID 000009.
2. Processor B and processor C both perform an initial program load (IPL) to incorporate the new resource definitions. The RID assignments on both processor B and processor C are identical.
 3. The DYN001 LU resource is defined on processor B using dynamic LU support.
 4. The DYN003 LU resource is defined on processor C using dynamic LU support.
 5. The DYN002 LU resource is defined on processor B using dynamic LU support.
 6. The RID assignments on processor B and processor C are no longer consistent, as shown in Figure 5. Notice that on processor B, RID 00000A is assigned to DYN001 but on processor C, RID 00000A is assigned to DYN003.

RVT for Processor B			RVT for Processor C		
Storage Address	NAME	RID	Storage Address	NAME	RID
1200	TPFDB2T	000006	1200	TPFDB2T	000006
1250	APPLB001	000007	1250	APPLB001	000007
1300	APPLA	000008	1300	APPLA	000008
1350	ZZZZ0018	000009	1350	ZZZZ0018	000009
1400	DYN001	00000A	1400	DYN003	00000A
1450	DYN002	00000B	1450		00000B
1500		00000C	1500		00000C
1550		00000D	1550		00000D
1600		00000E	1600		00000E
1650		00000F	1650		00000F

Figure 5. Inconsistent RID Assignments across Processors in a Loosely Coupled TPF 4.1 System. The RVT1 delimiters are not included in this figure.

New Structures Added for the RVT

Now that the LU section of the RVT is no longer maintained in alphabetic order, a hashing algorithm is necessary so that the TPF 4.1 system can effectively search the RVT for a particular LU resource. The hashing algorithm used is based on the resource name and it requires a number of new structures to access the entries in the RVT.

The following resource name hash (RNH) tables, which are all located in main storage and built during SNA restart, were created for dynamic LU support:

- Resource name hash control table (RNHCT)
- Resource name hash prime table (RNHPT)
- Resource name hash entry table (RNHET).

See *TPF ACF/SNA Data Communications Reference* for a description of these structures.

NCB Records and New NCB Structures

Resources defined using the OSTG program are still assigned a 381-byte fixed file NCB record when the OSTG program is run. However, because RIDs are no longer consistent across the processors in a loosely coupled TPF 4.1 system, the ordinal number of the NCB record is no longer the same as the RID. Therefore, to access the appropriate NCB record for a resource, you must use the CSNB segment. See *TPF ACF/SNA Data Communications Reference* for more information about the CSNB segment.

New LU resources that are defined to the TPF 4.1 system using dynamic LU support are **not** assigned a 381-byte fixed file NCB record. Instead, these LU resources are assigned from 1–8 long-term pool file NCB records. The contents of the 381-byte fixed file NCB record and the long-term pool-file NCB record is the same, and both types of NCB records are shared by all processors in a loosely coupled TPF 4.1 system.

The following NCB structures, which are also shared by all processors in a loosely coupled TPF 4.1 system, were created for dynamic LU support:

- NCB control record
- NCB directory records.

See *TPF ACF/SNA Data Communications Reference* for more information about these records.

Scratch Pad Area (SPA)

The NCB/SPA ordinal is assigned by the OSTG program. The SPA ordinal is identical to the NCB ordinal and the NCB/SPA ordinal is saved at RV1ORDN in the RVT. You can assign spared SPA ordinals to the dynamic LUs using the dynamic LU user exit. For a dynamic LU, the ordinal saved at RV1ORDN only means the SPA ordinal and cannot be used as an NCB ordinal. You can use the CSNB segment to access the SPA record. However, the SPA fixed file record must be initialized before calling the CSNB segment. Without doing so, the CSNB segment sets an error return code and returns to the calling segment.

Export ROUTC Changes

Before dynamic LU support, when RIDs were consistent across processors in a loosely coupled TPF 4.1 system, the RID was used by the export ROUTC function to determine the destination LU for routing messages. Now that the RIDs are no longer consistent across processors, this function was changed to pass the name and network ID of the destination LU between processors rather than the RID.

Functional Management Message Routing (FMMR) Changes

Before dynamic LU support, functional management message routing (FMMR) used only the name of the destination LU to send messages to LUs in other TPF 4.1 system complexes. FMMR was changed to pass the network ID, as well as the name, of the destination LU between processors.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with dynamic LU support, you must create the required operating environment. The following section describes hardware and software requirements specific to dynamic LU support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for SNA-Based Communication: With dynamic LU support, you are no longer required to define all of the SNA resources to the TPF 4.1 system using the OSTG program. See “Defining SNA Network Resources” on page 180 for more information.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 120 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 120. Changes to General Use C Language Header Files for Dynamic LU Support

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	X		Changed	No
c\$fva0.h	X		Changed	Yes
rcp0pl.h	X		Changed	No
c\$rv1vt.h	X		Changed	No
c\$syseq.h	X		Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 121 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 121. Changes to Copy Members for Dynamic LU Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CDC1	Control Program	CCDCOL	Changed	Updated to bypass data collection for LU resources that are defined after data collection is started.
CSX2	Control Program	CCSNA1	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSX6	Control Program	CCSNA1	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CS0B	Control Program	CCSNA4	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CS0D	Control Program	CCSNAD	Changed	Updated to build the negotiable BIND image for FMMR-FMMR sessions.
CS0F	Control Program	CCSNA4	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource. Also updated to build the negotiable BIND image for FMMR-FMMR sessions.
CS0J	Control Program	CCSNA1	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CS06	Control Program	CCSNA1	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CS11	Control Program	CCSNA0	Changed	Removed the resource identifier (RID) table.
CS12	Control Program	CCSNA0	Changed	Removed the resource identifier (RID) table.
CS13	Control Program	CCSNA0	Changed	Updated the INQRC macro for dynamic LU support.
CS20	Control Program	CCSNAB	Changed	Added checks for FMMR input messages.
CS96	Control Program	CCSNA3	Changed	Updated to save the input message sequence number for the system recovery table (SRT) in the trailer of the message block.
CT15	Control Program	CCCTIN	Changed	Allocated storage for the RNHCT.

Fixed File Records

Table 122 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 122. Changes to Fixed File Records for Dynamic LU Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#NCBN4	New	NCB directory record.
#NCBN5	New	NCB directory record.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 123 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 123. Changes to Communication Macros and Statements for Dynamic LU Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
ANTNME	Changed	No
SNAKEY	Changed	Yes

Data Macros: Table 124 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 124. Changes to Data Macros for Dynamic LU Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
AN0NT	Changed	Yes
CK2SN	Changed	No
CZ1SE	Changed	No
DC0DC	Changed	No
DLTEC	Changed	No
IDSCLR	Changed	Yes
INC1CR	New	Not Applicable
IND1DT	New	Not Applicable
IRNHCT	New	Not Applicable
IRNHET	New	Not Applicable
IRNHPT	New	Not Applicable
IRNHST	New	Not Applicable
ISCB	Changed	No
NC0CB	Changed	No
NODEQ	Changed	No
RC0AT	Changed	No
RC0PL	Changed	No
RC1IT	Changed	No

Table 124. Changes to Data Macros for Dynamic LU Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
RR0RT	Changed	No
RV1VT	Changed	No
SP0PA	Changed	No

General Macros: Table 125 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 125. Changes to General Macros for Dynamic LU Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
INQRC	Changed	No
RIDCC	Changed	Yes, if SVC=NO was specified.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 126 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 126. Changes to SIP Skeleton and Internal Macros for Dynamic LU Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKANTD	Changed
SKGLB	Changed
SKRCIT	Changed
SKSET	Changed
SPERRG	Changed
SPGLB	Changed
SPPGML	Changed
SPRIAT	Changed
SYSEQ	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 127 on page 194 summarizes system initialization program (SIP) Stage I macros and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 205 for a description of other system generation changes you must make for

dynamic LU support.

Table 127. Changes to SIP Stage I Macros and Statements for Dynamic LU Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
MSGRTA	Changed

System Initialization Program (SIP) Stage II Macros: Table 128 summarizes the system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 128. Changes to SIP Stage II Macros for Dynamic LU Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 129 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 129. Changes to System Macros for Dynamic LU Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
DHASHC	New	Not Applicable
GROUP	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 130 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 130. Changes to Segments for Dynamic LU Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BKDB	Real-Time Assembler	Not Applicable	Changed	Added descriptor records for dynamic LU support.
BRCP	Real-Time Assembler	Not Applicable	Changed	Added checks to prevent Recoup from being started if the NCB reorganization function is active.
CDLA	Real-Time Assembler	Not Applicable	New	Build the RNHCT, RNHET, RNHPT, and RVT termination list.
CDLB	Real-Time Assembler	Not Applicable	New	Keypoint newly created RVT entries.
CDLC	Real-Time Assembler	Not Applicable	New	Process the ZNDYN DISPLAY command.
CDLD	Real-Time Assembler	Not Applicable	New	Process the ZNDYN RECYCLE command.
CDLF	Real-Time Assembler	Not Applicable	New	Process the ZNDYN ADD and ZNDYN CHANGE commands.

Table 130. Changes to Segments for Dynamic LU Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CDLI	Real-Time Assembler	Not Applicable	New	Parse the ZNDYN commands.
CDLX	Real-Time Assembler	Not Applicable	New	Verify the changes made in the dynamic LU user exit (CDLY).
CDLY	Real-Time Assembler	Not Applicable	New	Dynamic LU user exit.
CDL0	Real-Time Assembler	Not Applicable	Changed	Updated for the ZNOPL BUILD and ZNOPL MERGE commands.
CDL1	Real-Time Assembler	Not Applicable	Changed	Updated to process the ZNOPL LOAD command using the new control bytes.
CDL2	Real-Time Assembler	Not Applicable	Changed	Updated to process the ZNOPL UPDATE command using the new control bytes.
CDL3	Real-Time Assembler	Not Applicable	Changed	Updated to process the ZNOPL FALLBACK command using the new control bytes.
CDL5	Real-Time Assembler	Not Applicable	Changed	Added more information to the ZNOPL STATUS command for dynamic LU support.
CDL6	Real-Time Assembler	Not Applicable	Changed	Updated the root dynamic load record (RDLR) for migration to dynamic LU support.
CDL7	Real-Time Assembler	Not Applicable	Changed	Added additional messages for the ZNOPL commands.
CDL8	Real-Time Assembler	Not Applicable	New	Process the ZNOPL MERGE command. This segment replaces the CSGI segment.
CDL9	Real-Time Assembler	Not Applicable	New	Create online a SNA resource definition for an ALS, CDRM, CTC, or NCP resource.
CHKB	Real-Time Assembler	Not Applicable	Changed	Updated to no longer initialize the NCB records for service LUs.
CHKR	Real-Time Assembler	Not Applicable	Changed	Updated to no longer initialize the NCB records for service LUs.
CHNV	Real-Time Assembler	Not Applicable	Changed	Updated to issue INQRC to allocate resources for remote LUs when issuing a CNOS INITIALIZE verb.
CHRR	Real-Time Assembler	Not Applicable	Changed	Updated to clean up and return resources to the TPF 4.1 system when an LU 6.2 session ends.
CHRY	Real-Time Assembler	Not Applicable	Changed	Updated to issue INQRC to allocate resources for remote LUs when issuing a TPPCC ALLOCATE verb.
CHSB	Real-Time Assembler	Not Applicable	Changed	Updated LU 6.2 BIND processing for dynamic LU support.
CHZL	Real-Time Assembler	Not Applicable	Changed	Updated with miscellaneous changes.
CIT6	Real-Time Assembler	Not Applicable	Changed	Updated to determine if a network ID is appended to an FMMR input message.
CMTE	Real-Time Assembler	Not Applicable	Changed	Updated to check the input message sequence number in the SRT and the message block if a FIND or FILE error occurs while searching the SRT.

Table 130. Changes to Segments for Dynamic LU Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CMTQ	Real-Time Assembler	Not Applicable	Changed	Updated to determine if a network ID is appended to an OMT wake-up message.
CMTS	Real-Time Assembler	Not Applicable	Changed	Added a check for session awareness.
CMWA	Real-Time Assembler	Not Applicable	Changed	Appended a network ID to the routing control parameter list (RCPL) for high-performance FMMR.
CMWB	Real-Time Assembler	Not Applicable	Changed	Appended a network ID to the routing control parameter list (RCPL) for FMMR.
COAD	Real-Time Assembler	Not Applicable	Changed	Appended a network ID to the routing control parameter list (RCPL) for export ROUTC.
COAE	Real-Time Assembler	Not Applicable	Changed	Added a node counter check.
CONN	Real-Time Assembler	Not Applicable	Changed	Updated to store the NCB device type and user area byte in the RCAT.
CSAD	Real-Time Assembler	Not Applicable	New	Process the ZNNCB DISPLAY command for the ALL parameter.
CSAE	Real-Time Assembler	Not Applicable	New	Process the ZNNCB DISPLAY command for the NAME parameter.
CSAF	Real-Time Assembler	Not Applicable	New	Initialize the NCB directory records.
CSAG	Real-Time Assembler	Not Applicable	New	Process the ZNNCB RECON command.
CSAH	Real-Time Assembler	Not Applicable	New	Process the ZNNCB REORG command.
CSAI	Real-Time Assembler	Not Applicable	New	Copy the current NCB directory record to the staged NCB directory record.
CSA0	Real-Time Assembler	Not Applicable	Changed	Added processing to initialize the long-term pool file NCB records, as well as the fixed file NCB records, when the ZNNCB command is entered with the ALL parameter.
CSA1	Real-Time Assembler	Not Applicable	Changed	Added processing to initialize the long-term pool file NCB records, as well as the fixed file NCB records, when the ZNNCB command is entered with the NAME or NOD parameter.
CSA2	Real-Time Assembler	Not Applicable	Changed	Added processing to initialize the long-term pool file NCB records, as well as the fixed file NCB records, when the ZNNCB command is entered with the MOD parameter.
CSA3	Real-Time Assembler	Not Applicable	Changed	Added additional messages for the ZNNCB commands.
CSA4	Real-Time Assembler	Not Applicable	Changed	Updated to not initialize an SPA record if the SPA record does not have a valid SPA ordinal number.
CSA6	Real-Time Assembler	Not Applicable	Changed	Updated to not initialize an SPA record if the SPA record does not have a valid SPA ordinal number.
CSA8	Real-Time Assembler	Not Applicable	New	Parse the ZNNCB commands.

Table 130. Changes to Segments for Dynamic LU Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSBH	Real-Time Assembler	Not Applicable	Changed	Updated to allow the TPF 4.1 system to define ALS resources using dynamic LU support.
CSBI	Real-Time Assembler	Not Applicable	Changed	Updated to allow the TPF 4.1 system to define ALS resources using dynamic LU support.
CSBP	Real-Time Assembler	Not Applicable	Changed	Updated to allow the TPF 4.1 system to define ALS resources using dynamic LU support.
CSBQ	Real-Time Assembler	Not Applicable	Changed	Updated to enable dynamic LU support for X.25 NPSI resources.
CSBU	Real-Time Assembler	Not Applicable	Changed	Updated to allow the TPF 4.1 system to define ALS resources using dynamic LU support.
CSBV	Real-Time Assembler	Not Applicable	Changed	Updated to not put an RVT on the RVT termination list for certain conditions.
CSCD	Real-Time Assembler	Not Applicable	Changed	Updated the cleanup processing for ALS, CDRM, and NCP resources.
CSCI	Real-Time Assembler	Not Applicable	Changed	Updated the processing of BIND responses for dynamic LU support.
CSCP	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSCQ	Real-Time Assembler	Not Applicable	Changed	Updated to clean up dynamic LU resources.
CSCY	Real-Time Assembler	Not Applicable	Changed	Updated the ZNRVT command to handle duplicate LU resources.
CSEA	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSEC	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSEI	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSEJ	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSES	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSFQ	Real-Time Assembler	Not Applicable	Changed	Added processing to sort the RVT entries and display them in alphabetic order when the ZNDLU command is entered.
CSGA	Real-Time Assembler	Not Applicable	Changed	Updated to restart the NCB reconciliation function when the TPF 4.1 system is cycling up if the NCB reconciliation function was active.
CSGB	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.

Table 130. Changes to Segments for Dynamic LU Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSGD	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSGE	Real-Time Assembler	Not Applicable	Changed	Updated to remove the RVT entry for both the target and alternate printers from the RVT termination list during ZNALT processing, if necessary.
CSGF	Real-Time Assembler	Not Applicable	Changed	Updated to put the RVT entry for both the target and alternate printers on the RVT termination list during ZNACT processing, if necessary.
CSGI	Real-Time Assembler	Not Applicable	No Longer Supported	Replaced by the CDL8 segment.
CSG0	Real-Time Assembler	Not Applicable	Changed	Updated to process SNA restart using the new control bytes in the root dynamic load record (RDLR) and enter CDLA to build the RNH tables.
CSG1	Real-Time Assembler	Not Applicable	Changed	Added more information to the subarea address table (SAT).
CSG2	Real-Time Assembler	Not Applicable	Changed	Updated to load resources to the non-LU or LU section of the RVT and to initialize the spare RVT entries.
CSG3	Real-Time Assembler	Not Applicable	Changed	Updated to initialize the spare RVT2 entries.
CSG4	Real-Time Assembler	Not Applicable	Changed	Added messages for SNA restart.
CSG5	Real-Time Assembler	Not Applicable	Changed	Updated to perform a nonfresh load and initialize the new RVT entries when the size of the RVT is increased.
CSG7	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSJB	Real-Time Assembler	Not Applicable	Changed	Updated to create and determine some characteristics of dynamic LU resources during CDINIT request processing.
CSJC	Real-Time Assembler	Not Applicable	Changed	Updated to enter the dynamic LU user exit during CDCINIT request processing.
CSJK	Real-Time Assembler	Not Applicable	Changed	Updated FMMR BIND processing for dynamic LU support.
CSJO	Real-Time Assembler	Not Applicable	Changed	Updated to keypoint the new dynamic LU resources.
CSJU	Real-Time Assembler	Not Applicable	Changed	Updated with miscellaneous changes.
CSK0	Real-Time Assembler	Not Applicable	Changed	Added new parameters to the ZNKEY command.
CSLD	Real-Time Assembler	Not Applicable	Changed	Updated to not add the LEID to the log processor because the CDLY segment will add the LEID.
CSLJ	Real-Time Assembler	Not Applicable	New	3270 welcome screen user exit.
CSM0	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.

Table 130. Changes to Segments for Dynamic LU Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSNB	Real-Time Assembler	Not Applicable	Changed	Updated to support both fixed file NCB records and long-term pool file NCB records.
CSN0	Real-Time Assembler	Not Applicable	Changed	Added an entry for the ZNDYN commands and changed the entry for the ZNNCB commands.
CSTA	Real-Time Assembler	Not Applicable	Changed	Updated to create and determine some characteristics of dynamic LU resources during SESINIT request processing.
CSTB	Real-Time Assembler	Not Applicable	Changed	Updated to keypoint dynamic LU resources.
CSTC	Real-Time Assembler	Not Applicable	Changed	Updated to create and determine some characteristics of dynamic LU resources during BIND request processing.
CSTE	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSTF	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSTG	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSTJ	Real-Time Assembler	Not Applicable	Changed	Updated to search the entire non-LU section of the RVT when looking for a specific non-LU resource.
CSXD	Real-Time Assembler	Not Applicable	Changed	Updated to call the 3270 welcome screen user exit.
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated to determine if the NCB reorganization function must be restarted.
CVAQ	Real-Time Assembler	Not Applicable	Changed	Updated to create a dynamic LU resource for import ROUTC if the resource does not exist in the processor.
CVYA	Real-Time Assembler	Not Applicable	Changed	Added an entry for the ZNDYN commands.
CVYB	Real-Time Assembler	Not Applicable	Changed	Updated the help information for the ZNNCB commands.
CVYD	Real-Time Assembler	Not Applicable	Changed	Added help information for the ZNDYN commands and updated the help information for the ZNOPL commands.
FTVA03	Offline C Language	Not Applicable	Changed	Added new record definitions for dynamic LU support.
GLBL	Real-Time Assembler	Not Applicable	Changed	Updated to prevent online file recoup from being started when the NCB reorganization function is active.
JCD6	Real-Time Assembler	Not Applicable	Changed	Updated to bypass data collection for LU resources that are defined after data collection is started.
JRA2	Offline PL/I	Not Applicable	Changed	Updated to bypass data reduction for LU resources that are defined after the data collection is started.
OSTGIP	Offline Assembler	OSTG	Changed	Updated to set up session awareness in the ANT deck.

Table 130. Changes to Segments for Dynamic LU Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
OSTGUP	Offline Assembler	OSTG	Changed	Updated to set up session awareness in the OSTG output.
RCTD	Real-Time Assembler	Not Applicable	Changed	Updated the display to include the NCB slot that will be used when an LU logs on to the application.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 131 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 131. Changes to SYSEQ Tags for Dynamic LU Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#NCBCR0	117	New

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 132. Changes to User Exits for Dynamic LU Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Dynamic LU	CDLX	CDLY	New	Allows you to define certain characteristics for dynamic LU resources that log on to the TPF 4.1 system and to specify which dynamic LU resources can log on to the TPF 4.1 system.
3270 Welcome Screen	CSXD	CSLJ	New	Provides a skeleton for a 3270 welcome screen that can be used with session awareness support.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 133 on page 201 summarizes command changes. This information is presented in alphabetic order by the name of the command.

Attention: Changes to commands can impact any automation programs you are using in your complex.

See *TPF Operations* for a complete description of all commands.

Table 133. Changes to Commands for Dynamic LU Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZDRCT	Changed	Added to the display the number of the NCB slot that will be used by an LU when it logs on to the application.
ZNDLU	Changed	Added support to list LUs in alphabetic order in the information that is displayed.
ZNDYN ADD	New	Adds a new ALS, CDRM, CTC, or NCP resource to the TPF 4.1 system.
ZNDYN CHANGE	New	Changes the name of an ALS, CDRM, CTC, or NCP resource in the TPF 4.1 system. Also changes the subarea of a CDRM, CTC, or NCP resource.
ZNDYN DISPLAY	New	Displays information from the resource name hash (RNH) tables.
ZNDYN RECYCLE	New	Recycles the RVT entries that are currently on the RVT termination list.
ZNKEY	Changed	Added support for the DYNT0, MAXPRIM, and NUMALS parameters.
ZNNCB	Changed	Added support to initialize long-term pool file NCB records as well as fixed file NCB records. Also added support for the NAME parameter.
ZNNCB DISPLAY	New	Displays information about NCB records.
ZNNCB RECON	New	Reconciles the NCB directory records in the TPF 4.1 system and returns to it the long-term pool file NCB records that are no longer being used.
ZNNCB REORG	New	Changes the number of NCB directory records being used in the TPF 4.1 system.
ZNOPL BUILD	New	Rebuilds the RVT by forcing a fresh load from the current RRT.
ZNOPL FALLBACK	Changed	Fallback is now allowed only after the update or merge function is performed.
ZNOPL LOAD	Changed	Disabled the fallback function after a dynamic or fresh load is performed.
ZNOPL MERGE	New	Merges the current RRT with the RVT without requiring an IPL.
ZNOPL STATUS	Changed	Added information about the build and merge functions to the status display. Also added information that indicates if a particular processor is active.
ZNOPL UPDATE	Changed	No longer calculates RIDs for the RVT entries. Instead, this function now calculates the NCB ordinal number that is used to determine the NCB file address.

Messages and System Errors

Table 134 on page 202 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Table 134. Changes to Messages and System Errors for Dynamic LU Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0009D0	System Error	New
0009D1	System Error	New
0009E0	System Error	New
0009E1	System Error	New
0009E2	System Error	New
0009E3	System Error	New
0009E4	System Error	New
0009E5	System Error	New
0009E6	System Error	New
0009E7	System Error	New
0009EA	System Error	New
0009EB	System Error	New
0009F0	System Error	New
0009F1	System Error	New
0009F2	System Error	New
0009F3	System Error	New
0009F4	System Error	New
0009F5	System Error	New
0009F6	System Error	New
0009F7	System Error	New
0009F8	System Error	New
BRCP0005E	Online	New
CSG40053E	Online	New
CSG40054W	Online	New
CSG40055E	Online	New
CSNB0001E	Online	New
CSNB0002I	Online	New
CSNB0003E	Online	New
CSNB0004I	Online	New
CSNB0005I	Online	New
NDYN0000E	Online	New
NDYN0004E	Online	New
NDYN0005I	Online	New
NDYN0006I	Online	New
NDYN0020I	Online	New
NDYN0030I	Online	New
NDYN0040I	Online	New
NDYN0050I	Online	New
NDYN0061E	Online	New
NDYN0062E	Online	New
NDYN0063E	Online	New
NDYN0064I	Online	New
NDYN0065E	Online	New
NDYN0066E	Online	New

Table 134. Changes to Messages and System Errors for Dynamic LU Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NDYN0070E	Online	New
NDYN0072E	Online	New
NDYN0073E	Online	New
NDYN0074I	Online	New
NDYN0075I	Online	New
NDYN0077E	Online	New
NDYN0078E	Online	New
NDYN0079E	Online	New
NDYN0080I	Online	New
NDYN0081E	Online	New
NDYN0082E	Online	New
NDYN0083E	Online	New
NDYN0084E	Online	New
NDYN0085E	Online	New
NDYN0086E	Online	New
NDYN0087E	Online	New
NDYN0088E	Online	New
NDYN0089E	Online	New
NDYN0090E	Online	New
NDYN0091E	Online	New
NDYN0092E	Online	New
NNCB0003E	Online	No Longer Supported
NNCB0018E	Online	New
NNCB0019E	Online	New
NNCB0020E	Online	New
NNCB0021E	Online	New
NNCB0022E	Online	New
NNCB0023E	Online	New
NNCB0024E	Online	New
NNCB0026E	Online	New
NNCB0027E	Online	New
NNCB0028E	Online	New
NNCB0029I	Online	New
NNCB0030E	Online	New
NNCB0031E	Online	New
NNCB0032E	Online	New
NNCB0033E	Online	New
NNCB0034E	Online	New
NNCB0035E	Online	New
NNCB0051E	Online	No Longer Supported
NNCB0070I	Online	New
NNCB0071I	Online	New
NNCB0072E	Online	New
NNCB0073W	Online	New

Table 134. Changes to Messages and System Errors for Dynamic LU Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NNCB0074I	Online	New
NNCB0075I	Online	New
NNCB0076I	Online	New
NNCB0077I	Online	New
NNCB0078I	Online	New
NNCB0079E	Online	New
NNCB0080E	Online	New
NNCB0083W	Online	New
NNCB0084I	Online	New
NNCB0085I	Online	New
NNCB0086I	Online	New
NNCB0087E	Online	New
NNCB0088E	Online	New
NNCB0089E	Online	New
NNCB0090E	Online	New
NNCB0091E	Online	New
NNCB0092E	Online	New
NNCB0093I	Online	New
NNCB0094W	Online	New
NNCB0096E	Online	New
NNCB0097I	Online	New
NNCB0098I	Online	New
NNCB0099I	Online	New
NNCB0100E	Online	New
NNCB0110I	Online	New
NNCB0130I	Online	New
NOPL0003I	Online	New
NOPL0033E	Online	Changed
NOPL0034E		
NOPL0040E	Online	No Longer Supported
NOPL0040A	Online	New
NOPL0041E	Online	No Longer Supported
NOPL0042E		
NOPL0042A	Online	New
NOPL0050E	Online	No Longer Supported
NOPL0052A	Online	New
NOPL0062A	Online	Changed
NOPL0063A		
NOPL0064I	Online	New
NOPL0065I	Online	New
NOPL0066E	Online	New
NOPL0067E	Online	New
NOPL0068E	Online	New

Table 134. Changes to Messages and System Errors for Dynamic LU Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NOPL0069A	Online	New
NOPL0072E	Online	New
NOPL0073E	Online	New
NOPL0074E	Online	New
NOPL0075E	Online	New
NOPL0076E	Online	New
NOPL0077E	Online	New
NOPL0078E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The following information describes the changes that were made to the system initialization program (SIP) and system generation for dynamic LU support.

Defining Records for Dynamic LU Support

Specify in the SIP stage I deck how many of the following types of records you want to generate in the TPF 4.1 system:

- 381-byte long-term pool file records
- #NCBN4 records
- #NCBN5 records.

The TPF 4.1 system uses 381-byte long-term pool file records to create NCB records for the new LU resources that are defined using dynamic LU support. As many as 8 NCB records can be created for each of these LU resources. Therefore, define enough of these records to accommodate the new LU resources that will log on to the TPF 4.1 system using dynamic LU support.

The TPF 4.1 system uses the #NCBN4 records to create the current NCB directory records, which are structures used to access the NCB records for LU resources that log on to the TPF 4.1 system using dynamic LU support. Each of these LU resources is assigned an entry in an NCB directory record when it logs on to the TPF 4.1 system.

Each NCB directory record contains 84 entries. To calculate the total number of NCB directory records that you need, estimate the number of LU resources that will log on to the TPF 4.1 system using dynamic LU support. Divide this number by 84 and double the result to determine the total number of NCB directory records to define.

For example, if you estimate that 8400 LU resources will log on to the TPF 4.1 system using dynamic LU support, define $(8400 \div 84) \times 2$, or 200, NCB directory records.

You can increase the number NCB directory records defined in the TPF 4.1 system at any time by using the NCB reorganization function. This function copies the *current* NCB directory records (which are initially the #NCBN4 records) to the *staged* NCB directory records (which are initially the #NCBN5 records). Therefore, define enough #NCBN5 records to accommodate any possible future expansion.

See *TPF ACF/SNA Data Communications Reference* for more information about the current NCB directory records, staged NCB directory records, and NCB reorganization function.

Defining User Application Programs

With the addition of dynamic LU support, you must now specify a value for the following MSGRTA parameters or use the default value that is provided:

- DEVTYPE
- SAWARE.

See *TPF System Generation* for more information about the MSGRTA macro and these new parameters.

Creating the SNA Keypoint (CTK2)

With the addition of dynamic LU support, you must now specify a value for the following SNAKEY parameters or use the default value that is provided:

- DYNT0
- MAXPRIM
- NUMALS.

You may also want to define more spare entries in the RVT to accommodate dynamic LU resources that will log on to the TPF 4.1 system. To define spare entries in the RVT, specify a value for the MAXRVT parameter that is greater than the number of resources you will define using the OSTG program. The number of dynamic LU resources that can log on to the TPF 4.1 system is limited by the number of spare entries defined in the RVT.

See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro and these parameters.

Generating the TPF 4.1 System without Dynamic LU support

Dynamic LU support is an option for the TPF 4.1 system. If you do not generate #NCBN4 or #NCBN5 in your TPF 4.1 system, then SIP stage 1 reports a warning and disables dynamic LU support. If you want to enable dynamic LU support at a later time, use this procedure.

1. Code the RAMFIL macros for the #NCBN4 and #NCBN5 records in your SIP stage 1 deck.
2. Run the FACE table generator.
3. Assemble your SIP stage 1 deck.
4. Update SYSET and SYGLB from the resulting SIP stage 2 deck.
5. Assemble and load BKDB.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 135 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 135. Changes to TPF Publications for Dynamic LU Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Data Communications Reference</i>	GTPSNR04	Added detailed, task-oriented information about dynamic LU support.
<i>TPF ACF/SNA Network Generation</i>	GTPACF04	Updated the description of the SNAKEY macro and the ANTNAME statement to include information about the new parameters that were added for dynamic LU support. Also updated the information about the OSTG program for dynamic LU support.
<i>TPF General Macros</i>	GTPGEN04	Updated the description of the INQRC macro to include information about the new parameters that were added for dynamic LU support.
<i>TPF Library Guide</i>	GTPDOC04	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for dynamic LU support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG04	Updated with migration considerations for dynamic LU support.
<i>TPF Operations</i>	GTPOPR04	Updated with information about the commands that were added and changed for dynamic LU support.
<i>TPF Program Development Support Reference</i>	GTPPDR04	Updated with information about the new dump labels that were added for dynamic LU support.
<i>TPF System Generation</i>	GTPSYG04	Updated the description of the MSGRTA macro to include information about the new parameters that were added for dynamic LU support.
<i>TPF System Installation Support Reference</i>	GTPINR04	Updated with information about the new ECB-control program (CP) user exits that were added for dynamic LU support.
<i>TPF System Macros</i>	GTPSYS04	Added information about the new DHASHC macro.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR04	Added information about data collection and reduction considerations for dynamic LU support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

You can install dynamic LU support on all of the processors in a loosely coupled TPF 4.1 system at the same time, or you can install dynamic LU support on only 1 processor at first and the remaining processors at a later time.

If you install dynamic LU on all of the processors in the loosely coupled TPF 4.1 system at the same time, follow the procedure described in “To Install Dynamic LU Support on All the Processors at Once”.

If you do not want to install dynamic LU support on all of the processors in the loosely coupled TPF 4.1 system at the same time, do the following:

1. Install dynamic LU support on the first processor in the loosely coupled TPF 4.1 system by using the procedure described in “To Install Dynamic LU Support on the First Processor” on page 209.
2. Install dynamic LU support on the remaining processors in the loosely coupled TPF 4.1 system by using the procedure described in “To Install Dynamic LU Support on the Remaining Processors” on page 211.
3. Fully enable dynamic LU support once it is installed on all the processors in the loosely coupled TPF 4.1 system by using the procedure described in “To Fully Enable Dynamic LU Support” on page 211.

When you install dynamic LU support on some, but not all, of the processors in a loosely coupled TPF 4.1 system, the following limitations exist:

- You cannot use dynamic LU support or the ZNDYN ADD command to define new non-LU resources to the TPF 4.1 system until dynamic LU support is installed on **each** processor in the loosely coupled TPF 4.1 system.
- You cannot perform the SNA fresh load, dynamic load, or fallback functions on the processors where dynamic LU support is not installed. You must perform these functions from the processors where dynamic LU support is installed.

The migration procedure in this section disables the ZNOPL LOAD, ZNOPL UPDATE, and ZNOPL FALLBACK commands on the processors that do not have dynamic LU support installed. If you enter the ZNOPL LOAD, ZNOPL UPDATE, or ZNOPL FALLBACK command on 1 of these processors, the status information for the ZNOPL STATUS command is displayed instead.

To Install Dynamic LU Support on All the Processors at Once

Use the following procedure to install dynamic LU support on all the processors in a loosely coupled TPF 4.1 system at the same time.

1. Install PUT 4, which contains the dynamic LU support APAR (PJ21044).
2. Update the dynamic LU user exit.

This user exit is shipped by IBM to reject all log on requests for all remote LU resources. You must update this user exit before you can use dynamic LU support. See *TPF System Installation Support Reference* for more information about the dynamic LU user exit.

3. Specify in the SIP stage I deck the number of #NCBN4 and #NCBN5 records that you want to generate in the TPF 4.1 system. Also define any additional 381-byte long-term pool file records for dynamic LU support. See “Defining Records for Dynamic LU Support” on page 205 for more information.
4. If you want to load new SNA resource definitions, do the following:

- a. Specify values for the new parameters that were added to the MSGRTA macro for dynamic LU support. See “Defining User Application Programs” on page 206 for more information.
 - b. Run SIP stage I to create the ANT deck, which will be used as input to the OSTG program.
 - c. Run the OSTG program to create an SNA pilot tape.
5. Use the SNAKEY macro to define the following information in the SNA keypoint (CTK2):
 - Size of the RVT using the MAXRVT parameter.

Note: Consider increasing the size of the RVT to accommodate the LU resources that may log on to the TPF 4.1 system using dynamic LU support.

- Size of the non-LU section in the RVT using the NUMALS parameter.
- Number of resource name hash prime table (RNHPT) entries defined in the TPF 4.1 system using the MAXPRIM parameter.
- Recycle time for an RVT entry using the DYNTD parameter.

See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

6. Load the updated SNA keypoint (CTK2) to each processor in the loosely coupled TPF 4.1 system.
 7. Perform a fresh load to rebuild the RVT for dynamic LU support and load any new SNA resource definitions that you created in step 4 on page 208.
- See *TPF ACF/SNA Data Communications Reference* for more information about the SNA fresh load function.

Note: You *must* perform a fresh load even if you did not create new SNA resource definitions.

8. Enter the ZRIPL commnd on each processor in the loosely coupled TPF 4.1 system to complete the fresh load function.

See *TPF Operations* for more information about the ZRIPL commnd.

Dynamic LU support is now installed and fully enabled on each processor in the loosely coupled TPF 4.1 system.

To Install Dynamic LU Support on the First Processor

Use the following procedure to install dynamic LU support on the first processor in your loosely coupled TPF 4.1 system.

1. Install PUT 4, which contains the dynamic LU support APAR (PJ21044).
2. Update the dynamic LU user exit.

This user exit is shipped by IBM to reject all log on requests for all remote LU resources. You must update this user exit before you can use dynamic LU support. See *TPF System Installation Support Reference* for more information about the dynamic LU user exit.

3. Specify in the SIP stage I deck the number of #NCBN4 and #NCBN5 records that you want to generate in the TPF 4.1 system. Also define any additional 381-byte long-term pool file records for dynamic LU support. See “Defining Records for Dynamic LU Support” on page 205 for more information.
4. If you want to load new SNA resource definitions, do the following:

- a. Specify values for the new parameters that were added to the MSGRTA macro for dynamic LU support. See “Defining User Application Programs” on page 206 for more information.
 - b. Run SIP stage I to create the ANT deck, which will be used as input to the OSTG program.
 - c. Run the OSTG program to create an SNA pilot tape.
5. Use the SNAKEY macro to define the following information in the SNA keypoint (CTK2):
 - Size of the RVT using the MAXRVT parameter.

Note: Consider increasing the size of the RVT to accommodate the LU resources that may log on to the TPF 4.1 system using dynamic LU support.

- Size of the non-LU section in the RVT using the NUMALS parameter, which must be equal to the number of non-LU resources defined in the OSTG input data set.

Note: After you install dynamic LU support on all of the processors in your loosely coupled TPF 4.1 system, you will increase the value assigned to the NUMALS parameter, which will allow you to define new non-LU resources using dynamic LU support or the ZNDYN ADD command.

- Number of resource name hash prime table (RHHPT) entries defined in the TPF 4.1 system using the MAXPRIM parameter.
- Recycle time for an RVT entry using the DYNTD parameter.

See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

6. Load the updated SNA keypoint (CTK2) to the processor where you are installing dynamic LU support.
7. Enter the following command on one of the processors in your loosely coupled TPF 4.1 system where dynamic LU support is **not** installed:

ZAPGM CDLO 003C 47F08178

This command will disable the SNA fresh load, dynamic load, and fallback functions on the processors that do not have dynamic LU support installed.

See *TPF Operations* for more information about the ZAPGM command.

8. Perform a fresh load on the processor where you are installing dynamic LU support to rebuild the RVT for dynamic LU support and load any new SNA resource definitions that you created in step 4 on page 209.

See *TPF ACF/SNA Data Communications Reference* for more information about the SNA fresh load function.

Note: You **must** perform a fresh load on this processor even if you did not create new SNA resource definitions.

9. Enter the ZRIPL command on the processor where you are installing dynamic LU support to complete the fresh load function.

See *TPF Operations* for more information about the ZRIPL command.

10. Enter the ZRIPL command on each of the processors that **do not** have dynamic LU support installed.

See *TPF Operations* for more information about the ZRIPL command.

11. Continue with the steps in “To Install Dynamic LU Support on the Remaining Processors”.

To Install Dynamic LU Support on the Remaining Processors

Use the following procedure when you are ready to install dynamic LU support on the remaining processors in your loosely coupled TPF 4.1 system.

1. Load the updated SNA keypoint (CTK2) to the processor where you are installing dynamic LU support.
2. Perform a fresh load on the processor where you are installing dynamic LU support to rebuild the RVT for dynamic LU support.

See *TPF ACF/SNA Data Communications Reference* for more information about the SNA fresh load function.

Note: You *must* perform a fresh load on this processor even if you did not create new SNA resource definitions.

3. Enter the ZRIPL command on the processor where you are installing dynamic LU support to complete the fresh load function.

See *TPF Operations* for more information about the ZRIPL command.

4. Repeat steps 1–3 for each of the remaining processors in the loosely coupled TPF 4.1 system.
5. Continue with the steps in “To Fully Enable Dynamic LU Support”.

To Fully Enable Dynamic LU Support

Use the following procedure to fully enable dynamic LU support after you install it on *each* processor in the loosely coupled TPF 4.1 system.

1. Use the SNAKEY macro to increase the value of the NUMALS parameter in the SNA keypoint (CTK2). This will create spare entries in the non-LU section of the RVT and allow you to define non-LU resources using dynamic LU support or the ZNDYN ADD command.
2. Load the new version of the SNA keypoint to *each* processor in your loosely coupled TPF 4.1 system.

Note: Because you increased the value of the NUMALS parameter, a fresh load will automatically be performed on each processor when you load the new version of the SNA keypoint.

Dynamic LU support is now installed and fully enabled on each processor in the loosely coupled TPF 4.1 system.

Fallback Scenarios

If the conversion to dynamic LU support is not successful, you will need to fall back to the previous TPF environment, correct the problem, and try the conversion again.

To Fall Back to the Previous TPF 4.1 System Environment

If you used multiple TPF images to install dynamic LU support, use the following procedure to easily fall back to the previous TPF environment.

1. Ensure that the value assigned to the NUMALS parameter in the SNAKEY macro is equal to the number of non-LU resources defined in the OSTG input data set.
2. On all but 1 of the processors that have dynamic LU support installed, do the following:
 - a. Enter the ZNOPL LOAD command and specify the FRESH parameter.

- b. Restore the original version of the SNA keypoint (CTK2).
 - c. Perform a hard initial program load (IPL) on the processor and come up on the original TPF image (that is, the image that does **not** have dynamic LU support installed).
3. On the **last** processor in the complex that has dynamic LU support installed, do the following:
 - a. Perform a fresh load by using the ZNOPL LOAD command with the FRESH parameter.
 - b. Enter **ZAREC LIBMML.1B 002 00** to reset the indicator bit in the root dynamic load record (RDLR).
 - c. Restore the original version of the SNA keypoint (CTK2).
 - d. Perform a hard IPL on the processor and come up on the original TPF image (that is, the image that does **not** have dynamic LU support installed).
 - e. Enter **ZAPGM CDL0 003C 4D5081B8** to enable the processors to enter the ZNOPL LOAD, ZNOPL UPDATE, and ZNOPL FALLBACK commands.

Use the following procedure to fall back to the previous TPF environment if you used an offline loader to install dynamic LU support.

1. Use the same offline loader to fall back to the previous TPF environment.
2. Once you fall back the last processor that had dynamic LU support installed, enter **ZAREC LIBMML.1B 002 00** on that processor. This will reset the indicator bit in the root dynamic load record (RDLR).
3. Perform an IPL on each processor.
4. Enter **ZAPGM CDL0 003C 4D5081B8** on one of the processors to enable the processors to enter the ZNOPL LOAD, ZNOPL UPDATE, and ZNOPL FALLBACK commands.

See *TPF Operations* for more information about the ZNOPL LOAD, ZAREC, and ZAPGM commands.

Multiple I-Stream DASD I/O Support (APAR PJ21313)

The following section discusses the migration considerations for multiple I-stream DASD I/O support.

Prerequisite APARs

See the APEDIT for APAR PJ21313 for information about prerequisite APARs.

Functional Overview

Multiple I-stream DASD I/O support allows the TPF 4.1 system to process most DASD input/output requests from any I-stream. This support allows you to take advantage of processors with more I-streams by not overloading the main I-stream with DASD I/O related work.

Architecture

Multiple I-stream DASD I/O support is implemented by allowing DASD I/O requests to be started on any I-stream and by enabling DASD I/O interrupts to occur on any I-stream. Because any I-stream now has the ability to update certain DASD tables, locking is used to serialize updates to these tables.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 136 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 136. Changes to General Use C Language Header Files for Multiple I-Stream DASD I/O Support

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	X	X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 137 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 137. Changes to CINFC Tags for Multiple I-Stream DASD I/O Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMECT	354	New

Copy Members

The following section summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 138. Changes to Copy Members for Multiple I-Stream DASD I/O Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCIO	Control Program	IPLB	Changed	Put I-stream number in trace; locking changes.
CCIT	Control Program	CCNUCL	Changed	Set up I/O new PSW for I-streams 3 and higher.
CEFH	Control Program	CCSONA	Changed	Interface change.
CEFJ	Control Program	CCFADC	Changed	Interface change.
CICR	Control Program	CCNUCL	Changed	Added CMMECT CINFC information.
CJIC	Control Program	CCSONS	Changed	Added the DLCKC service routine; lost interrupt processing (from CYED); locking changes.
CJIE	Control Program	CCSONS	Changed	Locking changes; reentrancy updates; asynchronous queue scan of SSST.
CJIF	Control Program	CCSONS	Changed	Reentrancy changes.
CJII	Control Program	CCSONS	Changed	Set up prime/duplicate MFST lock pointers; set up subclass 7.
CJIL	Control Program	CCSONA	Changed	Interface change.
CJIM	Control Program	CCSONS	Changed	Interface changes; locking changes.
CJIO	Control Program	CCSONS	Changed	Locking changes; reentrancy changes.
CJIP	Control Program	CCSONS	Changed	Interface changes.
CJIQ	Control Program	CCSONS	Changed	Reentrancy changes.
CJIT	Control Program	CCSONS	Changed	Reentrancy changes.
CJIV	Control Program	CCRCSC	Changed	Update emergency unlock routine with new tables to be unlocked; locking changes; interface updates.
CJIW	Control Program	CCSONS	Changed	Locking changes.
CJIX	Control Program	CCSONS	Changed	Reentrancy changes; locking changes; interface changes.
CJIY	Control Program	CCSONS	Changed	Reentrancy changes; locking changes.

Table 138. Changes to Copy Members for Multiple I-Stream DASD I/O Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CMKH	Control Program	CCMKH	Changed	Set up I/O subclass 7 for DASD I/O.
CPSF	Control Program	CCCPSF	Changed	Reset I/O subclass.
CPSL	Control Program	CCCPSE	Changed	Set up I/O dump trace.
CT40	Control Program	CCCTIN	Changed	Set up the CMMECT CINFC tag.
CT85	Control Program	CCCTIN	Changed	Set up the I-stream control area.
CVF3	Control Program	CCVFAC	Changed	Virtual file access (VFA) to DASD interface changes; DASD table locking changes

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 139 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 139. Changes to Data Macros for Multiple I-Stream DASD I/O Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
DCTMDR	Changed	Yes
DCTMFS	Changed	Yes
DCTMIO	Changed	Yes
IDSECT	Changed	Yes
IDSTTR	Changed	Yes
LDEVBK	Changed	Yes
MRLNQ	Changed	Yes

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): There are no changes.

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 140 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 140. Changes to System Macros for Multiple I-Stream DASD I/O Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
DLCKC	New	Yes
FCTL	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

The following section summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 141. Changes to Segments for Multiple I-Stream DASD I/O Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CAC1	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CAC2	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CAC4	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CACA	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CLM1	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CLM2	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CLMF	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CLMI	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CLMM	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CLMN	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CLOK	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CML2	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CMUB	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CMUC	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CPAA	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CPAB	Real-Time Assembler	Not Applicable	Changed	Locking changes.

Table 141. Changes to Segments for Multiple I-Stream DASD I/O Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CPAD	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CPAF	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CPAG	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CPAH	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CPAI	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CRM0	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CSGB	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CSS0	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CSS1	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CSS2	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CSS3	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CSS4	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CSS5	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CSSA	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CVKM	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CVLC	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CVPX	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CVLD	Real-Time Assembler	Not Applicable	Changed	Indicate no locking to CIO.
CYEA	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYED	Real-Time Assembler	Not Applicable	Changed	Removed most lost interrupt scanning code.
CYEP	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYGN	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYMA	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPA	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPB	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPC	Real-Time Assembler	Not Applicable	Changed	Locking changes.

Table 141. Changes to Segments for Multiple I-Stream DASD I/O Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYPD	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPE	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPF	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPH	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPI	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPL	Real-Time Assembler	Not Applicable	Changed	Locking changes.
CYPR	Real-Time Assembler	Not Applicable	Changed	Locking changes.
JCD4	Real-Time Assembler	Not Applicable	Changed	Locking changes.
JCF0	Real-Time Assembler	Not Applicable	Changed	Locking changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

Table 142 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Table 142. Changes to Messages and System Errors for Multiple I-Stream DASD I/O Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000576	System Error	No Longer Supported

Performance or Tuning Changes

Multiple I-Stream DASD I/O support will not impact performance. There are no recommended tuning changes for multiple I-stream DASD I/O support.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 143 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 143. Changes to TPF Publications for Multiple I-Stream DASD I/O Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Concepts and Structures</i>	GTPCON04	Updated references to DASD I/O on main I-stream only.
<i>TPF Library Guide</i>	GTPDOC04	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for multiple I-stream DASD I/O.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG04	Updated with migration considerations for multiple I-stream DASD I/O.
<i>TPF System Macros</i>	GTPSYS04	Added the new DLCKC macro and updated the FLTLC macro.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Databases Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

To verify that multiple I-stream DASD I/O support has been installed in a system with multiple I-streams, enter **ZDUMP SEL** while the TPF 4.1 system is busy. The I/O trace will show the I/O being processed on multiple I-streams.

Migration Scenarios

There are no migration scenarios.

Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)

The following section discusses the migration considerations for TCP/IP offload support.

Prerequisite APARs

See the APEDIT for APAR PJ21791 for information about prerequisite APARs.

Functional Overview

TCP/IP offload support provides the following benefits to the TPF 4.1 system:

Open Connectivity, which allows socket applications on the TPF 4.1 system to communicate through a TCP/IP offload device with socket applications on remote TCP/IP devices.

Enhanced Role in the Internet, which allows the TPF 4.1 system to connect to the Internet through a TCP/IP offload device.

Industry Standard Socket application programming interface (API), which provides an industry standard API that contains ISO-C socket function calls. You can use the socket API on the TPF 4.1 system to create socket applications that can communicate with other socket applications on remote TCP/IP devices.

Client/Server Environment where you can use the socket API to create socket applications that allow the TPF 4.1 system to function as either a client or server.

Ease of Porting Socket Applications because the ISO-C socket function calls use an industry standard API, you can easily port socket applications to the TPF 4.1 system.

Architecture

TCP/IP offload support is an offload implementation based on the TCP/IP offload device. Socket applications in the TPF 4.1 system communicate through a TCP/IP offload device to other socket applications in remote TCP/IP devices.

A socket API, which consists of standard ISO-C socket function calls, is provided with TCP/IP offload support. You can use the socket API to create socket applications for the TPF 4.1 system.

When a TPF application issues a socket function call, the call is sent to a TCP/IP offload device using the Common Link Access to Workstation (CLAW) protocol. The TCP/IP offload device then communicates with the remote node using TCP/IP. The TCP/IP offload device uses the CLAW protocol to pass the socket API return code back to the TPF 4.1 system. The TPF system then presents the return code to the application that issued the socket function call.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about TCP/IP offload support and the socket API.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TCP/IP offload support, you must establish the required operating environment. The following section describes hardware and software requirements specific to TCP/IP offload support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Control Units: The following section discusses types of devices and control units.

Communication Control Units: TCP/IP offload support provides support for the IBM 3172 Model 3 Interconnect Controller with the IBM 3172 Offload Feature installed.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for TCP/IP-Based Communication: Transmission Control Protocol/Internet Protocol (TCP/IP) offload support requires an IBM 3172 Model 3 Interconnect Controller with the IBM 3172 Offload Feature installed.

The IBM 3172 Model 3 Interconnect Controller can be attached to the TPF 4.1 system using either a parallel channel adapter or an Enterprise Systems Connection (ESCON) channel adapter.

Programming Request for Price Quotation (PRPQ)

You must order PRPQ 5799-QWZ to obtain the software for the IBM 3172 Offload Feature mentioned in “Hardware” and “Software (Programming Requirements)”. Call TPF Systems to order PRPQ 5799-QWZ.

Table 144. Programming Request for Price Quotation (PRPQ) for TCP/IP offload support

PRPQ and Product Feature	Description								
5799-QWZ for TCP/IP Offload Support	<p>Contains the following features:</p> <table><tr><th>Feature Number</th><th>Description</th></tr><tr><td>9001</td><td>Asset registration on the TPF 4.1 system.</td></tr><tr><td>4003</td><td>IBM 3172 Offload Feature.</td></tr><tr><td>5805</td><td><p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when the 4003 feature number is specified during ordering. In addition, you will receive the following publications:</p><ul style="list-style-type: none">• <i>TPF Transmission Control Protocol/Internet Protocol</i>• <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i></td></tr></table>	Feature Number	Description	9001	Asset registration on the TPF 4.1 system.	4003	IBM 3172 Offload Feature.	5805	<p>The TPF TCP/IP Offload program (shipped on diskettes), which is preloaded when the 4003 feature number is specified during ordering. In addition, you will receive the following publications:</p> <ul style="list-style-type: none">• <i>TPF Transmission Control Protocol/Internet Protocol</i>• <i>TCP/IP for MVS: Offloading TCP/IP Processing, Version 3, Release 1.</i>
Feature Number	Description								
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Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language. See *TPF Transmission Control Protocol/Internet Protocol* for more information about the C/C++ language functions provided with TCP/IP offload support.

Build Scripts: Table 145 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 145. Changes to Build Scripts for TCP/IP Offload Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CLA1BS	DLM	New	Build script for the CLA1 DLM.
CLA2BS	DLM	New	Build script for the CLA2 DLM.
CLA3BS	DLM	New	Build script for the CLA3 DLM.
CLA4BS	DLM	New	Build script for the CLA4 DLM.
CLCABS	DLM	New	Build script for the CLCA DLM.
CLCBBS	DLM	New	Build script for the CLCB DLM.
CLCCBS	DLM	New	Build script for the CLCC DLM.
CLCDBS	DLM	New	Build script for the CLCD DLM.
CLCEBS	DLM	New	Build script for the CLCE DLM.
CLCHBS	DLM	New	Build script for the CLCH DLM.
CLCIBS	DLM	New	Build script for the CLCI DLM.
CLCJBS	DLM	New	Build script for the CLCJ DLM.
CLCKBS	DLM	New	Build script for the CLCK DLM.
CLCMBS	DLM	New	Build script for the CLCM DLM.
CLCQBS	DLM	New	Build script for the CLCQ DLM.
CLCRBS	DLM	New	Build script for the CLCR DLM.
CLCXBS	DLM	New	Build script for the CLCX DLM.
CLSUBS	DLM	New	Build script for the CLSU DLM.
CLZKBS	DLM	New	Build script for the CLZK DLM.
COMXBS	DLM	New	Build script for the COMX library.

Dynamic Load Module (DLM) Stubs: Table 146 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 146. Changes to Dynamic Load Module (DLM) Stubs for TCP/IP Offload Support

DLM Stub	New, Changed, or No Longer Supported?
CLA1	New
CLA2	New
CLA3	New
CLA4	New
CLCD	New

Table 146. Changes to Dynamic Load Module (DLM) Stubs for TCP/IP Offload Support (continued)

DLM Stub	New, Changed, or No Longer Supported?
CLCE	New
CLCH	New
CLCI	New
CLCJ	New
CLCL	New
CLCM	New
CLCQ	New
CLCX	New
CLSX	New

General Use C Language Header Files: Table 147 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 147. Changes to General Use C Language Header Files for TCP/IP Offload Support

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	X	X	Changed	No
c\$eb0eb.h	X	X	Changed	No
c\$icadap.h		X	New	Not Applicable
c\$icpath.h		X	New	Not Applicable
c\$iscddt.h		X	New	Not Applicable
c\$iscfdt.h		X	New	Not Applicable
c\$iscipt.h		X	New	Not Applicable
c\$iscInt.h		X	New	Not Applicable
c\$isiucv.h		X	New	Not Applicable
c\$isqlmc.h	X	X	Changed	No
c\$itrdbl.h		X	New	Not Applicable
claw.h		X	New	Not Applicable
ioctl.h		X	New	Not Applicable
ip.h		X	New	Not Applicable
socket.h		X	New	Not Applicable
sysapi.h	X	X	Changed	No
types.h		X	New	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 148 on page 225 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 148. Changes to Library Interface Scripts for TCP/IP Offload Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	New	Communications related functions.

Library Members (Object Files): Table 149 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 149. Changes to Library Members (Object Files) for TCP/IP Offload Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C501	COMX	New	Assembler	Processes the claw_accept function.
C502	COMX	New	Assembler	Processes the claw_closeadapter function.
C503	COMX	New	Assembler	Processes the claw_connect function.
C504	COMX	New	Assembler	Processes the claw_disconnect function.
C505	COMX	New	Assembler	Processes the claw_end function.
C506	COMX	New	Assembler	Processes the claw_initialization function.
C507	COMX	New	Assembler	Processes the claw_openadapter function.
C508	COMX	New	Assembler	Processes the claw_query function.
C509	COMX	New	Assembler	Processes the claw_send function.
C510	COMX	New	Assembler	CLAW block processing.
C511	COMX	New	C Language	Processes the socket accept function.
C512	COMX	New	C Language	Processes the socket activate_on_receipt function.
C513	COMX	New	C Language	Processes the socket bind function.
C514	COMX	New	C Language	Processes the socket close function.
C515	COMX	New	C Language	Processes the socket connect function.
C516	COMX	New	C Language	Processes the socket gethostid function.
C517	COMX	New	C Language	Processes the socket gethostname function.
C518	COMX	New	C Language	Processes the socket getpeername function.
C519	COMX	New	C Language	Processes the socket getsockname function.
C520	COMX	New	C Language	Processes the socket getsockopt function.
C521	COMX	New	C Language	Processes the socket htonl function.
C522	COMX	New	C Language	Processes the socket htons function.
C523	COMX	New	C Language	Processes the socket inet_addr function.
C524	COMX	New	C Language	Processes the socket ioctl function.
C525	COMX	New	C Language	Processes the socket listen function.
C526	COMX	New	C Language	Processes the socket ntohl function.
C527	COMX	New	C Language	Processes the socket ntohs function.
C528	COMX	New	C Language	Processes the socket read function.
C529	COMX	New	C Language	Processes the socket recv and recvfrom functions.

Table 149. Changes to Library Members (Object Files) for TCP/IP Offload Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C530	COMX	New	C Language	Processes the socket select function.
C531	COMX	New	C Language	Processes the socket send function.
C532	COMX	New	C Language	Processes the socket sendto function.
C533	COMX	New	C Language	Processes the socket setsockopt function.
C534	COMX	New	C Language	Processes the socket shutdown function.
C535	COMX	New	C Language	Processes the socket sock_errno function.
C536	COMX	New	C Language	Processes the socket socket function.
C537	COMX	New	C Language	Processes the socket write function.
C538	COMX	New	C Language	Processes the socket writen function.
C539	COMX	New	C Language	Allocate an inter-user communication vehicle (IUCV) block.
C540	COMX	New	C Language	Pass an inter-user communication vehicle (IUCV) block to the CLAW service routine.
C541	COMX	New	C Language	Creates an inter-user communication vehicle (IUCV) block and sends the setsockopt function call to the TCP/IP offload device.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 150 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 150. Changes to Members (Object Files) for TCP/IP Offload Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLA1	CLA1	New	C Language	Sends notification when there is a Common Link Access to Workstation (CLAW) adapter failure and deactivates the connection between the TPF 4.1 system and the workstation application.
CLA2	CLA2	New	C Language	Sends notification when a CLAW path is being disconnected.
CLA3	CLA3	New	C Language	Sends notification when a CLAW connection request is received from a remote user.
CLA4	CLA4	New	C Language	Nonsocket message user exit.
CLCA	CLCA	New	C Language	CLAW cycle-up processing.
CLCB	CLCB	New	C Language	CLAW cycle-down processing.
CLCC	CLCC	New	C Language	Retrieves the CLAW device table (CDT) from fixed file record type #IBMM4.

Table 150. Changes to Members (Object Files) for TCP/IP Offload Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLCD	CLCD	New	C Language	Gets the current core copy of the CLAW device table (CDT) and saves it on file.
CLCE	CLCE	New	C Language	Disconnects the TCP/IP offload device.
CLCF	CLCB	New	C Language	Socket cycle-down process; disconnects all connections between the TPF 4.1 system and the TCP/IP offload devices.
CLCH	CLCH	New	C Language	Socket activation user exit.
CLCI	CLCI	New	C Language	Socket deactivation user exit.
CLCJ	CLCJ	New	C Language	Socket restart.
CLCK	CLCK	New	C Language	Offload restart.
CLCM	CLCM	New	C Language	Nonsocket deactivation user exit.
CLCN	CLCC	New	C Language	Initializes the CLAW trace parameters during restart.
CLCQ	CLCQ	New	C Language	Nonsocket activation user exit.
CLCR	CLCR	New	C Language	Processes the socket system errors.
CLCX	CLCX	New	C Language	Socket system error user exit.
CLSU	CLSU	New	C Language	Receives unsolicited messages from the TCP/IP offload device that indicate state changes.
CLZD	CLZK	New	C Language	Processes the ZCLAW ADD command.
CLZE	CLZK	New	C Language	Processes the ZCLAW DELETE command.
CLZF	CLZK	New	C Language	Processes the ZCLAW ACTIVATE command.
CLZG	CLZK	New	C Language	Processes the ZCLAW INACTIVATE command.
CLZH	CLZK	New	C Language	Processes the ZCLAW HELP command.
CLZI	CLZK	New	C Language	Processes the ZCLAW TRACE command.
CLZJ	CLZK	New	C Language	Processes the ZCLAW DISPLAY command.
CLZK	CLZK	New	C Language	Processes the initial call to all the ZCLAW command.
CLZL	CLZK	New	C Language	Processes the ZCLAW STATUS command.
CLZM	CLZK	New	C Language	Subroutine for the ZCLAW INACTIVATE command.
CLZN	CLZK	New	C Language	Subroutine for the ZCLAW INACTIVATE command.
CLZO	CLZK	New	C Language	Subroutine for the ZCLAW STATUS command.
CLZP	CLZK	New	C Language	Subroutine for the ZCLAW ACTIVATE command.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 151 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 151. Changes to Copy Members for TCP/IP Offload Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCPU	Control Program	CCNUCL	Changed	Added an entry for CPMCLAW.
CIDP	Control Program	CCCPSE	Changed	Defined dump overrides for CLAW system errors.
CIEF	Control Program	CCCIEF	Changed	Added return codes for the EVNTC and POSTC macros.
CLBA	Control Program	CCLAW1	New	Deletes a CLAW logical link.
CLBB	Control Program	CCLAW1	New	Notifies the host application when a logical link is deleted.
CLBC	Control Program	CCLAW1	New	Handles interrupts in the CLAW device interface.
CLBD	Control Program	CCLAW1	New	Adds pending read CLAW message queue elements to the read channel program.
CLBE	Control Program	CCLAW1	New	Initiates CLAW I/O.
CLBF	Control Program	CCLAW1	New	Processes a DISCONNECT request from the host application.
CLBG	Control Program	CCLAW1	New	Handles transaction requests from the host application.
CLBH	Control Program	CCLAW1	New	Periodic scanning routine.
CLBI	Control Program	CCLAW1	New	Notifies the application of a completed SEND request.
CLBJ	Control Program	CCLAW1	New	Adds pending write CLAW message queue elements to the write channel program.
CLBK	Control Program	CCLAW1	New	Polling routine to check for completed messages.
CLBL	Control Program	CCLAW1	New	Notifies the workstation application when a logical link is deleted.
CLBM	Control Program	CCLAW1	New	Attaches completed write CLAW message queue elements to the CLAW device interface extension block, which is defined by the ICLTRB data macro.
CLBN	Control Program	CCLAW1	New	Queues RECEIVE requests from the workstation application.
CLBO	Control Program	CCLAW1	New	Issues an ACCEPT request in response to a CONNECT request from the workstation.
CLBP	Control Program	CCLAW1	New	Translate tables.
CLBQ	Control Program	CCLAW1	New	Queues CLAW message queue elements for READ requests.
CLBR	Control Program	CCLAW1	New	Returns signed out pages to the CLAW device interface.
CLBS	Control Program	CCLAW1	New	Queues SEND requests from the host application.

Table 151. Changes to Copy Members for TCP/IP Offload Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CLBT	Control Program	CCLAW1	New	Removes the completed writes from the active CLAW message queue element queue.
CLBU	Control Program	CCLAW1	New	Removes the completed reads from the active CLAW message queue element queue.
CLBV	Control Program	CCLAW1	New	CLAW request dispatcher.
CLBW	Control Program	CCLAW1	New	Queues CLAW message queue elements for WRITE requests.
CLBX	Control Program	CCLAW1	New	Processes a CONNECT request from the host application.
CLBY	Control Program	CCLAW1	New	Close and cleanup processor; cleans up adapter control blocks, frees up attached control blocks, and stops I/O to the workstation.
CLBZ	Control Program	CCLAW1	New	Build CLAW message queue elements from pending write CLAW device interface extension blocks, defined by the ICLTRB data macro.
CLB0	Control Program	CCLAW1	New	Return completed READ requests to the host application.
CLB1	Control Program	CCLAW1	New	Process a CLAW transaction subrequest for logical link 0.
CLB2	Control Program	CCLAW1	New	CLAW device interface main entry point.
CLB3	Control Program	CCLAW1	New	Handles I/O interrupts for CLAW devices.
CLB4	Control Program	CCLAW1	New	Performs the CLAW initialization function by setting up permanent work areas, channel programs, and control blocks.
CLB5	Control Program	CCLAW1	New	Handles the CLAW process trace function.
CLB6	Control Program	CCLAW1	New	CLAW application programming interface (API) services prolog.
CLHH	Control Program	CCSTOR	Changed	Updated to allow the MALOC macro to be called from the control program (CP).
CLHL	Control Program	CCCLHR	Changed	Updated to allow CLAW devices to be polled.
CLWB	Control Program	CCLAW3	New	Unsuspects an entry control block (ECB) after a CLAW API call.
CLWF	Control Program	CCLAW3	New	Performs the CLAW post-interrupt routine for SEND COMPLETE processing.
CLWG	Control Program	CCLAW3	New	Post-interrupt routine for FAIL ADAPTER processing.
CLWI	Control Program	CCLAW3	New	CLAW CONNECT cleanup.
CLWJ	Control Program	CCLAW3	New	CLAW DISCONNECT cleanup.
CLWK	Control Program	CCLAW3	New	Post-interrupt routine for a RECEIVE request with an error.
CLWM	Control Program	CCLAW3	New	Post-interrupt routine for an ACCEPT request from the workstation.
CLWN	Control Program	CCLAW3	New	Starts the internal generation of RECEIVE requests to the CLAW device interface after a host application issues an ACCEPT or an ACCEPT is received from a CLAW workstation application.

Table 151. Changes to Copy Members for TCP/IP Offload Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CLWP	Control Program	CCLAW3	New	Post-interrupt routine for a RECEIVE request without an error.
CLWQ	Control Program	CCLAW3	New	Returns a page to the available list after the READ COMPLETE routines copy data from that page.
CLWS	Control Program	CCLAW3	New	Performs internally the equivalent of the <code>claw_closeadapter</code> function.
CLWT	Control Program	CCLAW3	New	Performs internally the equivalent of the <code>claw_disconnect</code> function.
CLWU	Control Program	CCLAW3	New	CLAW buffer trace facility.
CLWV	Control Program	CCLAW3	New	CLAW process trace facility.
CLWW	Control Program	CCLAW3	New	Catastrophic dump lock picking routine.
CLWX	Control Program	CCLAW3	New	Suspend an ECB after a CLAW API call.
CLWY	Control Program	CCLAW3	New	CLAW buffer/process trace common segment.
CLW1	Control Program	CCLAW3	New	Root segment for post-interrupt processing.
CLW2	Control Program	CCLAW3	New	Performs fail processing on the CLAW adapter.
CLW3	Control Program	CCLAW3	New	Drops the adapter control block from the active queue.
CLW4	Control Program	CCLAW3	New	Returns storage block to CLAW control block pool.
CLW5	Control Program	CCLAW3	New	Obtains storage block from the CLAW control block pool.
CLW6	Control Program	CCLAW3	New	CLAW macro interface processing.
CLW7	Control Program	CCLAW3	New	Locates CLAW control blocks.
CLW8	Control Program	CCLAW3	New	Processes CLAW device interface subrequests.
CLW9	Control Program	CCLAW3	New	Post-interrupt routine for initialization complete processing.
CPSE	Control Program	CCCPSE	Changed	Updated to define the CLAW unlock routine.
CT15	Control Program	CCCTIN	Changed	Updated to carve out storage defined in the new MSAT3 table.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 152 on page 231 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 152. Changes to Communication Macros and Statements for TCP/IP Offload Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 153 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 153. Changes to Data Macros for TCP/IP Offload Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
DCTSWC	Changed	Yes
EB0EB	Changed	No
ICADAP	New	Not Applicable
ICDDOR	New	Not Applicable
ICDIOB	New	Not Applicable
ICGBLK	New	Not Applicable
ICLAWB	New	Not Applicable
ICLAWC	New	Not Applicable
ICLAWG	New	Not Applicable
ICLAWP	New	Not Applicable
ICLCFC	New	Not Applicable
ICLCFG	New	Not Applicable
ICLCON	New	Not Applicable
ICLIBK	New	Not Applicable
ICLIOI	New	Not Applicable
ICLLOG	New	Not Applicable
ICLTRB	New	Not Applicable
ICLWRC	New	Not Applicable
ICMSGB	New	Not Applicable
ICNBLK	New	Not Applicable
ICPATH	New	Not Applicable
ICPERM	New	Not Applicable
ICPOLL	New	Not Applicable
ICQBLK	New	Not Applicable
ICRBLK	New	Not Applicable
ICRCCW	New	Not Applicable
ICSGBK	New	Not Applicable
ICTRCE	New	Not Applicable
ICUBLK	New	Not Applicable
ICWCCW	New	Not Applicable
IDSTTR	Changed	Yes
ISCFDT	New	Not Applicable
ISIUCV	New	Not Applicable
ITRTBL	New	Not Applicable

General Macros: Table 154 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 154. Changes to General Macros for TCP/IP Offload Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
MALOC	Changed	No
POSTC	Changed	No

Selected Equate Macros: Table 155 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 155. Changes to Selected Equate Macros for TCP/IP Offload Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CLAWC	New	Not Applicable
CZOCP	Changed	Yes
CZ1SE	Changed	No
ECBEQ	Changed	No
IEQCE2	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 156 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 156. Changes to SIP Skeleton and Internal Macros for TCP/IP Offload Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 157 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 238 for a description of other system generation changes you must make.

Table 157. Changes to SIP Stage I Macros and Statements for TCP/IP Offload Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 158 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 158. Changes to SIP Stage II Macros for TCP/IP Offload Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 159 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 159. Changes to System Macros for TCP/IP Offload Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CLAWCC	New	Not Applicable
GCLAC	New	Not Applicable
IBMSVC	Changed	Not Applicable
IDATB	Changed	Yes
RCLAC	New	Not Applicable
TCLAC	New	Not Applicable

System Macros (IBM Use Only): Table 160 summarizes system macro (IBM use only) changes. This information is presented in alphabetic order by the name of the system macro.

Table 160. Changes to System Macros (IBM Use Only) for TCP/IP Offload Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes
CLHDRC	New	Not Applicable
CLTPC	New	Not Applicable
CLTRC	New	Not Applicable
DLTEC	Changed	Yes

Segments

Table 161 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 161. Changes to Segments for TCP/IP Offload Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCLAW1	CSECT	Not Applicable	New	CLAW device interface code; performs I/O to and from CLAW devices.
CCLAW3	CSECT	Not Applicable	New	CLAW service routines.

Table 161. Changes to Segments for TCP/IP Offload Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLA5	Real-Time Assembler	Not Applicable	New	CLAW entry point (EP) process root.
CLCL	Real-Time Assembler	Not Applicable	New	Writes CLAW trace record to tape.
CLC0	Real-Time Assembler	Not Applicable	New	Socket/CLAW Restart; initializes tables and blocks.
CLSX	Real-Time Assembler	Not Applicable	New	Socket catastrophic routine; takes a catastrophic dump if there are no more file descriptors available.
CLTD	Offline Assembler	CLTD40	New	CLAW data trace postprocessor.
CLTP	Offline Assembler	CLTP40	New	CLAW process trace postprocessor.
CPLKMP	CSECT	Not Applicable	Changed	Added CCLAW1 and CCLAW3.
CPSA	Real-Time Assembler	Not Applicable	Changed	Added code to go to the socket error handler if the ECB is a socket ECB.
CSK0	Real-Time Assembler	Not Applicable	Changed	Added code to display CLAW values from keypoint record 2 (CTK2) for the ZNKEY command.
CTKR	Real-Time Assembler	Not Applicable	Changed	Added code to schedule socket cycle-down processing.
CTKS	Real-Time Assembler	Not Applicable	Changed	Added code to schedule socket restart processing.
CTKT	Real-Time Assembler	Not Applicable	Changed	Added code to schedule socket cycle-up processing.
CTU1	Real-Time C Language	Not Applicable	Changed	Added code to update the event device table for CLAW devices.
CTU3	Real-Time C Language	Not Applicable	Changed	Added code to post the event in the event device table for CLAW devices.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added code to route ZCLAW commands to the CLZK DLM for processing.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 162. Changes to ECB User Exits for TCP/IP Offload Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Nonsocket Message User Exit	CLA5	CLA4	New	Allows messages to be routed to specific nonsocket applications.
Socket Activation User Exit	CLCJ, CLCK	CLCH	New	Allows you to activate server applications.

Table 162. Changes to ECB User Exits for TCP/IP Offload Support (continued)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Socket Deactivation User Exit	CLCE, CLCF	CLCI	New	Allows socket applications to clean up socket application resources.
Nonsocket Deactivation User Exit	CLA1, CLA2, CLCB, CLZN	CLCM	New	Allows nonsocket Common Link Access to Workstation (CLAW) applications to deactivate nonsocket CLAW application resources.
Nonsocket Activation User Exit	CLCA, CLZP	CLCQ	New	Allows nonsocket CLAW applications to be activated.
Socket System Error User Exit	CLCR	CLCX	New	Allows you to clean up the socket application resources for an entry control block (ECB).

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 163 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 163. Changes to Commands for TCP/IP Offload Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZCLAW ACTIVATE	New	Activates a CLAW workstation.
ZCLAW ADD	New	Defines the CLAW workstation and CLAW host name for a processor.
ZCLAW DELETE	New	Deletes CLAW workstation definitions.
ZCLAW DISPLAY	New	Displays information about CLAW workstations.
ZCLAW INACTIVATE	New	Deactivates a CLAW workstation.
ZCLAW RESET	New	Resets the ZCLAW command lock.
ZCLAW STATUS	New	Displays status information about the active CLAW workstations.
ZCLAW TRACE	New	Starts and stops the CLAW trace functions.
ZNKEY	Changed	Added support for the CLAWADP, CLAWFD, and CLAWIP parameters.

Messages and System Errors

Table 164 on page 236 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information,

the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 164. Changes to Messages and System Errors for TCP/IP Offload Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
009100	System Error	New
009101	System Error	New
009102	System Error	New
009103	System Error	New
009104	System Error	New
009105	System Error	New
009106	System Error	New
009107	System Error	New
00910A	System Error	New
009110	System Error	New
009111	System Error	New
009112	System Error	New
009113	System Error	New
009114	System Error	New
009115	System Error	New
009116	System Error	New
CLAW0001I	Online	New
CLAW0002E	Online	New
CLAW0003I	Online	New
CLAW0004E	Online	New
CLAW0005E	Online	New
CLAW0006E	Online	New
CLAW0007E	Online	New
CLAW0008I	Online	New
CLAW0009E	Online	New
CLAW0010I	Online	New
CLAW0011I	Online	New
CLAW0013I	Online	New
CLAW0014E	Online	New
CLAW0015E	Online	New
CLAW0018E	Online	New
CLAW0019E	Online	New
CLAW0021E	Online	New
CLAW0022E	Online	New
CLAW0023E	Online	New
CLAW0024E	Online	New
CLAW0026I	Online	New
CLAW0027E	Online	New
CLAW0028E	Online	New

Table 164. Changes to Messages and System Errors for TCP/IP Offload Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CLAW0029E	Online	New
CLAW0030E	Online	New
CLAW0033E	Online	New
CLAW0035E	Online	New
CLAW0036E	Online	New
CLAW0037I	Online	New
CLAW0038E	Online	New
CLAW0039E	Online	New
CLAW0040E	Online	New
CLAW0041E	Online	New
CLAW0042E	Online	New
CLAW0043E	Online	New
CLAW0044I	Online	New
CLAW0045E	Online	New
CLAW0046I	Online	New
CLAW0047I	Online	New
CLAW0048E	Online	New
CLAW0071I	Online	New
CLAW0072I	Online	New
CLAW0073I	Online	New
CLAW0074I	Online	New
CLAW0082I	Online	New
CLAW0083E	Online	New
CLAW0084I	Online	New
CLAW0085E	Online	New
CLAW0086I	Online	New
CLAW0088E	Online	New
CLAW0089I	Online	New
CLAW0090E	Online	New
CLAW0091E	Online	New
CLAW0092I	Online	New
CLAW0093E	Online	New
CLAW0094I	Online	New
CLAW0095E	Online	New
CLAW0096E	Online	New
CLAW0097I	Online	New
CLAW0098I	Online	New
CLAW0099E	Online	New
CLCL0066W	Online	New
CLCL0067E	Online	New
CLC00001I	Online	New
SOCK0001E	Online	New
SOCK0002E	Online	New

Table 164. Changes to Messages and System Errors for TCP/IP Offload Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SOCK0003E	Online	New
SOCK0004E	Online	New

Performance or Tuning Changes

Use the SNAKEY macro to define the size of the main storage tables that are used by TCP/IP offload support. See *TPF Transmission Control Protocol/Internet Protocol* for information about the recommended size of these tables.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The new COMX library requires 69 688 bytes in the core resident program area (CRPA) and 21 #XPRG records. Therefore, you may need to increase the size of the CRPA and define more #XPRG records. See *TPF System Generation* for more information.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 165 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 165. Changes to TPF Publications for TCP/IP Offload Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF04	Updated the description of the SNAKEY macro to include information about the new parameters that were added for TCP/IP offload support.
<i>TPF Application Programming</i>	GTPAPP04	Updated with information about the new C header files that were added for TCP/IP offload support.
<i>TPF C Language Support User's Guide</i>	GTPCLU04	Added references to <i>TPF Transmission Control Protocol/Internet Protocol</i> for information about the CLAW API and socket API functions.
<i>TPF Concepts and Structures</i>	GTPCON02	Added a high-level description of TCP/IP offload support.
<i>TPF Library Guide</i>	GTPDOC04	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for TCP/IP offload support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG04	Updated with migration considerations for TCP/IP offload support.
<i>TPF Operations</i>	GTPOPR04	Updated with information about the commands that were added and changed for TCP/IP offload support.

Table 165. Changes to TPF Publications for TCP/IP Offload Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Program Development Support Reference</i>	GTPPDR04	Updated with information about the new dump labels that were added for TCP/IP offload support.
<i>TPF Programming Standards</i>	GTPPSM04	Updated with information about the C header files and equate macros that were added for TCP/IP offload support and do not conform to TPF standards.
<i>TPF System Generation</i>	GTPSYG04	Added references to <i>TPF Transmission Control Protocol/Internet Protocol</i> for information about TCP/IP offload support.
<i>TPF System Installation Support Reference</i>	GTPINR04	Updated with information about ECB control program (CP) user exits that were added for TCP/IP offload support.
<i>TPF System Macros</i>	GTPSYS04	Updated with information about the system macros that were added and changed for TCP/IP offload support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW00	Published a new publication for TCP/IP offload support. This publication contains information for the application programmer, system programmer, and operator.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

TCP/IP offload support provides a socket application programming interface (API) that contains ISO-C socket function calls. You can use the socket API to create socket applications on the TPF 4.1 system that can communicate with other socket applications on remote TCP/IP devices.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about the socket API.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TCP/IP offload support in your TPF 4.1 system.

1. Configure your network for TCP/IP offload support. See *TPF Transmission Control Protocol/Internet Protocol* for information.
2. Install PUT 4, which contains TCP/IP offload support (APAR PJ21791), on the TPF 4.1 system. Be sure to do the following:
 - a. Compile without TARGET(TPF) all required C programs. The required C programs are listed in "Interface Changes" on page 223.
 - b. Assemble all required real-time assembler programs. The required real-time assembler programs are listed in "Interface Changes" on page 223.

- c. Assemble all required CSECTs. The required CSECTs are listed in Table 161 on page 233.
- d. Generate stubs for the programs that are called externally by the new TCP/IP offload support DLMs.
- e. Generate the library stubs for the library functions in the newly created COMX library. This step is needed for only the basic subsystem (BSS).
- f. Create a new system allocator (SALO) that includes the following:
 - New COMX library
 - New TCP/IP offload support DLMs
 - New TCP/IP offload support real-time assembler programs.
- g. Recompile and run SALO to create an updated IPAT and TABLE.
- h. Link-edit all of the applicable C programs, making sure that you pick up the updated CSTRTD (C startup code) from APAR PJ21167 for the ISO-C DLMs.
- i. Link-edit the new COMX library, making sure that you pick up the updated CSTRTL (library startup code) from APAR PJ21167.
- j. Link-edit the control program (CPS0).
3. Update the following user exits, if appropriate:
 - Nonsocket Message User Exit (CLA4)
 - Socket Activation User Exit (CLCH)
 - Socket Deactivation User Exit (CLCI)
 - Nonsocket Deactivation User Exit (CLCM)
 - Nonsocket Activation User Exit (CLCQ)
 - Socket System Error User Exit (CLCX).

See *TPF System Installation Support Reference* for more information about these user exits.

4. Use the SNAKEY macro to define the following information in keypoint record 2 (CTK2):
 - Number of CLAW adapters using the CLAWADP parameter
 - Number of file descriptors using the CLAWFD parameter
 - Number of local Internet Protocol (IP) addresses using the CLAWIP parameter.

See *TPF Transmission Control Protocol/Internet Protocol* for information about the values to specify for these parameters. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

5. Load the updated keypoint record 2 (CTK2) to a processor in the TPF 4.1 system.
6. Perform an initial program load (IPL) on that processor.
7. After the processor reaches 1052 state, define the CLAW host name for that processor by entering the ZCLAW ADD command with the HOSTNAME parameter specified.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about defining the CLAW host name. See *TPF Operations* for more information about the ZCLAW ADD command.

8. Define the Common Link Access to Workstation (CLAW) workstations for the processor by entering the ZCLAW ADD command.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about defining CLAW workstations. See *TPF Operations* for more information about the ZCLAW ADD command.

9. Cycle the processor to CRAS state or above by entering the ZCYCL command.

See *TPF Operations* for more information about the ZCYCL command.

10. Activate the CLAW workstations by entering the ZCLAW ACTIVATE command.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about activating CLAW workstations. See *TPF Operations* for more information about the ZCLAW ACTIVATE command.

11. Repeat steps 5–10 on each additional processor in your loosely coupled TPF 4.1 system where you want to install TCP/IP offload support.

Fallback Scenarios

If the conversion to TCP/IP offload support is not successful, you will need to fall back to the previous TPF environment, correct the problem, and try the conversion again.

Use the following procedure to fall back to the previous TPF environment.

1. Use the SNAKEY macro to update keypoint record 2 (CTK2) and assign a zero value to the following SNAKEY parameters:
 - CLAWADP
 - CLAWFD
 - CLAWIP.

See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro and these parameters.

2. Load the updated keypoint record 2 (CTK2) to the TPF 4.1 system.
3. Perform an initial program load (IPL) for the TPF 4.1 system.

Additional Migration Considerations for Program Update Tape (PUT) 4

This section discusses the migration considerations for authorized program analysis reports (APARs) other than the small programming enhancements (SPEs) discussed previously.

Information Provided	Where to Go For More Information
Critical APARs shipped on Program Update Tape (PUT) 4	"Critical APARs"
APARs that correct incorrect APARs shipped on previous PUTs	"APARs that Correct Incorrect APARs Shipped on Previous PUTs" on page 243
APARs that correct incorrect APARs shipped on PUT 4	"APARs that Correct Incorrect APARs Shipped on PUT 4" on page 243

Critical APARs

Table 166 summarizes critical APARs shipped on PUT 4. These critical APARs are valid at the time PUT 4 ships and are subject to change later. Please see the APAR response information that accompanies each APAR and your IBM service representative for more information about critical APARs.

This information is presented in numeric order based on the APAR number.

Table 166. Critical APARs Shipped on PUT 4

APAR Number	Description	Base or Feature
PJ19272	SPE: cratc Function	Base
PJ19959	MPIF Possible CTL-001 Catastrophic	Multi-Processor Interconnect Facility (MPIF)
PJ20003	Infinite Loop With Greater Than 32 DASD Addresses	High Performance Option (HPO)
PJ20227	Invalid SVCs Cause a Re-IPL	Base
PJ20262	CTL-571 and CTL-572 Catastrophic	Base
PJ20407	CTL-021 Catastrophic: Record Hold Overflow	Base
PJ20551	SPE: Performance Enhancement for Auto Storage Blocks	Base
PJ20657	CTL-001 Catastrophic	Base
PJ20811	SPE: ELDR Performance	Base
PJ20861	MPIF Catastrophic CTL-230	Multi-Processor Interconnect Facility (MPIF)
PJ20895	BSC CTL-002 Catastrophic	Base
PJ21331	Improve Shared PR/SM Performance	Base Note: If you installed APAR PJ17778 for Shared PR/SM from PUT 2 on your TPF 4.1 system, then you must install APAR PJ21331.
PJ21474	Provide C Header File for CTKB	Base
PJ21509	Possible Corruption of Main Storage	Base
PJ21548	Record Out of Synch Because of FILUC and FIWHC Processing	Base

APARs that Correct Incorrect APARs Shipped on Previous PUTs

Table 167 summarizes APARs contained on PUT 4 that fix incorrect APARs shipped with the current PUT or previous PUTs. This table is ordered in numeric order based on the correcting APAR number.

Table 167. APARs Correcting Incorrect APARs Shipped on Previous PUTs — PUT 4

Correcting APAR Number (PUT 4)	Incorrect APAR Number	PUT That Shipped the Incorrect APAR	Base or Feature
PJ19655	PJ17852	PUT 2	Base
PJ19706	PJ17852	PUT 2	Base
PJ19727	PJ18916	PUT 3	Base
PJ19818	PJ17852	PUT 2	Base
PJ19841	PJ17852	PUT 2	Base
PJ19968	PJ13889	PUT 1	High Performance Option (HPO)
PJ20092	PJ14605	PUT 1	Base
PJ20143	PJ15565	PUT 2	Base
PJ20157	PJ19480	PUT 2	Base
PJ20339	PJ17852	PUT 2	Base
PJ20404	PJ19966	PUT 3	Base
PJ20554	PJ17584	PUT 2	Base
PJ20627	PJ17852	PUT 2	Base
PJ20701	PJ17912	PUT 2	Base
PJ20789	PJ19966	PUT 3	Base
PJ20847	PJ18609	PUT 3	Base
PJ20958	PJ19966	PUT 3	Base
PJ21060	PJ17852	PUT 2	Base
PJ21276	PJ14737	PUT 2	High Performance Option (HPO)
PJ21478	PJ17852	PUT 2	Base
PJ21797	PJ21313	PUT 4	Base
PJ21885	PJ21044	PUT 4	Base
PJ21911	PJ21791	PUT 4	Base
PJ21953	PJ21791	PUT 4	Base
PJ21967	PJ21592	PUT 4	Base

APARs that Correct Incorrect APARs Shipped on PUT 4

Table 168 summarizes APARs contained on PUT 4 that fix incorrect APARs also shipped on PUT 4. This table is ordered in numeric order based on the correcting APAR number.

Table 168. APARs Correcting Incorrect APARs Shipped on PUT 4

Correcting APAR Number (PUT 4)	Incorrect APAR Number (PUT 4)	PUT That Shipped the Incorrect APAR
PJ21797	PJ21313	PUT 4
PJ21885	PJ21044	PUT 4
PJ21967	PJ21592	PUT 4
PJ21911, PJ21953	PJ21791	PUT 4
PJ22166	PJ21044	PUT 4

Table 168. APARs Correcting Incorrect APARs Shipped on PUT 4 (continued)

Correcting APAR Number (PUT 4)	Incorrect APAR Number (PUT 4)	PUT That Shipped the Incorrect APAR
PJ22462	PJ20249	PUT 4
PJ22379	PJ21592	PUT 4

Program Update Tape 5 (PUT 5)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 5 (PUT 5).

SPE	Where to Go For More Information
Resource Control	"Resource Control (APAR PJ23178)" on page 246
Transmission Control Protocol/Internet Protocol (TCP/IP) Full-Duplex Socket Support	"Transmission Control Protocol/Internet Protocol (TCP/IP) Full-Duplex Socket Support (APAR PJ23180)" on page 259
Message Queue Interface (MQI) Client	"Message Queue Interface (MQI) Client (APAR PJ22434)" on page 268

In addition, migration considerations are included for the following types of Authorized Program Analysis Reports (APARs):

- Critical APARs shipped on PUT 5
- APARs that correct incorrect APARs shipped on previous PUTs.

See "Additional Migration Considerations for Program Update Tape (PUT) 5" on page 279 for more information about the migration considerations for these APARs.

TPF 4.1 PUT 5 is compiled with the IBM C/C++ for MVS/ESA Version 3 Release 1 (C/MVS compiler component only) compiler. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Resource Control (APAR PJ23178)

The following section discusses the migration considerations for resource control.

Prerequisite APARs

See the APEDIT for APAR PJ23178 for information about prerequisite APARs.

Functional Overview

Resource control provides:

- A general use macro (LODIC) that applications can use to determine the level of available system resources (common blocks (CMBs), entry control blocks (ECBs), frames (FRMs), input/output blocks (IOBs), and system work blocks (SWBs)).
- The ability to control utility or batch processes automatically so that they do not deplete system resources during peak or busy periods, while making maximum use of available resources under varying system conditions.
- The ability to time slice CPU-intensive applications, forcing them to give up control after running for specified intervals of time, allowing the system to process other transactions.

You can do all of the previous by using the following new macros.

Macro Name	Description
LODIC	Check the system load and identify an entry control block (ECB) as a batch-type transaction.
TMSLC	Enable or disable time slicing for a transaction.

Architecture

New Supervisor Call (SVC) Service Routines

Two new macros, LODIC and TMSLC, are provided. They are SVC-type macros and have a corresponding macro service routine in the control program.

While running one of these macros, the service routine sets up the appropriate ECB fields, return conditions, or both. Control usually returns back to the application program through the common macro exit routine. However, sometimes the ECB does not receive control immediately and can be placed on a new list called the *suspend list*, in which case the system task dispatcher (CPU loop) is then entered. The suspend list is a CPU loop list that contains ECBs that have been suspended.

Once a LODIC macro has been run, after the ECB gives up control, the ECB will not get back control until enough system resources exist. Once a TMSLC macro has been run, an ECB can be forced to give up control at preset time intervals during processing to enable other system work to complete.

System Task Dispatcher Changes: A major change in functional flow has been made to the system task dispatcher (CPU loop) for all I-streams. A new list, called the suspend list, has been added. This list will function similarly to the virtual file access count (VCT) list.

ECBs that issue TMSLC or LODIC macros, or both, can be suspended at any point following the macro call. While suspended, these ECBs reside on a suspend list while other transactions are processed. The system task dispatcher will dispense

from the suspend list in a fashion similar to the VCT list; that is, at equal priority to the input list but still dispatched during input list shutdown.

Application Timeout Changes: A new application timeout dump has been added that pertains only to ECBs that can be time sliced. This timeout will only occur if this type of ECB exceeded its maximum allowable CPU run time, which is never reset (even during a loss of control) while the ECB is marked as being able to be time sliced.

When an ECB issues a TMSLC macro, the ECB is enabled for time slicing and generally will not time out. Instead, the ECB is time-sliced and allows the system to perform other work. The time-sliced ECB can theoretically use an infinite amount of CPU time while giving up control at system-defined time intervals.

Other Changes: Two new commands for changing the LODIC and TMSLC run-time parameters have been added.

Command	Description
ZSYSL	Display or change priority class shutdown levels.
ZTMSL	Display or change time-slice attributes.

There are new data collection and data reduction fields, such as:

- Suspend list ECBs
- Low priority ECB classification
- Instantaneous activity
- VCT.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 169 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 169. Changes to Build Scripts for Resource Control

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CTALBS	DLM	Changed	Added new lodic_ext and tmslc C functions.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 170 on page 248 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 170. Changes to General Use C Language Header Files for Resource Control

General Use C Language Header File	Target (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	X	X	Changed	No
c\$ck1ke.h	X	X	Changed	No
c\$eb0eb.h	X	X	Changed	No
c\$syseq.h	X	X	Changed	No
sysapi.h		X	Changed	No
tpfapi.h		X	Changed	No
tpfglb.h	X	X	Changed	Yes

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 171 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 171. Changes to Library Interface Scripts for Resource Control

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Added the CLODIC and CTMSLC library members.

Library Members (Object Files): Table 172 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 172. Changes to Library Members (Object Files) for Resource Control

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CLODIC	CTAL	New	Assembler	LODIC library function.
CTMSLC	CTAL	New	Assembler	TMSLC library function.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 173 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 173. Changes to CINFC Tags for Resource Control

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMLODIC	293	New

Table 173. Changes to CINFC Tags for Resource Control (continued)

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMTMSLC	294	New

Copy Members

Table 174 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 174. Changes to Copy Members for Resource Control

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Changed	Updated CP directory.
CAPE	Control Program	CCNUCL	Changed	Defined post-interrupt (PI) entry points for ECBs that can be suspended.
CAPT	Control Program	CCNUCL	Changed	Defined PI entry points for ECBs that can be suspended.
CCEB	Control Program	CCENBK	Changed	Added low-priority ECB checks to the file resident/core resident (FR/CR) program ENTER routine.
CCEC	Control Program	CCENBK	Changed	Added low-priority ECB check to the GETPC exit point.
CCED	Control Program	CCENBK	Changed	Added low-priority ECB check to the DLM enter routine.
CCE3	Control Program	CCIISC	Changed	Updated the application timeout value in the PAUSC routine.
CCE4	Control Program	CCIISC	Changed	Set up the resource control data in the SWISC CREATE transfer block.
CCE7	Control Program	CCIISC	Changed	Included size of the suspend list in I-stream scheduling calculations.
CCIT	Control Program	CCNUCL	Changed	Added low-priority ECB checks to the TAPE PI routine. Added the PI subroutine for suspending low-priority and time-sliced ECBs.
CEDM	Control Program	CCMCDC	Changed	Added the macro decoder entry point for time-sliced ECBs.
CHSZ	Control Program	CCNUCL	Changed	Copied LODIC data from the ECB CREATE transfer block.
CICR	Control Program	CCNUCL	Changed	Added a low-priority ECB check to the ECB CREATE routine. Set up LODIC data in the ECB CREATE transfer block. Updated the ELLEC macro with the ability to unsuspend ECBs.
CICS	Control Program	CCNUCL	Changed	Added the LODIC and TMSLC macro service routines.
CLHL	Control Program	CCCLHR	Changed	Added code to the queue and an ECB to the suspend list. Added the suspend list PI routine.
CTME	Control Program	CCNUCL	Changed	Added application time-slice support to timer routines.
CT01	Control Program	CCCTIN	Changed	Allocated storage for the new time-slice name table.
CT40	Control Program	CCCTIN	Changed	Set up new LODIC shutdown table.
CUSR	Control Program	CCUEXT	Changed	Added new user exit support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 175 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 175. Changes to Data Macros for Resource Control

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK1KE	Changed	No
DCTPFX	Changed	No
DCTUCL	Changed	No
DLTEC	Changed	Yes
IDSXFC	Changed	Yes
ISUSP	New	Not Applicable
ITSNT	New	Not Applicable

General Macros: Table 176 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 176. Changes to General Macros for Resource Control

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
LODIC	New	Not Applicable

Selected Equate Macros: Table 177 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 177. Changes to Selected Equate Macros for Resource Control

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No
CZ4CP	Changed	No
IEQCE2	Changed	No
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 178 on page 251 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF*

System Generation for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 178. Changes to SIP Skeleton and Internal Macros for Resource Control

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKA	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 179 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 179. Changes to SIP Stage II Macros for Resource Control

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 180 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 180. Changes to System Macros for Resource Control

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No
ELLEC	Changed	No
IBMSVC	Changed	Not Applicable
TMSLC	New	Not Applicable
UXITC	Changed	No

System Macros (IBM Use Only): Table 181 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 181. Changes to System Macros (IBM Use Only) for Resource Control

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes

Segments

Table 182 on page 252 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 182. Changes to Segments for Resource Control

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CAPC	Real-Time Assembler	Not Applicable	Changed	Updated the ZECBL command processing to allow for the display and dispatch of suspended ECBs.
CAPD	Real-Time Assembler	Not Applicable	Changed	Updated the ZECBL command with messages that support the display and dispatch of suspended ECBs.
CAPF	Real-Time Assembler	Not Applicable	Changed	Updated the ZECBL command with error messages related to attempts to display or dispatch suspended ECBs.
CLH1	Real-Time Assembler	Not Applicable	New	Processes the ZSYSL command.
CTKO	Real-Time Assembler	Not Applicable	Changed	Added a call to the time-slice restart (CTMS) segment.
CTMS	Real-Time Assembler	Not Applicable	New	Initialized the time-slice name table during restart. Provides help support for the ZTMSL command.
CTMT	Real-Time Assembler	Not Applicable	New	Processes the ZTMSL command.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added code to route the ZSYSL command to the CLH1 segment. Added code to route the ZTMSL command to the CTMT segment.
CVOO	Real-Time Assembler	Not Applicable	Changed	Updated the ZSTAT command with the U parameter specified to include the VCT list and the suspend list.
DCR2	Offline Assembler	DCRS	Changed	Added new system error fields to the macro cross-reference table.
JCD4	Real-Time Assembler	Not Applicable	Changed	Updated data collection to collect relevant resource control data.
JCS0	Real-Time Assembler	Not Applicable	Changed	Updated data collection to collect relevant resource control data.
JRA1	Offline PL/I	DATAREAD	Changed	Updated data reduction to use relevant resource control data.
JRA2	Offline PL/I	DATAREAD	Changed	Updated data reduction to use relevant resource control data.
JRA3	Offline PL/I	DATAREAD	Changed	Updated data reduction to use relevant resource control data.
JRS3	Offline PL/I	DATAREAD	Changed	Updated data reduction to use relevant resource control data.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 183 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 183. Changes to SYSEQ Tags for Resource Control

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#TMSLTAB	118	New

User Exits

"Control Program (CP) User Exits" and "ECB User Exits" summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 184. Changes to Control Program (CP) User Exits for Resource Control

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CTME (CCNUCL)	UCCAPL	New	Called before issuing the 000010 or 00002010.
CCEB (CCENBK) CCED (CCENBK) CLHL (CCCLHR)	UCCCREB	Changed	Called at the end of macro processing and before control is passed to the destination program for either an enter-type macro going to a core resident program or a BACKC macro coming from a core resident program.
CCEB (CCENBK) CCED (CCENBK) CLHL (CCCLHR)	UCCFREB	Changed	Called at the end of macro processing and before control is passed to the destination program for either an enter-type macro going to a file resident program or a BACKC macro coming from a file resident program.
CICS (CCNUCL)	UCCLODC	New	Called at the end of the LODIC macro processing routine.
CICS (CCNUCL)	UCCSUSC	New	Called when determining if an ECB should be added to the suspend list or dispatched from the suspend list.
CLHL (CCCLHR)	UCCSUSE	New	Called whenever an ECB that is marked as being able to be suspended is about to be suspended during CPU loop dispatch time.
CLHL (CCCLHR)	UCCSUSP	New	Called whenever an item is taken from the suspend list and is about to be dispatched.
CICS (CCNUCL)	UCCTMSL	New	Called at end of the TMSLC macro processing routine.

ECB User Exits: There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 185 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 185. Changes to Commands for Resource Control

Command	New, Changed, or No Longer Supported?	Description of Change
ZECBL	Changed	Added the ability to display and dispatch suspended ECBs.
ZSTAT	Changed	Updated the ZSTAT command with the U parameter to include the VCT list and the suspend list.

Table 185. Changes to Commands for Resource Control (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZSYSL	New	Display or change shutdown levels for LODIC priority classes.
ZTMSL	New	Display or change time-slice attributes. Add or remove a time-slice name from the time slice name table.

Messages and System Errors

Table 186 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 186. Changes to Messages and System Errors for Resource Control

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000010	System Error	Changed
00002010	System Error	New
00002011	System Error	New
00002012	System Error	New
00002013	System Error	New
00002014	System Error	New
CTMS0001I	Online	New
CTMS0002W	Online	New
CTMS0003E	Online	New
CTMS0004E	Online	New
ECBL0008E	Online	No Longer Supported
ECBL0012I	Online	No Longer Supported
ECBL0014I	Online	New
ECBL0015I	Online	New
ECBL0016I	Online	New
ECBL0017E	Online	New
ECBL0018E	Online	New
STAT0009I	Online	No Longer Supported
STAT0011I	Online	New
SYSL0001I	Online	New
SYSL0002I	Online	New
SYSL0003I	Online	New
SYSL0004E	Online	New
SYSL0005E	Online	New
SYSL0006E	Online	New

Table 186. Changes to Messages and System Errors for Resource Control (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SYSL0007E	Online	New
SYSL0008E	Online	New
SYSL0009E	Online	New
TMSL0001I	Online	New
TMSL0002I	Online	New
TMSL0003I	Online	New
TMSL0004I	Online	New
TMSL0005I	Online	New
TMSL0006E	Online	New
TMSL0007E	Online	New
TMSL0008E	Online	New
TMSL0009E	Online	New
TMSL0010I	Online	New
TMSL0011E	Online	New
TMSL0013E	Online	New
TMSL0014E	Online	New
TMSL0015E	Online	New

Performance or Tuning Changes

Resource control is used by application programmers to control system resources. Utilities and batch processes can be controlled automatically so they will not deplete system resources during peak periods and can maximize the use of available resources under varying system conditions.

Resource control adds the capability in the TPF 4.1 system to time slice CPU-intensive applications, forcing them to relinquish control after running for specified intervals of time. This will allow you to process other transactions.

Overall system performance can be improved by identifying low-priority batch-type jobs and using the LODIC macro to suspend these jobs automatically when system activity gets too high.

Likewise, you can use the TMSLC macro to increase overall system performance by using it to control CPU-intensive transactions.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

Two new tables have been added to the TPF 4.1 system. The priority class table is associated with the LODIC macro. The time-slice name table is associated with the TMSLC macro.

Priority Class Table

One of the parameters used by the LODIC macro is the *priority class* parameter. Each LODIC priority class defines 5 shutdown values, one for each block type (CMB, ECB, FRM, IOB, SWB).

Resource control provides 4 predefined priority classes:

- BATCH
- LOBATCH
- IBMHI
- IBMLO.

IBMHI and IBMLO are reserved for use by IBM.

See the LODIC macro in *TPF General Macros* and the ZSYSL command in *TPF Operations* for additional information on these 4 predefined priority classes.

As many as four additional priority classes (a total of eight) can be defined. These priority classes **must** be defined in the system before they can be used by the LODIC macro.

The LODIC priority class table is located in copy segment CICS of CSECT CCNUCL. It is built by CTIN from data in keypoint A.

To add additional priority classes, update the following segments:

- CICS
- CFMCC
- CK1KE
- CLH1
- LODIC
- SKCTKA
- TPFAPL.

Time-Slice Name Table: One of the parameters used by the TMSLC macro is the NAME parameter. Each time-slice name has four time-slice values associated with it, one for each of the following TMSLC attributes:

- RUNTIME
- MAXTIME
- MINSUSP
- MAXECB.

Resource control provides three predefined time-slice names:

- IBMHIPRI (IBM use only)
- IBMLOPRI (IBM use only)
- IBMINDEF (IBM use only).

You can define as many as 100 TMSLC names in the system. These names can be added, changed, or removed dynamically with the new ZTMSL command. See *TPF Operations* for more information about the ZTMSL command.

You can also code TMSLC names in the resource control restart segment (CTMS). resource control restart (CTMS) receives control during system restart. It rebuilds the time-slice name table in core from the time-slice name table on file. If the file copy has been corrupted, or has not yet been created, resource control restart uses the coded TMSLC names to rebuild both the file and core copies of the time-slice name table.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 187 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 187. Changes to TPF Publications for Resource Control

Publication Title	Softcopy File Name	Description of Change
<i>TPF C Language Support Reference Summary</i>	N/A	Added the lodic, lodic_ext, and tmslc C functions.
<i>TPF C Language Support User's Guide</i>	GTPCLU05	Added the lodic, lodic_ext, and tmslc C functions.
<i>TPF Concepts and Structures</i>	GTPCON03	Added VCT list and suspend list information.
<i>TPF General Macros</i>	GTPGEN05	Added the LODIC macro.
<i>TPF Library Guide</i>	GTPDOC05	Updated with definitions for new terminology in the master glossary.
<i>TPF Main Supervisor Reference</i>	GTPMSR05	Added information on the suspend list, on suspend processing of an entry, and on altering and displaying resource control values.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for resource control.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG05	Updated with migration considerations for resource control.
<i>TPF Operations</i>	GTPOPR05	Added the ZSYSL and ZTMSL commands and updated the ZECBL and ZSTAT commands.
<i>TPF Program Development Support Reference</i>	GTPPDR05	Added a new dump label.
<i>TPF System Installation Support Reference</i>	GTPINR05	Added 5 new user exits and updated 2 user exits.
<i>TPF System Macros</i>	GTPSYS05	Added the TMSLC macro.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR05	Added new data collection and data reduction fields.

Host System Changes

There are changes to the offline data reduction job control language (JCL). The logical record length (LRECL) of STEMP must be increased from 248 bytes to 328 bytes, and the block size (BLKSIZE) of STEMP must be changed accordingly.

The LRECL of STEMPIS varies according to the number of I-streams specified in JPC0, and will increase from 96 bytes for each I-stream to 128 bytes for each I-stream with the application of resource control. BLKSIZE must be changed accordingly.

See *TPF Operations* for an updated sample of JCL for offline data reduction for eight I-streams.

Application Programming Interface (API) Changes

Resource control includes one new general macro (LODIC), one new system macro (TMSLC), and three new C-library functions (lodlc, lodlc_ext, and tmslc). See *TPF General Macros* for more information about the LODIC and TMSLC macros. See the *TPF C/C++ Language Support User's Guide* for more information about the lodlc, lodlc_ext, and tmslc functions.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

You can quickly verify that resource control has been installed by entering the following new commands:

- ZTMSL DISPLAY COPY-BOTH displays a list of the time-slice names currently defined on file and in core.
- ZTMSL DISPLAY IBMHIPRI displays the time-slice attributes that are currently defined for time-slice name IBMHIPRI which is on file.
- ZSYSL DISPLAY CLASS-IBMLO displays the currently defined shutdown levels for priority class IBMLO.

Migration Scenarios

Adding resource control will have no impact on existing TPF 4.1 system or the applications on an existing TPF 4.1 system.

Investigate your current application and system program base to identify places where you have implemented your own forms of resource checking or time slicing. It may be to your advantage to remove any modifications you made and use the new macros that are provided by resource control.

Installing resource control requires allocation of:

- Three new real-time programs
 - CLH1
 - CTMS
 - CTMT.
- Two new C library members
 - CLODIC
 - CTMSLC.
- One new 4 KB fixed file record
 - Time-slice name table.

Installation of resource control also requires a CP load.

Transmission Control Protocol/Internet Protocol (TCP/IP) Full-Duplex Socket Support (APAR PJ23180)

The following section discusses the migration considerations for TCP/IP full-duplex socket support.

Prerequisite APARs

See the APEDIT for APAR PJ23180 for information about prerequisite APARs.

Be sure TCP/IP offload support (APAR PJ21791) is applied **before** applying TCP/IP full-duplex socket support (APAR PJ23180). See “Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)” on page 221 for more information about TCP/IP offload support (APAR PJ21791).

Functional Overview

TCP/IP full-duplex socket support is an enhancement of TCP/IP offload support, which is described in “Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)” on page 221 and provides these functions.

Full-Duplex Socket Support or Multiple Entry Control Block (ECB) Support, which allows another socket application to issue a *different* type of function call and the call is **not blocked** even if a specific type of function call is outstanding for a particular socket descriptor. A list of these function calls follows here:

- accept
- read, or recv, or recvfrom, or activate_on_receipt
- send, or sendto, or write, or writev when written to a datagram socket
- connect
- shutdown
- close
- listen
- bind or socket
- gethostid
- gethostname
- getpeername
- getsockname
- getsockopt
- ioctl
- select
- setsockopt.

For example, if a socket application program issues a send type function call for a particular socket, this does not block another socket application program from issuing a receive type function call from a different entry control block (ECB) for the same socket. Therefore, multiple socket application programs can access the same socket at the same time, allowing *full-duplex* support between socket application programs.

Socket Cycle-Up User Exit in which the *socket cycle-up* user exit is entered only once during system cycle-up and allows you to activate socket server applications automatically during system cycle-up. The socket cycle-up user exit lets you

maintain your user exits more easily when you have more than one TCP/IP offload device defined in your TPF 4.1 system. In addition, this user exit is suitable for applications that issue bind socket API function calls to bind all network interfaces in the internet domain.

Internet Protocol (IP) Table Expansion in which the Internet Protocol (IP) table is expanded to allow you to define 81 TCP/IP offload devices. See *TPF Transmission Control Protocol/Internet Protocol* for information about TCP/IP control blocks and storage considerations.

Architecture

Using TCP/IP full-duplex socket support, socket application programs can access the same socket without being blocked. However, each socket application program must use different function calls from a discrete set of functions. See “Functional Overview” on page 259 for a list of these function calls.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language. See *TPF Transmission Control Protocol/Internet Protocol* for more information about the C/C++ language functions provided with the TCP/IP support.

Build Scripts: Table 188 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 188. Changes to Build Scripts for TCP/IP Full-Duplex Socket Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CLCVBS	DLM	New	Build script for the CLCV DLM.

Dynamic Load Module (DLM) Stubs: Table 189 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 189. Changes to Dynamic Load Module (DLM) Stubs for TCP/IP Full-Duplex Socket Support

DLM Stub	New, Changed, or No Longer Supported?
CLCV	New

General Use C Language Header Files: Table 190 on page 261 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 190. Changes to General Use C Language Header Files for TCP/IP Full-Duplex Socket Support

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$eb0eb.h		X	Changed	No
c\$iscddt.h		X	Changed	No
c\$iscfdt.h		X	Changed	No
c\$iscipt.h		X	Changed	No
c\$iscInt.h		X	Changed	No
c\$isiucv.h		X	Changed	No
c\$sthr.h		X	New	Not Applicable
claw.h		X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 191 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 191. Changes to Library Members (Object Files) for TCP/IP Full-Duplex Socket Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C511	COMX	Changed	C Language	Updated to provide multiple ECB support.
C512	COMX	Changed	C Language	Updated to provide multiple ECB support.
C513	COMX	Changed	C Language	Updated to provide multiple ECB support.
C514	COMX	Changed	C Language	Updated to provide multiple ECB support.
C515	COMX	Changed	C Language	Updated to provide multiple ECB support.
C516	COMX	Changed	C Language	Updated to provide multiple ECB support.
C517	COMX	Changed	C Language	Updated to provide multiple ECB support.
C518	COMX	Changed	C Language	Updated to provide multiple ECB support.
C519	COMX	Changed	C Language	Updated to provide multiple ECB support.
C520	COMX	Changed	C Language	Updated to provide multiple ECB support.
C524	COMX	Changed	C Language	Updated to provide multiple ECB support.
C525	COMX	Changed	C Language	Updated to provide multiple ECB support.
C528	COMX	Changed	C Language	Updated to provide multiple ECB support.
C529	COMX	Changed	C Language	Updated to provide multiple ECB support.
C530	COMX	Changed	C Language	Updated to provide multiple ECB support.
C531	COMX	Changed	C Language	Updated to provide multiple ECB support.
C532	COMX	Changed	C Language	Updated to provide multiple ECB support.
C533	COMX	Changed	C Language	Updated to provide multiple ECB support.
C534	COMX	Changed	C Language	Updated to provide multiple ECB support.
C537	COMX	Changed	C Language	Updated to provide multiple ECB support.
C539	COMX	Changed	C Language	Updated to provide multiple ECB support.
C540	COMX	Changed	C Language	Updated to provide multiple ECB support.
C541	COMX	Changed	C Language	Updated to provide multiple ECB support.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 192 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 192. Changes to Members (Object Files) for TCP/IP Full-Duplex Socket Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLCA	CLCA	Changed	C Language	Provides support for the socket cycle-up user exit.
CLCE	CLCE	Changed	C Language	Posts events associated with each device of the file descriptor when the TCP/IP offload device is deactivated.
CLCF	CLCB	Changed	C Language	Posts events associated with each file descriptor when the system is cycling down to the 1052 state.
CLCK	CLCK	Changed	C Language	Handles Internet Protocol (IP) table expansion.
CLCR	CLCR	Changed	C Language	Posts events associated with a file descriptor when a system error occurs on the socket.
CLCV	CLCV	New	C Language	Contains the socket cycle-up user exit.
CLZD	CLZK	Changed	C Language	Corrects parsing of the ZCLAW commands.
CLZE	CLZK	Changed	C Language	Corrects parsing of the ZCLAW commands.
CLZF	CLZK	Changed	C Language	Corrects parsing of the ZCLAW commands.
CLZG	CLZK	Changed	C Language	Corrects parsing of the ZCLAW commands.
CLZJ	CLZK	Changed	C Language	Corrects parsing of the ZCLAW commands.
CLZK	CLZK	Changed	C Language	Corrects parsing of the ZCLAW commands.
CLZL	CLZL	Changed	C Language	Corrects parsing of the ZCLAW commands.
CLZK	CLZK	Changed	C Language	Corrects parsing of the ZCLAW commands.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 193 on page 263 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 193. Changes to Copy Members for TCP/IP Full-Duplex Socket Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CLWP	Control Program	CCLAW3	Changed	Discards responses to socket application programming interface (API) requests that have timed out.
CLWX	Control Program	CCLAW3	Changed	Allows ECBs to hold records when an ECB is suspended during CLAW API processing.
CLW8	Control Program	CCLAW3	Changed	Picks up the I-stream number from the IUCV header for most socket API responses during RECEIVE complete subrequest processing.
CT15	Control Program	CCCTIN	Changed	Recalculates sizes of CLAW areas to account for new socket thread support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 194 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 194. Changes to Communication Macros and Statements for TCP/IP Full-Duplex Socket Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 195 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 195. Changes to Data Macros for TCP/IP Full-Duplex Socket Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
EB0EB	Changed	No
ICLAWP	Changed	No
ICLCFG	Changed	No
ISCDT	New	Not Applicable
ISCFDT	Changed	No
ISIPT	New	Not Applicable
ISIUCV	Changed	No
ISTHR	New	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: Table 196 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 196. Changes to Selected Equate Macros for TCP/IP Full-Duplex Socket Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CLAWC	Changed	No
ECBEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 197 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 197. Changes to SIP Skeleton and Internal Macros for TCP/IP Full-Duplex Socket Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 198 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 198. Changes to SIP Stage II Macros for TCP/IP Full-Duplex Socket Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 199 on page 265 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 199. Changes to Segments for TCP/IP Full-Duplex Socket Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLC0	Real-Time Assembler	Not Applicable	Changed	Socket/CLAW Restart; initializes tables and blocks.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 200. Changes to ECB User Exits for TCP/IP Full-Duplex Socket Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Socket Cycle-Up User Exit	CLCA	CLCV	New	Allows you to activate all of your socket server applications at one time.

Functional and Operational Changes

There are no changes.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

Use the SNAKEY macro to define the size of the main storage variables used by the TCP/IP offload support. The maximum value that you can define for the number of TPF Internet Protocol (IP) entries using the CLAWIP parameter has increased to 6804. See *TPF Transmission Control Protocol/Internet Protocol* for information about determining values for these parameters.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 201 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 201. Changes to TPF Publications for TCP/IP Full-Duplex Socket Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF05	Updated to reflect changes in the SNAKEY macro.
<i>TPF Library Guide</i>	GTPDOC05	Updated with definitions for new terminology in the master glossary.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG05	Updated with migration considerations for TCP/IP full-duplex socket support.
<i>TPF Operations</i>	GTPOPR05	Updated with information about displaying the values set by the SNAKEY macro.
<i>TPF System Installation Support Reference</i>	GTPINR05	Updated to document the new socket cycle-up user exit.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW01	Updated with information about the new value for the CLAWIP parameter, calculating the total number of bytes required by the TPF 4.1 system for control block structures, user exits, and multiple ECB support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install the TCP/IP full-duplex socket support in your TPF 4.1 system.

1. Ensure TCP/IP offload support (APAR PJ21791) is installed:
 - If TCP/IP offload support (APAR PJ21791) is installed already, continue with step 2
 - If TCP/IP offload support (APAR PJ21791) is **not** installed already, follow the procedure “Migration Scenarios” on page 239 in “Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)” on page 221 to do so. Then, return here and continue with step 2.
2. Update the socket cycle-up user exit (CLCA). See *TPF System Installation Support Reference* for more information about this user exit.
3. Use the SNAKEY macro to define the following information in keypoint record 2 (CTK2):

- Number of CLAW adapters using the CLAWADP parameter
- Number of file descriptors using the CLAWFD parameter
- Number of local Internet Protocol (IP) addresses using the CLAWIP parameter.

See *TPF Transmission Control Protocol/Internet Protocol* for information about the values to specify for these parameters. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

4. Load the updated keypoint record 2 (CTK2) to a processor in the TPF 4.1 system.
5. Recompile all changed ISO-C DLMS, prelink, link-edit, and reload. See "Interface Changes" on page 260 for more information about the updated ISO-C programs.
6. Run the system allocator (SALO) to include the new CLCV segment.
7. Reassemble the CCLAW3 CSECT, CCCTIN.
8. Link-edit the control program (CPS0).
9. Link-edit the COMX library because of changes to the library members.
10. Reassemble the new assembler segments found in "Interface Changes" on page 260.
11. Perform an initial program load (IPL).

Message Queue Interface (MQI) Client (APAR PJ22434)

The following section discusses the migration considerations for the Message Queue Interface (MQI) client.

Prerequisite APARs

See the APEDIT for APAR PJ22434 for information about prerequisite APARs.

Functional Overview

This new function implements an MQSeries client on the TPF 4.1 system. With this function, TPF applications can now interact with MQSeries applications running on several different platforms using a messaging and queuing model for communication services. The MQSeries client gives TPF applications access to the standard message queue interface (MQI), supported by other MQSeries product offerings. A complete description of the MQI is contained in the *MQSeries Message Queue Interface Technical Reference*. Specifics about MQI clients is found in *MQSeries Clients* and *MQSeries Distributed Queue Management Guide*.

Architecture

This MQSeries client implementation is based on the standard MQSeries client server interface used by other MQSeries product offerings. An ISO-C interface is provided for the 11 functions that make up the MQI. The MQI client function is shipped as a new ISO-C library, with the 11 functions implemented as external functions in this library. The MQI client uses LU 6.2 sessions, through Common Programming Interface for Communications (CPI-C), to connect with remote MQI queue managers that are capable of running the MQ series function, therefore, a systems network architecture (SNA) connection between the TPF 4.1 system and MQ series system is required.

To support the MQI client, 5 new commands are provided. The ZMQID ALTER, ZMQID DEFINE, ZMQID DELETE, and ZMQID DISPLAY commands, which are used to maintain the MQI channel directory, and the ZMQIT command, which is used to assist in debugging MQI application problems.

MQSeries clients use MQI channels to communicate with MQ series. A channel definition must be created at both the MQI client and server ends of the connection. The MQI channel directory is where the TPF 4.1 system maintains a maximum of 50 channel definitions.

You can configure the TPF 4.1 system to run with a variable size MQI trace table by specifying the MQITRC keyword on the SNAKEY macro when defining keypoint 2 (CTK2). When the MQI trace table is defined to the TPF 4.1 system, all MQI function call requests and responses are logged to the table by the MQI client. The ZMQIT command can then be used to display entries in this table.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with the MQI client, you must establish the required operating environment. The following section describes hardware and software requirements specific to the MQI client.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for SNA-Based Communication: The MQI client requires LU 6.2 sessions to establish connections with an MQ series. SNA network definitions must be updated to define the TPF 4.1 system and remote MQI queue manager to each other, before the MQI client can be processed successfully on the TPF 4.1 system. See *TPF ACF/SNA Network Generation* and *TPF ACF/SNA Data Communications Reference* for more information about how to define and start LU 6.2 sessions.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 202 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 202. Changes to Build Scripts for the MQI Client

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMQIBS	DLM	New	Build script for the MQI client library.
CMQ1BS	DLM	New	Build script for the function to initialize the MQI trace table.
CMQ2BS	DLM	New	Build script for all functions required to process the ZMQID commands.
CMQ3BS	DLM	New	Build script for all functions required to process the ZMQIT command.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 203 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 203. Changes to General Use C Language Header Files for the MQI Client

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
amqcccha.h		X	New	Yes
amqcccha.h		X	New	Yes
amqccxha.h		X	New	Yes

Table 203. Changes to General Use C Language Header Files for the MQI Client (continued)

General Use C Language Header File	TARGET (TPF)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
amqrfpha.h		X	New	Yes
amqrrcha.h		X	New	Yes
amqrriha.h		X	New	Yes
amqrrxha.h		X	New	Yes
amqxdvha.h		X	New	Yes
amqxecha.h		X	New	Yes
amqxeeha.h		X	New	Yes
cmqc.h		X	New	Yes
cmqxc.h		X	New	Yes
c\$ck2sn.h	X	X	Changed	No
c\$imqt.h		X	New	Yes
c\$mqcd.h		X	New	Yes
c\$mqpr.h		X	New	Yes
tpfparse.h		X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 204 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 204. Changes to Library Interface Scripts for the MQI Client

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CMQIXV	New	The library interface script for the MQI client library. An entry for each of the 11 MQI functions is contained in this library interface script.

Library Members (Object Files): Table 205 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 205. Changes to Library Members (Object Files) for the MQI Client

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CMCSLL	CTAL	Changed	Assembler	Added code to clear the LU 6.2 deallocation cleanup indicator field kept in the entry control block (ECB), before trying to allocate a conversation control block (CCB). This corrects a potential CTL-1 problem that can occur when a single ECB issues multiple CMINIT function calls.
CQCCCX	CMQI	New	C Language	The internal MQI client functions that interface with external communication services provided by the TPF 4.1 system.

Table 205. Changes to Library Members (Object Files) for the MQI Client (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CQCCIC	CMQI	New	C Language	The internal MQI client functions that interface with the TPF 4.1 system Common Programming Interface for Communications (CPI-C) functions.
CQCCMX	CMQI	New	C Language	The internal MQI client functions that manage memory allocations for communication services.
CQCLIB	CMQI	New	C Language	The internal MQI client functions that initialize communication services.
CQEXIT	CMQI	New	Assembler	The internal MQI client functions that activate the message channel agent (MCA) user exit functions.
CQREXT	CMQI	New	C Language	The internal MQI client functions that manage the MCA user exit interface.
CQRFPT	CMQI	New	C Language	The internal MQI client functions that implement the MQI client-server protocols.
CQRMSS	CMQI	New	C Language	The internal MQI client functions that initialize the MQI channel connection.
CQRREQ	CMQI	New	C Language	The MQI client external interface.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 206 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 206. Changes to Members (Object Files) for the MQI Client

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CMQI01	CMQ1	New	C Language	The function to initialize the MQI trace table.
CMQI03	CMQ3	New	C Language	All the functions required to process the ZMQIT command.
CNMQD	CMQ2	New	C Language	Output message processing for the ZMQID commands.
CNMQI	CMQ2	New	C Language	Input message processing for the ZMQID commands.
CNMQJ	CMQ2	New	C Language	All the low level functions required to manage and display the MQI channel directory.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

Table 207 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 207. Changes to Fixed File Records for the MQI Client

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#MQICD	New	The file storage required for the MQI channel directory. This fixed file record can be defined as either processor unique or processor shared.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 208 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 208. Changes to Communication Macros and Statements for the MQI Client

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 209 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 209. Changes to Data Macros for the MQI Client

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 210 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 210. Changes to Selected Equate Macros for the MQI Client

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 211 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 211. Changes to SIP Skeleton and Internal Macros for the MQI Client

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 212 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 276 for a description of other system generation changes you must make.

Table 212. Changes to SIP Stage I Macros and Statements for the MQI Client

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 213 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 213. Changes to SIP Stage II Macros for the MQI Client

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Macros: There are no changes.

System Macros (IBM Use Only): Table 214 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 214. Changes to System Macros (IBM Use Only) for MQI Client

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMDC	Changed	No

System Communication Keypoint (SCK) Generation Macros: There are no changes.

Segments

Table 215 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 215. Changes to Segments for the MQI Client

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSK0	Real-Time Assembler	Not Applicable	Changed	Added code to display the MQITRC value from keypoint 2 (CTK2).
CTKS	Real-Time Assembler	Not Applicable	Changed	Added code to activate the MQI trace table initialization routine, which is CMQ1.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added code to route the ZMQID and ZMQIT commands to CMQ2 and CMQ3 for processing.
FTVA03	Offline C Language	FCTB	Changed	Check for the correct #MQICD RAMFIL definition.

System Equates

There are no changes.

User Exits

Standard MQSeries client support provides 3 user exits that allow you to customize the channel interface, security, send and receive. These exits are referred to as the message channel agent (MCA) exits. The TPF 4.1 system supports the MCA exits available to an MQI client.

The MCA exits are defined and enabled using the ZMQID ALTER or ZMQID DEFINE command. See *TPF Operations* for more information on how to define and enable the MCA exits on the TPF 4.1 system. See *MQSeries Distributed Queue Management Guide* and *TPF System Installation Support Reference* for more information about the MCA exit interface.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 216 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 216. Changes to Commands for the MQI Client

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQID ALTER	New	Alters the MQI channel directory entry.
ZMQID DEFINE	New	Defines the MQI channel directory entry.
ZMQID DELETE	New	Deletes the MQI channel directory entry.
ZMQID DISPLAY	New	Displays the MQI channel directory entries.
ZMQIT	New	Displays the MQI trace table entries.

Table 216. Changes to Commands for the MQI Client (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZNKEY	Changed	Added support to display the number of 4 KB pages defined for the MQI trace table (MQITRC keyword).

Messages and System Errors

Table 217 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 217. Changes to Messages and System Errors for the MQI Client

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQID0011I	Online	New
MQID0012I	Online	New
MQID0013I	Online	New
MQID0014I	Online	New
MQID0015I	Online	New
MQID0016I	Online	New
MQID0091E	Online	New
MQID0092E	Online	New
MQID0093E	Online	New
MQID0094E	Online	New
MQID0095E	Online	New
MQID0097E	Online	New
MQID0098E	Online	New
MQID0099E	Online	New
MQID0100E	Online	New
MQID0101E	Online	New
MQID0102E	Online	New
MQID0103E	Online	New
MQID0104E	Online	New
MQID0105E	Online	New
MQIT0001W	Online	New
MQIT0002W	Online	New
MQIT0003I	Online	New
MQIT0004I	Online	New
007600	System Error	New
007601	System Error	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The new CMQI library requires approximately 50 000 bytes in the core resident program area (CRPA) and 15 #XPRGn records. The three new ISO-C DLMs, which are CMQ1, CMQ2, and CMQ3, require approximately 36 000 bytes in the CRPA and 13 #XPRGn records. See *TPF System Generation* for more information on how to change the size of the CRPA or add #XPRGn records.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 218 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 218. Changes to TPF Publications for the MQI Client

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF05	Updated the description of the SNAKEY macro to include information about the new MQITRC parameter.
<i>TPF Application Programming</i>	GTPAPP05	Updated with a high level description of the MQI client.
<i>TPF C Language Support User's Guide</i>	GTPCLU05	Updated with list of the MQI functions and a pointer to the appropriate MQSeries publications.
<i>TPF Library Guide</i>	GTPDOC05	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added for the MQI client.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG05	Updated with migration considerations for the MQI client.
<i>TPF Operations</i>	GTPOPR05	Updated with information about the commands that were added and changed for the MQI client.
<i>TPF Programming Standards</i>	GTPPSM05	Updated with information about the C header files that were added for the MQI client and do not conform to TPF standards.
<i>TPF System Generation</i>	GTPSYG05	Added information about the MQI channel directory.
<i>TPF System Installation Support Reference</i>	GTPINR05	Updated with information about the ECB control program (CP) user exits that were added for the MQI client.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The message queue interface (MQI) is now available to ISO-C programs. See *MQSeries Message Queue Interface Technical Reference* for a complete description of the message queue interface (MQI).

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

If TPF Advanced Program-to-Program Communications (TPF/APPC) is already installed on the TPF 4.1 system, you can install the MQI client by creating a new image and loading the new and changed programs to that image. See *TPF ACF/SNA Network Generation* and *TPF ACF/SNA Data Communications Reference* for information about how to install and configure TPF/APPC support.

1. Enter the ZIMAG DEFINE command to define a new image using a new program base. See *TPF Operations* for more information about how to define a new image with the ZIMAG DEFINE command .
2. Initialize the new image by doing one of the following:
 - Copy the old image to the new image using the ZIMAG COPY command. See *TPF Operations* for more information about how to copy an old image to a new image with the ZIMAG COPY command .
 - Perform a full load to the new image.
3. Reassemble and recompile all required programs. (Required programs refers to the programs affected by changes discussed earlier in the description of the MQI client.)

Note: The CRFA, CRFD, and CRFK C library source files must be recompiled to pick up the change made to the tpfparse.h C language header file, to increase the maximum size of the parsing grammar.

4. Add the MQITRC parameter (valid values are 1 to 255 4 KB pages) to the SNAKEY macro definition in keypoint 2 (CTK2) and reassemble keypoint 2 (CTK2).
5. Define space for the MQI channel directory by updating the SIP Stage I, defining a RAMFIL definition for 51 #MQICD records, using 4K spare records.
6. Run the file address compute program (FACE) table generator and link the object module to create a new FCTB.
7. Create a new system allocator (SALO) that includes the newly created CMQI, CMQ1, CMQ2, and CMQ3 segments.
8. Recompile and run SALO to create an updated IPAT and SAL table.
9. Run the library interface tool (LIBI) to create the function call stubs for the message queue interface (MQI).
10. Link all the new and changed ISO-C libraries and DLMS, CMQI, CMQ1, CMQ2, CMQ3, CTAL, and CTBX.
11. Define a load deck for the auxiliary loader (ALDR) that includes the following:

- New or updated programs
 - Keypoint 2 (CTK2)
 - New FACE table (FCTB)
 - Updated IPAT.
12. Run the auxiliary loader (ALDR).
 13. Perform a load to the new image using the ZTPLD command.
 14. Enable the new image by entering the ZIMAG ENABLE command.
 15. IPL the TPF 4.1 system and choose the new image as the active image.
 16. IPL any other TPF 4.1 systems that are defined in your complex using the new image as the active image.
 17. Define MQI channel directory entries for each MQI queue manager the MQI client will connect to with the ZMQID DEFINE and ZMQID ALTER commands. See *TPF Operations* and *MQSeries Distributed Queue Management Guide* for more information about defining MQI channel connections.
- Migration is completed.

Additional Migration Considerations for Program Update Tape (PUT) 5

This section discusses the migration considerations for authorized program analysis reports (APARs) other than the small programming enhancements (SPEs) discussed previously.

Information Provided	Where to Go For More Information
Year 2000 APARs	"Year 2000 APARs"
Critical APARs shipped on Program Update Tape (PUT) 5	"Critical APARs"
APARs that correct incorrect APARs shipped on previous PUTs	"APARs that Correct Incorrect APARs Shipped on Previous PUTs" on page 280
APARs that correct incorrect APARs shipped on PUT 5	"APARs that Correct Incorrect APARs Shipped on PUT 5" on page 281

Year 2000 APARs

The TPF 4.1 system is Year 2000 ready with PUT 5. If your TPF 4.1 system is at PUT 3 level, you must apply the APARs listed in Table 219. This table is ordered in numeric order based on the Year 2000 APAR number.

Table 219. Year 2000 APARs

Year 2000 APAR	PUT That Shipped the Year 2000 APAR
PJ17689	PUT 5
PJ20355	PUT 4
PJ22415	PUT 5

Critical APARs

Table 220 summarizes critical APARs shipped on PUT 5. These critical APARs are valid at the time PUT 5 ships and are subject to change later. Please see the APAR response information that accompanies each APAR and your IBM service representative for more information about critical APARs.

This information is presented in numeric order based on the APAR number.

Table 220. Critical APARs Shipped on PUT 5

APAR Number	Description	Base or Feature
PJ18808	External Interrupts Must Be Disabled When Holding SNA Locks	Base
PJ20647	Processes Outgoing CDRM as Incoming; Corrupting RVT	Base
PJ20982	\$MONTC Code Path is Too Long	Base
PJ21027	Problem Running the TPF 4.1 System with IBM VTAM Version 4 Release 3	Base
PJ21224	Recoup Performance Degrades in the TPF 4.1 System	Base
PJ21564	CTC Queues Not Drained Properly Across an IPL	Base
PJ21732	Problems with DASD Modules Being Taken Offline	Base
PJ22032	IBM TPFDF SPMs Added to the TPF 4.1 System	Base
PJ22094	Resynchronization for FMMR-FMMR Session Causes Hung Session	Base
PJ22116	CTL-6DA Out of CLVG	Base
PJ22195	Nonactivation XID error Can Lead to Tight Loop in CP	Base

Table 220. Critical APARs Shipped on PUT 5 (continued)

APAR Number	Description	Base or Feature
PJ22297	CTL-571/572/573 Occur on Loosely Coupled Systems Using LLF	Base
PJ22298	Entire TPF 4.1 System Hung for Over 30 Seconds at a Time	Base
PJ22369	Fallback Problems with IBM 9037s on a Partially Partitioned IBM 9121	High Performance Option (HPO)
PJ22389	Enhancements and Fixes for TCP/IP Offload Support	Base
PJ22415	Clocks Does Not Support Years Starting with 2000	Base
PJ22434	Message Queue Interface (MQI) Client Support	Base
PJ22452	C Function Trace Enhancements — Support for Longname IBM C/370 Compile Option	Base
PJ22478	CTL-05A Error During Capture/Restore Tape Switch	Base
PJ22505	I/O Error During TOPNC Can Cause a CTL-00C	Base
PJ22546	3390 Summary of the File Accesses Per Record ID Report Missing	Base
PJ22565	CTL-004 in Recoup Phases 1 and 3	Base
PJ22572	Input List Lockout May Occur on Multiple ZOLDR ACCEPT Commands	Base
PJ22810	CSD1 Removes Needed Network Addresses from NAT	Base
PJ22814	Problems in SNA Communications and ART	Base
PJ22825	Installing PUT 4 Will Break APPN — Correcting Fix	Base
PJ22878	Provide Support for Enter by Name with Return for ISO-C Support	Base
PJ22896	CTL-001 from CCTAPE at the Start of DDR Processing	Base
PJ22898	More than One MVCL Needed to Clear WGTA	Base
PJ22956	Hung Sessions, New Sessions Cannot be Activated	Base
PJ22971	Broken Chains Should Not Be Written to the RCI Tape	Base
PJ23098	Performance Problem on CTC Links	Base
PJ23178	Resource Control Support	Base
PJ23180	Transmission Control Protocol/Internet Protocol (TCP/IP) Full-Duplex Socket Support	Base
PJ23240	Cannot Load Network Greater than 104857 Definitions	Base

APARs that Correct Incorrect APARs Shipped on Previous PUTs

Table 221 summarizes APARs contained on PUT 5 that fix incorrect APARs shipped with the current PUT or previous PUTs. This table is ordered in numeric order based on the correcting APAR number.

Table 221. APARs Correcting Incorrect APARs Shipped on Previous PUTs — PUT 5

Correcting APAR Number (PUT 5)	Incorrect APAR Number	PUT That Shipped the Incorrect APAR
PJ20516	PJ14843	PUT 2
PJ21283	PJ17852	PUT 2
PJ21707	PJ17912	PUT 2
PJ21710	PJ13765	PUT 2
PJ21768	PJ17852	PUT 2
PJ21906	PJ15116	PUT 3
PJ22098	PJ19949	PUT 3
PJ22099	PJ17852	PUT 2

Table 221. APARs Correcting Incorrect APARs Shipped on Previous PUTs — PUT 5 (continued)

Correcting APAR Number (PUT 5)	Incorrect APAR Number	PUT That Shipped the Incorrect APAR
PJ22195	PJ19949	PUT 3
PJ22243	PJ17912	PUT 2
PJ22297	PJ21313	PUT 4
PJ22300	PJ19422	PUT 3
PJ22303	PJ19949	PUT 3
PJ22305	PJ13765	PUT 2
PJ22313	PJ17852	PUT 2
PJ22389	PJ21791	PUT 4
PJ22523	PJ17852	PUT 2
PJ22524	PJ17852	PUT 2
PJ22614	PJ19688	PUT 3
PJ22640	PJ17852	PUT 2
PJ22670	PJ17852	PUT 2
PJ22707	PJ21313	PUT 4
PJ22720	PJ21044	PUT 4
PJ22793	PJ21313	PUT 4
PJ22805	PJ19480	PUT 3
PJ22825	PJ21044	PUT 4
PJ22839	PJ19966	PUT 3
PJ22855	PJ21266	PUT 4
PJ22876	PJ19966	PUT 3
PJ22909	PJ21596	PUT 4
PJ22992	PJ17912	PUT 2
PJ22992	PJ17912	PUT 2
PJ23108	PJ21791	PUT 4
PJ23128	PJ21791	PUT 4

APARs that Correct Incorrect APARs Shipped on PUT 5

Table 222 summarizes APARs contained on PUT 5 that fix incorrect APARs also shipped on PUT 5. This table is ordered in numeric order based on the correcting APAR number.

Table 222. APARs Correcting Incorrect APARs Shipped on PUT 5

Correcting APAR Number (PUT 5)	Incorrect APAR Number (PUT 5)	PUT That Shipped the Incorrect APAR
PJ23148	PJ17689	PUT 5
PJ23318	PJ21907	PUT 5
PJ22910	PJ22452	PUT 5
PJ23325	PJ22958	PUT 5

Program Update Tape 6 (PUT 6)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 6 (PUT 6).

SPE	Where to Go For More Information
3590 Support	"3590 Support (APAR PJ24563)" on page 284
TPF Application Requester Enhancements	"TPF Application Requester Enhancements (APAR PJ23931)" on page 294
Trace Information in the C Function Trace Table	"Trace Information in the C Function Trace Table (APAR PJ23493)" on page 308
C main() Support	"C main() Support (APAR PJ24472)" on page 316
Threads Precursor	"Threads Precursor (APAR PJ24530)" on page 324
Transmission Control Protocol/Internet Protocol (TCP/IP) Resource Management	"Transmission Control Protocol/Internet Protocol (TCP/IP) Resource Management (APAR PJ24525)" on page 333

In addition, migration considerations are included for the following types of Authorized Program Analysis Reports (APARs):

- Critical APARs shipped on PUT 6
- APARs that correct incorrect SPE APARs shipped on PUT 6 and previous PUTs
- APARs that correct incorrect APARs shipped on previous PUTs.
- APARs that correct incorrect APARs shipped on PUT 6.

See "Additional Migration Considerations for Program Update Tape (PUT) 6" on page 343 for more information about the migration considerations for these APARs.

TPF 4.1 PUT 6 is compiled with the IBM C/C++ for MVS/ESA Version 3 Release 2, IBM OS/390 C/C++ Version 1 Release 2, and IBM OS/390 C/C++ Version 1 Release 3 compilers. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

3590 Support (APAR PJ24563)

The following section discusses the migration considerations for 3590 support.

Prerequisite APARs

See the APEDIT for APAR PJ24563 for more information about prerequisite APARs.

Functional Overview

3590 support exploits the functions provided by the IBM 3590 tape control unit and the IBM 3590 tape devices. IBM 3590 tape control units and tape devices provide the following performance, capacity, and error rate improvements:

- Data rate of 9 MB for each second (3 times the data rate of an IBM 3490E tape device)
- Cartridge capacity of 10–40 GB (25 times the capacity of an IBM 3490E tape cartridge)
- 33 percent improved data compaction algorithm
- Improved error rates because of an improved media, recording techniques, error detection, and error correction methods.

Architecture

3590 support allows the new IBM 3590 tape devices to function on a TPF 4.1 system. This support incorporates any code changes that are required by the new tape architecture.

Also, 3590 support changes the way tapes are described. Instead of describing tapes in terms of density, tapes are now described in terms of format. For example, an IBM 3480 tape was said to have a density of 38 K. It is now said to have a format with an operating density of 38 K. While this does not seem to be much of a change, the change is more apparent when discussing IBM 3590 tapes. IBM 3590 tapes have a format of 16X128; that is, 16 tracks for each pass with a total of 128 tracks on the tape.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with 3590 support, you must establish the required operating environment. The following section describes hardware and software requirements specific to 3590 support.

Operating Environment Requirements and Planning Information provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Storage Devices: The following section discusses tape unit storage devices.

Tape Units: A TPF installation requires an IBM 3590 control unit (licensed internal code (LIC) level 1.7.12 or later) and IBM 3590 tape drives (LIC level 81EA or later). If you plan to attach the IBM 3590 tape devices to an IBM 3494 tape library manager, the IBM 3494 tape library manager LIC must be level LM512.05 or later.

Software (Programming Requirements)

The following section contains information about software requirements.

If you plan to use IBM 3590 tape devices for offline batch or utility functions, you need IBM MVS/SP Version 4 Release 3, Version 5 Release 1, or Version 5 Release 2 and DFSMS Version 1 Release 2.0 with 3590-support PTFs installed on an IBM MVS system.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 223 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 223. Changes to Copy Members for 3590 Support

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where CP Copy Member Is Located	Description of Change
CAAA	Control Program	CCNUCL	Changed	Updated for 3590 support.
CAPT	Control Program	CCNUCL	Changed	Updated for 3590 support.
CEDT	Control Program	CCCPSF	Changed	Updated for 3590 support.
CEFA	Control Program	CCTAPE	Changed	Updated for 3590 support.
CEFB	Control Program	CCTAPE	Changed	Updated for 3590 support.
CEFE	Control Program	CCTAPE	Changed	Updated for 3590 support.
CEFM	Control Program	CCTAPE	Changed	Updated for 3590 support.
CEFR	Control Program	CCTAPE	New	Added for 3590 support.
CEFS	Control Program	CCTAPE	Changed	Updated for 3590 support.
CEFT	Control Program	CCTAPE	Changed	Updated for 3590 support.
CEFZ	Control Program	CCTAPE	Changed	Updated for 3590 support.
CPSF	Control Program	CCCPSF	Changed	Updated for 3590 support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 224 on page 286 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 224. Changes to Data Macros for 3590 Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ITERP	New	No
ITSTB	Changed	No
ITSWB	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 225 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 225. Changes to Selected Equate Macros for 3590 Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
TAPEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 226 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 226. Changes to SIP Skeleton and Internal Macros for 3590 Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 227 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 227. Changes to SIP Stage II Macros for 3590 Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Systems Network Architecture (SNA) Communication Macros and Statements: There are no changes.

Segments

Table 228 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 228. Changes to Segments for 3590 Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCTAPE	CSECT	CPS0	Changed	Updated for 3590 support.
CORK	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSA	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSB	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSD	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSE	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSF	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSG	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSI	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSK	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSL	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSM	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSO	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSP	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSQ	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSR	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COSZ	Real-Time Assembler	Not Applicable	New	Added for 3590 support.
COS3	Real-Time Assembler	Not Applicable	New	Added for 3590 support.
COS9	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTA	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTC	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTD	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.

Table 228. Changes to Segments for 3590 Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
COTG	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTI	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTJ	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTK	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTL	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTM	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTO	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTR	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTS	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTU	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.
COTZ	Real-Time Assembler	Not Applicable	Changed	Updated for 3590 support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 229 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 229. Changes to Commands for 3590 Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZTINT	Changed	Added the new F, F38K, F38K2, and F16X128 format parameters.
ZTLBL	Changed	Added the new F, F38K, F38K2, and F16X128 format parameters.
ZTMNT	Changed	Added the new F, F38K, F38K2, and F16X128 format parameters.

Messages and System Errors

Table 230 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 230. Changes to Messages and System Errors for 3590 Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CEFR0179E	Online	New
CEFR0180E	Online	New
CEFR0187E	Online	New
CEFR0204E	Online	New
CEFR0233E	Online	New
CEFR0239E	Online	New
CEFR0245E	Online	New
CEFR0252E	Online	New
CEFR0266W	Online	New
CEFR0276E	Online	New
CEFR0278E	Online	New
CEFR0279E	Online	New
CEFR0315E	Online	New
CEFR0316E	Online	New
CEFR0317E	Online	New
CEFR0318E	Online	New
CEFR0319E	Online	New
CEFR0320E	Online	New
CEFR0321E	Online	New
CEFR0323E	Online	New
CEFR0325E	Online	New
CEFR0326E	Online	New
CEFR0327E	Online	New
CEFR0328E	Online	New
CEFR0329E	Online	New
CEFR0330E	Online	New
CEFR0331E	Online	New
CEFR0332E	Online	New
CEFR0333E	Online	New
CEFR0334E	Online	New
CEFR0335E	Online	New

Table 230. Changes to Messages and System Errors for 3590 Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CEFR0336E	Online	New
CEFR0337E	Online	New
CEFR0338E	Online	New
CEFR0339E	Online	New
CEFR0340E	Online	New
CEFR0341I	Online	New
CEFR0342E	Online	New
CEFR0343E	Online	New
CEFR0344E	Online	New
CEFR0345E	Online	New
CEFR0346I	Online	New
CEFR0347W	Online	New
CEFR0348W	Online	New
CEFR0349E	Online	New
CEFR0350I	Online	New
CEFR0351W	Online	New
CEFR0352W	Online	New
CEFR0353E	Online	New
CEFR0354I	Online	New
CEFR0355W	Online	New
CEFR0356W	Online	New
CEFR0357E	Online	New
CEFR0358I	Online	New
CEFR0359W	Online	New
CEFR0360W	Online	New
CEFR0361E	Online	New
CEFR0362I	Online	New
CEFR0363I	Online	New
CEFR0365I	Online	New
CEFR0366I	Online	New
CEFR0367E	Online	New
CEFR0368E	Online	New
CEFR0369E	Online	New
CEFR0370I	Online	New
CEFR0371I	Online	New
CEFR0378E	Online	New
CEFR0379W	Online	New
COSA0139W	Online	No Longer Supported
COSA0297W	Online	New
COSB0148W	Online	No Longer Supported
COSB0196E	Online	No Longer Supported
COSB0296E	Online	New
COSB0298W	Online	New
COSE0119I	Online	No Longer Supported

Table 230. Changes to Messages and System Errors for 3590 Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
COSE0299I	Online	New
COSE0312E	Online	New
COSK0372E	Online	New
COSK0374E	Online	New
COSK0375E	Online	New
COTC0080A	Online	No Longer Supported
COTC0128I	Online	No Longer Supported
COTC0129I	Online	No Longer Supported
COTC0300A	Online	New
COTC0301I	Online	New
COTC0302I	Online	New
COTE0001I	Online	No Longer Supported
COTE0002I	Online	New
COTG0080A	Online	No Longer Supported
COTG0300A	Online	New
COTI0004E	Online	No Longer Supported
COTI0009I	Online	No Longer Supported
COTI0016E	Online	Changed
COTI0295I	Online	New
COTI0303E	Online	New
COTI0304I	Online	New
COTJ0044I	Online	No Longer Supported
COTJ0313I	Online	New
COTJ0314I	Online	New
COTK0060E	Online	No Longer Supported
COTK0061E	Online	No Longer Supported
COTK0305E	Online	New
COTK0373E	Online	New
COTL0001I	Online	No Longer Supported
COTL0002I	Online	New
COTM0004E	Online	No Longer Supported
COTM0023W	Online	No Longer Supported
COTM0032E	Online	No Longer Supported
COTM0033W	Online	No Longer Supported
COTM0036E	Online	No Longer Supported
COTM0046I	Online	No Longer Supported
COTM0161E	Online	No Longer Supported
COTM0199E	Online	No Longer Supported
COTM0295I	Online	New
COTM0303E	Online	New
COTM0306W	Online	New
COTM0307E	Online	New
COTM0308W	Online	New
COTM0309E	Online	New

Table 230. Changes to Messages and System Errors for 3590 Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
COTM0310I	Online	New
COTM0311E	Online	New
COTM0312E	Online	New
COTS0300A	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 231 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 231. Changes to TPF Publications for 3590 Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Library Guide</i>	GTPDOC06	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for 3590 support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG06	Updated with migration considerations for 3590 support.
<i>TPF Operations</i>	GTPOPR06	Updated with information about the commands that were added and changed for 3590 support.
<i>TPF System Generation</i>	GTPSYG06	Added information for 3590 support.
<i>TPF System Installation Support Reference</i>	GTPINR06	Added information for 3590 support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

To verify that 3590 support is active, create a tape label with a format of F16X128. If you are successful, 3590 support is active.

Migration Scenarios

Use the new generic unit name of 3590-1 for offline IBM MVS processing. This generic unit name is used for the IBM 3590 tape drive in JCL, HCD dialog, and on different interactive screen management facility (ISMF) panels. In addition, this generic unit name is incompatible with other tape devices.

In the new MVS default device preference table, the position of the IBM 3590 devices is as follows:

1. 3590-1
2. 3490
3. 3480.

See the appropriate IBM 3590 hardware publications for planning, installation, configuration, and performance considerations.

TPF Application Requester Enhancements (APAR PJ23931)

The following section discusses the migration considerations for TPF Application Requester Enhancements. Also see the *TPF Application Requester User's Guide* for migration information.

Prerequisite APARs

See the APEDIT for APAR PJ23931 for information about prerequisite APARs.

Functional Overview

TPF Application Requester Enhancements adds capabilities for TPF Application Requester (TPFAR) programs using databases on IBM RISC System/6000 (IBM RS/6000) and IBM Personal System/2 (IBM PS/2) platforms (or on other distributed relational database architecture (DRDA) level-1 compliant platforms). TPF Application Requester Enhancements implements:

- Dynamic structured query language (SQL) verbs and the Set PackageSet verb
- Run-time binding of packages, which are SQL control structures
- Expanded character representations made available by code page support
- Additional diagnostic information from the SQL communications area (SQLCA).

Architecture

With TPF Application Requester Enhancements, TPF applications using SQL functions can connect with IBM DATABASE 2 (IBM DB2) on IBM RS/6000 and IBM PS/2 platforms. This is done by accounting for the byte order and numerical representations of the different platforms during flow interchanges (FD0CA).

Run-time binding of database resource management (DBRM) information occurs while an application is running. When an application containing SQL statements has not been bound, IBM DB2 does not have an execution package associated with the application. When the application tries to connect to IBM DB2, an error is returned indicating that there is no package. The TPF 4.1 system receives this error and tries to provide the application package information at run time. This involves reading DBRM information appended to the application segment and sending it to IBM DB2 with a request to bind. IBM DB2 binds the package; then, the TPF 4.1 system issues a new connect request, which is accepted because the package is now bound. Run-time binding is only available for programs written in ISO-C and not assembler.

The TPF support for coded character set IDs (CCSIDs) other than CCSID 500 involves the use of tools and data supplied by the IBM SAA AD/Cycle Language Environment (LE/370) C language function `iconv` and the GENXLT process. Code sets are defined by an offline process involving the GENXLT process. A table of defined code sets is loaded to the online TPF 4.1 system. The ZSQLD command is used to specify code sets to be used on the TPF 4.1 system and on the remote database. The TPF 4.1 system exchanges its requirements for character representation with the remote database server and, provided there is a translation mechanism available, translates from one character representation to another. The numerical representations and byte-order characteristics associated with standard platform architectures are also supported.

Dynamic SQL support enables preparation of SQL statements at run time instead of having prepared statements embedded in source programs. The following SQL verbs are supported:

- DESCRIBE
- EXECUTE
- EXECUTE IMMEDIATE
- PREPARE.

Additional diagnostic fields have been added to the SQL trace table. The diagnostic information found in the SQLCA is saved in an expanded SQL trace entry and can be displayed by entering the ZSTTD command with the DET parameter specified.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF Application Requester Enhancements, you must establish the required operating environment. The following section describes hardware and software requirements specific to TPF Application Requester Enhancements.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for SNA-Based Communication: The TPF 4.1 system uses TPF Advanced Peer-to-Peer Networking (TPF/APPN) support to communicate with IBM RS/6000 and IBM PS/2 platforms.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 232 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 232. Changes to Build Scripts for TPF Application Requester Enhancements

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CISOBS	DLM	Changed	Added the <code>iconv</code> C language function.
CPGSBS	DLM	New	Builds the coded character set support table.
CPG0BS	DLM	New	Builds a coded character set, which is 819–500 initially.
CPG1BS	DLM	New	Builds a coded character set, which is 819–500 initially.

Table 232. Changes to Build Scripts for TPF Application Requester Enhancements (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CPG2BS	DLM	New	Builds a coded character set, which is 819–500 initially.
CPG3BS	DLM	New	Builds a coded character set, which is 819–500 initially.
CPG4BS	DLM	New	Builds a coded character set, which is 819–500 initially.
CPG5BS	DLM	New	Builds a coded character, which is 850–1047 initially.
CPG6BS	DLM	New	Builds a coded character set, which is 850–500 initially.
CPG7BS	DLM	New	Builds a coded character set, which is 932–290 initially.
CPG8BS	DLM	New	Builds a coded character set, which is 932–300 initially.
CPG9BS	DLM	New	Builds a coded character set, which is 932–930 initially.
CRDABS	DLM	New	Added for run-time binding and dynamic SQL support, converted to ISO-C support and repackaged in a dynamic load module (DLM).
CREABS	DLM	New	Added for run-time binding and dynamic SQL support, converted to ISO-C support and repackaged in a DLM.
CTBXBS	DLM	Changed	Changed for more robust parsing of wildcard characters.
CRDQBS	DLM	New	Added for the database support structure.
CRDRBS	DLM	New	Added for the database support structure.
CRDUBS	DLM	New	Added for command support.
CRDWBS	DLM	New	Added for command support.

Dynamic Load Module (DLM) Stubs: Table 233 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 233. Changes to Dynamic Load Module (DLM) Stubs for TPF Application Requester Enhancements

DLM Stub	New, Changed, or No Longer Supported?
CPGS	New
CRDA	New
CRDQ	New
CRDR	New
CREA	New
CYYA	New

General Use C Language Header Files: Table 234 on page 297 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 234. Changes to General Use C Language Header Files for TPF Application Requester Enhancements

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn	Changed	Yes
c\$dbrm.h	New	Yes
c\$dbzac	Changed	Yes
c\$dbzdc	Changed	Yes
c\$icnv	New	Yes
c\$icracb	Changed	Yes
c\$iddmeq	Changed	Yes
c\$idir	Changed	Yes
c\$ifdo	Changed	Yes
c\$irdicb	Changed	Yes
c\$isddcb	Changed	Yes
c\$ismtcb	Changed	Yes
c\$isq1	Changed	Yes
c\$isq1mc	Changed	Yes
c\$istpcb	Changed	Yes
c\$tar0.h	Changed	Yes
timeinci	Changed	Yes
tpfar	Changed	Yes
tpfarapi	Changed	Yes

Implementation-Specific C Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 235 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 235. Changes to Library Interface Scripts for TPF Application Requester Enhancements

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	The CICON, CSNAM, CCSIDC, and C390CN functions were added to support multiple CCSIDs.

Library Members (Object Files): Table 236 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 236. Changes to Library Members (Object Files) for TPF Application Requester Enhancements

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CCSIDC	CISO	New	C Language	Added support for iconv functional conversion of code pages.
CICON	CISO	New	C Language	Added the iconv, iconv_open, iconv_close functions.

Table 236. Changes to Library Members (Object Files) for TPF Application Requester Enhancements (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CRFB	CTBX	Changed	C Language	Added support for more robust wildcard character processing.
CRFG	CTBX	Changed	C Language	Added support for more robust wildcard character processing.
CSNAM	CISO	New	C Language	Added support for using multiple code pages at run time.
C390CN	CISO	New	C Language	Added support for byte conversions.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 237 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 237. Changes to Members (Object Files) for TPF Application Requester Enhancements

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CENTPT	CPG0 CPG1 CPG2 CPG3 CPG4 CPG5 CPG6 CPG7 CPG8 CPG9	New	C Language	Changes made for NOVA/LEDT support.
CPGS	CPGS	New	C Language	Code added for code page list and tables.
CRDA	CRDA	Changed	C Language	Changes incorporating the set current package set; modifications for use with ISO-C support; implementation of dynamic SQL; updates for run-time binding.
CRDB	CRDA	Changed	C Language	Changes incorporating the set current package set; modifications for use with ISO-C support.
CRDC	CRDA	Changed	C Language	Changes incorporating the set current package set; modifications for use with ISO-C support; updates for run-time binding.

Table 237. Changes to Members (Object Files) for TPF Application Requester Enhancements (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CRDE	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CRDF	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CRDG	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CRDH	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and support for multiple CCSIDs.
CRDI	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and support for multiple CCSIDs.
CRDJ	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support; implementation of dynamic SQL; updates for run-time binding and support for multiple CCSIDs.
CRDK	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and support for multiple CCSIDs.
CRDL	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CRDM	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CRDN	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CRDO	CRDU CRDA	Changed	C Language	Added coding for expanded diagnostic support; modifications for use with ISO-C support.
CRDP	CRDU CRDA	Changed	C Language	Added coding for expanded diagnostic support; modifications for use with ISO-C support.
CRDQ	CRDQ	Changed	C Language	Modifications for use with ISO-C support.
CRDR	CRDR	Changed	C Language	Modifications for use with ISO-C support.
CRDS	CRDA	Changed	C Language	Implementation of run-time binding.
CRDT	CRDA CREA	Changed	C Language	Implementation of run-time binding.
CRDU	CRDU	Changed	C Language	Added coding for expanded diagnostic support.
CRDV	CRDU	Changed	C Language	Added coding for expanded diagnostic support.
CRDW	CRDW	Changed	C Language	Added coding for expanded diagnostic support.
CRDX	CRDW	Changed	C Language	Added coding for expanded diagnostic support.
CRDZ	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and support for multiple CCSIDs.

Table 237. Changes to Members (Object Files) for TPF Application Requester Enhancements (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CREA	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support; implementation of run-time binding; implementation of dynamic SQL.
CREB	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREC	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CRED	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREG	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREH	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREI	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and support for multiple CCSIDs.
CREJ	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support; implementation of run-time binding; implementation of dynamic SQL.
CREK	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support; implementation of run-time binding; implementation of dynamic SQL.
CREL	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREM	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and support for multiple CCSIDs.
CREN	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and conversion of numeric representations.
CREO	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and implementation of dynamic SQL.
CREP	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and conversion of numeric representations.
CREQ	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and conversion of numeric representations.
CRER	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and conversion of numeric representations.
CRES	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and support for multiple CCSIDs.
CRET	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and conversion of numeric representations.

Table 237. Changes to Members (Object Files) for TPF Application Requester Enhancements (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CREU	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREV	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and conversion of numeric representations.
CREW	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support and conversion of numeric representations.
CREX	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREY	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CREZ	CRDA CREA	Changed	C Language	Modifications for use with ISO-C support.
CTOD	CRDA CREA	Changed	C Language	Changed the #pragma map name.
UAR1	CRDA CREA	Changed	C Language	Changed commentary.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 238 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 238. Changes to Copy Members for TPF Application Requester Enhancements

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Changed	Modifications for hot cons.
CDR0	CCNUCL	Changed	Added the relational database name to the distributed data manager flow.	
CDR1	Control Program	CCNUCL	Changed	Added non-S370 numeric data formats to the distributed data manager flow.
CICS	Control Program	CCNUCL	Changed	Added the CATRDB field to the functional support console.
CRD5	Control Program	CCNUCL	Changed	Modifications for use with ISO-C support.
CT15	Control Program	CCCTIN	Changed	Sets an indicator to show an expanded SQL directory is in use.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 239 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 239. Changes to Data Macros for TPF Application Requester Enhancements

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
CK2SN	Changed	Yes
CR0AT	Changed	Yes
IRDICB	Changed	Yes
ISDDCB	Changed	Yes
ISMTCB	Changed	Yes
ISTPCB	Changed	Yes
WO0RK	Changed	Yes

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 240 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 240. Changes to SIP Skeleton and Internal Macros for TPF Application Requester Enhancements

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 241 on page 303 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 241. Changes to SIP Stage II Macros for TPF Application Requester Enhancements

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 242 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 242. Changes to System Macros (IBM Use Only) for TPF Application Requester Enhancements

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes

Segments

Table 243 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 243. Changes to Segments for TPF Application Requester Enhancements

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSNMC	Offline Assembler	Not Applicable	Changed	Added for code page support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 244 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 244. Changes to Commands for TPF Application Requester Enhancements

Commnd	New, Changed, or No Longer Supported?	Description of Change
ZSQLD	Changed	Added the TPFCCSID and SELECT parameters.

Table 244. Changes to Commands for TPF Application Requester Enhancements (continued)

Commnd	New, Changed, or No Longer Supported?	Description of Change
ZSTTD	Changed	Added the DETAIL TRACE parameter.

Messages and System Errors

Table 245 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 245. Changes to Messages and System Errors for TPF Application Requester Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DB2P0001E	Offline	Changed
DB2P0002E	Offline	Changed
DB2P0003E	Offline	Changed
DB2P0003W	Offline	No Longer Supported
DB2P0004W	Offline	Changed
DB2P0005W	Offline	Changed
DB2P0006E	Offline	Changed
DB2P0006W	Offline	No Longer Supported
DB2P0007E	Offline	Changed
DB2P0007W	Offline	No Longer Supported
DB2P0008E	Offline	Changed
DB2P0008W	Offline	No Longer Supported
DB2P0009E	Offline	New
DB2P0010E	Offline	New
DB2P0053W	Offline	New
SQLD0012I	Online	No Longer Supported
SQLD0013I	Online	No Longer Supported
SQLD0017I	Online	New
SQLD0018I	Online	New
SQLD0081I	Online	New
SQLD0082E	Online	New
SQLD0083E	Online	New
SQLD0084E	Online	New
SQLD0085E	Online	New
SQLD0086I	Online	New
SQLD0087I	Online	New

Table 245. Changes to Messages and System Errors for TPF Application Requester Enhancements (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SQLD0088I	Online	New
SQLD0089E	Online	New
SQLD0098E	Online	New

Performance or Tuning Changes

Run-time binding of program packages takes longer than static binding on an online system because of the binding process. The time difference depends on the number of packages being bound and the load on both the TPF 4.1 system and the remote systems so specific time differences vary. Once the program packages are bound, packages bound at run time perform the same as program packages that were bound statically.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The CK2ARIALL indicator was added to the CK2ARI field for SNA keypoint 2 to show when global tracing is active.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 246 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 246. Changes to TPF Publications for TPF Application Requester Enhancements

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP06	Updated with editorial changes.
<i>TPF Application Requester User's Guide</i>	GTPARU02	Updated with information about using TPF Application Requester Enhancements.
<i>TPF Library Guide</i>	GTPDOC06	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added or changed for TPF Application Requester Enhancements.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG06	Updated with migration considerations for TPF Application Requester Enhancements.
<i>TPF Operations</i>	GTPOPR06	Updated with information about the commands that were added or changed for TPF Application Requester Enhancements.

Host System Changes

Determine whether mixed-byte data is required. If it is required, the appropriate character sets must be identified. If translation table support is needed beyond what is supplied by TPF Application Requester Enhancements, identify the translation tables needed and develop procedures for incorporating them in CSNAM and CPGS.

Run-time binding of program packages provides more freedom to move programs. This allows more flexibility in the program management system.

Application Programming Interface (API) Changes

The application programming interface (API) has changed with the addition of the dynamic SQL verbs and the support of double-byte and mixed-byte character sets.

Database Changes

There are no changes.

Feature Changes

Changes described in this chapter on migration relate to the TPF Application Requester (TPFAR) feature.

Installation Validation

Recompile an ISO-C program that was previously statically bound but do not send the database request module (DBRM) information to the database. The preprocessor will add the DBRM information to the end of the source program and it will be compiled into the object file. Load and run this program on the online TPF 4.1 system. The program will run normally. There is no notification that run-time binding is taking place. Run-time binding is seen in the SQL trace table with entries resulting in an SQL state of -805 immediately followed by a BIND verb.

Migration Scenarios

Use the following procedure to install TPF Application Requester Enhancements in your TPF 4.1 system.

1. Make the appropriate changes to IBMPAL and SPPGML.
2. Generate a new allocator.
3. Make the appropriate control program (CP) changes.
4. Update the SNAKEY macro and update keypoint 2.
5. Generate a new control program.
6. Build the CISO and CTBX libraries. If code page support is to be used, see the *TPF Application Requester User's Guide* for additional migration information.
7. Build the stub library.
8. Build the real-time programs and link them into dynamic load modules (DLMs).
9. Load the new control program and DLMs to the TPF 4.1 system.
10. Load keypoint 2.
11. IPL the TPF 4.1 system again and bring it to NORM state. If the TPF Application Requester (TPFAR) feature was installed previously, observe the migration message prior to 1052 state. This occurs because the new SQL directory is larger than the previous one.
12. Enter the ZSQLD command with the INIT parameter specified to set up the SQL directory.

13. Enter the ZSQLD command with the ADD, RDB-*rdb_name*, and LU-*lu_name* parameters specified to indicate that CCSID 500 is valid on the remote database and the TPF 4.1 system.

Trace Information in the C Function Trace Table (APAR PJ23493)

The following section discusses the migration considerations for APAR PJ23493.

Prerequisite APARs

See the APEDIT for APAR PJ23493 for information about prerequisite APARs.

In addition, APAR PJ23651 and APAR PJ23900 are additional prerequisite APARs for APAR PJ23493. The CCCPSE segment must be assembled using macro libraries for APAR PJ23651, APAR PJ23900, APAR PJ23493, as well as their prerequisite APARs. See the APEDITs for APAR PJ23651 and APAR PJ23900 for a list of those prerequisite APARs.

Functional Overview

APAR PJ23493 provides trace information in the C function trace table for breakpoints other than program entry breakpoints and program exit breakpoints.

Use C function trace to trace ISO-C programs that have been compiled using the TEST option of one of the IBM C/370 family of compilers supported by the TPF 4.1 system. C function trace provides relevant information to help analyze C program problems, therefore reducing the development cycle of these C programs.

C function trace uses *breakpoints* generated by the compiler when a program is compiled using the TEST option. Breakpoints are grouped into types, for example, program entry, program exit, and others.

After implementing C function trace, ISO-C users have the ability to trace C internal functions, dynamic link modules (DLMs), and C library functions using commands, TPF macros, or unique user exit routines.

Architecture

Most of the changes to the TPF 4.1 system for C function trace and APAR PJ23493 are modifications to existing control program (CP) segments and modules written in assembler language. There also are changes to modules written in PL/I for data reduction.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with APAR PJ23493, you must establish the required operating environment. The following section describes hardware and software requirements specific to APAR PJ23493.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements for APAR PJ23493. Prerequisite software includes:

- Program Update Tape (PUT) 5 installed on your TPF 4.1 system
- One of the IBM C/370 family of compilers supported by the TPF 4.1 system.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 247 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 247. Changes to General Use C Language Header Files for APAR PJ23493

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck1ke.h	Changed	No

Implementation-Specific C Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 248 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 248. Changes to Library Members (Object Files) for APAR PJ23493

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CLMINT	CISO	Not Changed	Assembler	Although CLMINT was not changed, the IDSCID DSECT was changed so CLMINT must be assembled and linked.
CTRINT	CISO	Changed	Object-Only	CTRINT was changed to support breakpoints other than program entry breakpoints and program exit breakpoints.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Although there are no changes to the control program interface (CINFC) tags, APAR PJ23493 changed the CINFC area as follows:

- Updated fields in the CID
- Created new fields in CPMTE in CAPT
- Added equates to CZ3CP for the extended trace options.

Copy Members

Table 249 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Notes:

1. APAR PJ23651 and APAR PJ23900 are additional prerequisite APARs for APAR PJ23493. The CCCPSE segment must be assembled using macro libraries for APAR PJ23651, APAR PJ23900, APAR PJ23493, as well as their prerequisite APARs. See the APEDITs for APARs PJ23651 and PJ23900 for a list of those prerequisite APARs.
2. CCCTIN copy members use macros that were changed by APAR PJ23493. CCCTIN must be assembled using APAR PJ23493 and its prerequisite APARs.
3. CCENBK copy members use macros that were changed by APAR PJ23493. CCENBK must be assembled using APAR PJ23493 and its prerequisite APARs.

Table 249. Changes to Copy Members for APAR PJ23493

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAPT	Control Program	CCNUCL	Changed	System nucleus. Added a comment to define a bit for C function trace of other breakpoints.
CIS1	Control Program	CCISOC	Changed	CP routine addresses. Added C function trace data and support for tracing of other breakpoints.
CTRY	Control Program	CCISOC	Changed	C function trace other breakpoint routine. Added support to trace other breakpoints.
CTR0	Control Program	CCISOC	Changed	C function trace exception routine. Added support to trace other breakpoints.
CTR1	Control Program	CCISOC	Changed	C function trace debug interface module (DIM) routine. Added support to trace other breakpoints.
CTR2	Control Program	CCISOC	Changed	C function trace program entry and program exit routine. Added support to trace other breakpoints.
CTR3	Control Program	CCISOC	Changed	C function trace update CID fields routine. Added support to trace other breakpoints.
CTR8	Control Program	CCISOC	Changed	C function trace SETTC service routine. Added support to trace other breakpoints.
CTR9	Control Program	CCISOC	Changed	C function trace ENATC service routine. Added support to trace other breakpoints.
CUSR	Control Program	CCUEXT	Changed	User exit routines. Changed the CTRC user exit to support other breakpoints.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 250 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 250. Changes to Data Macros for APAR PJ23493

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK1KE	Changed	No
IDSCID	Changed	Yes
IDSCTO	Changed	Yes
IDSCTR	Changed	Yes
IDSTCA	Changed	Yes

General Macros: There are no changes.

Selected Equate Macros: Table 251 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 251. Changes to Selected Equate Macros for APAR PJ23493

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ3CP	Changed	No
IEQCE2	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 252 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 252. Changes to SIP Skeleton and Internal Macros for APAR PJ23493

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKA	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 253 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 253. Changes to System Macros for APAR PJ23493

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
GNAMC	Changed	Yes

System Macros (IBM Use Only): There are no changes.

Systems Network Architecture (SNA) Communication Macros and Statements: There are no changes.

Segments

Table 254 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 254. Changes to Segments for APAR PJ23493

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVOJ	Real-Time Assembler	Not Applicable	Changed	Added the C function trace XHOOKS parameter for the ZSTRC command to trace other breakpoints.
ICDF	Real-Time Assembler	Not Applicable	Not Changed	Although this segment was not changed, the CFMCC macro was changed so the ICDF segment must be assembled.
JRA1	Offline	DATAREAD	Changed	Added the value of the C function trace XHOOKS parameter on the ZSTRC command at the start of data collection to data collection output.
JRA3	Offline	DATAREAD	Changed	Added the value of the C function trace XHOOKS parameter on the ZSTRC command at the end of data collection to data collection output.
STPP	Offline	PPCP	Changed	Added support for C function trace of other breakpoints.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” on page 313 summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 255. Changes to Control Program (CP) User Exits for APAR PJ23493

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CTRC	UCCCTRC	Changed	Added the ability for you to insert additional trace data into the C function trace user area for breakpoints other than program entry breakpoints and program exit breakpoints.

ECB User Exits: There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 256 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 256. Changes to Commands for APAR PJ23493

Command	New, Changed, or No Longer Supported?	Description of Change
ZSTRC	Changed	<p>This command now supports the XHOOKS parameter, which enables the C function trace of breakpoints other than program entry breakpoints and program exit breakpoints for ISO-C programs compiled using the TEST option of one of the IBM C/370 family of compilers supported by the TPF 4.1 system.</p> <p>The NOXHOOKS parameter disables the C function trace of breakpoints other than program entry breakpoints and program exit breakpoints for ISO-C programs compiled using the TEST option of one of the IBM C/370 family of compilers supported by the TPF 4.1 system.</p> <p>If the CDEBUG parameter is not active, the ZSTRC command with the XHOOKS parameter specified does not trace any information.</p>

Messages and System Errors

Table 257 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline message, online messages, and system errors may impact any automation programs you are using in your complex.

Table 257. Changes to Messages and System Errors for APAR PJ23493

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
STRC0003I	Online	No Longer Supported
STRC0004I	Online	No Longer Supported
STRC0005I	Online	New; replaces STRC0003I

Table 257. Changes to Messages and System Errors for APAR PJ23493 (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
STRC0006I	Online	New; replaces STRC0004I

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 258 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 258. Changes to TPF Publications for APAR PJ23493

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for APAR PJ23493.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG06	Updated with migration considerations for APAR PJ23493.
<i>TPF Operations</i>	GTPOPR06	Updated with information about the new XHOOKS parameter of the ZSTRC command for APAR PJ23493.
<i>TPF Program Development Support Reference</i>	GTPPDR06	Added examples for the new format of C function trace output., as well as examples for tracing breakpoints other than program entry breakpoints and program exit breakpoints.
<i>TPF System Installation Support Reference</i>	GTPINR06	Updated the description of the CTRC user exit.
<i>TPF System Macros</i>	GTPSYS06	Updated the description of the SETTC and ENATC macros.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR06	Updated the environment summary information.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure when using APAR PJ23493.

1. Ensure Program Update Tape (PUT) 5 is installed on your TPF 4.1 system so you have the C function trace level code available to support the E-type loader.
2. Compile any ISO-C programs that you want to trace using the TEST option of one of the IBM C/370 family of compilers supported by the TPF 4.1 system.

When you compile a program with the TEST option, the compiler generates a breakpoint (an EX instruction with a hook statement as its subject instruction). The hook statement is stored in the task control area (TCA) and initialized to be a no-operation instruction.

You can generate breakpoints at various points in your ISO-C program by specifying different compiler options.

3. Ensure that APAR PJ23493, APAR PJ23651, and APAR PJ23900, as well as their prerequisite APARs are applied to your TPF 4.1 system.
4. Relink the ISO-C programs that you want to trace using C function trace.
5. Establish the trace environment, which is used throughout the life of an entry control block (ECB) by doing the following:
 - a. Create a new image, if appropriate.
 - b. Load the program with the auxiliary loader (TLDR) to the appropriate image.
 - c. Set the trace options by entering the ZSTRC command at a system level or using the SETTC and ENATC macros for a specific ECB.
 - d. Change the trace table storage size using the SETTC macro, if appropriate.

Notes:

- a. After taking these preliminary steps, C function trace is started when an active break is issued by an ECB for the first time.
 - b. Subsequent attempts to alter or reset the trace environment using the SETTC macro or the ZSTRC command have no effect on the currently running ECB.
 - c. You can stop and start C function trace at any time using the ENATC macro.
 - d. You can also provide unique code at the C function trace user exits (UCCCDEB, UCCCEXP, and UCCCTRC) to customize your trace output.
6. Postprocess the tape to obtain trace data.

Note: Before you postprocess your dumps, code the region size as 3 M on the JCL for the posttape PPCP. Then, assemble PPCP in step SIP13B of the SIP II job execution.

C main() Support (APAR PJ24472)

The following section discusses the migration considerations for C main() support.

Prerequisite APARs

See the APEDIT for APAR PJ24472 for information about prerequisite APARs.

Functional Overview

C main() support allows you to use these additional ISO-C functions:

- main
- system
- atexit
- strerror.

Architecture

The following architectural changes were made for C main() support:

- The offline linkage editor (NLDT) was changed to allow the main functions.
- The enter/back process was changed to support the system and main functions.
- The exit/error processing was changed to support the atexit and strerror functions.

Restart adds to reinitialization of C run-time data and ISO-C support is involved in all of these changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 259 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 259. Changes to Build Scripts for C main() Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CEPIBS	DLM	New	Not Applicable.
CISOBS	DLM	Changed	Added atexit, strerror, system, and initialization support.

Dynamic Load Module (DLM) Stubs: Table 260 on page 317 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 260. Changes to Dynamic Load Module (DLM) Stubs for C main() Support

DLM Stub	New, Changed, or No Longer Supported?
CBCSG003	New
CEEBETBL	New
CEEMAIN	New
CEERootA	New
CEESG003	New
CEESTART	New
EDCINPL	New

General Use C Language Header Files: Table 261 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 261. Changes to General Use C Language Header Files for C main() Support

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$eb0eb.h	Changed	No
c\$idsicd.h	Changed	No
c\$idslst.h	Changed	No
c\$proc.h	Changed	No
errno.h	Changed	No
errno.h	Changed	No
limits.h	Changed	No
stdarg.h	Changed	No
stdio.h	Changed	No
stdlib.h	Changed	No
string.h	Changed	No
tpfapi.h	Changed	No

Implementation-Specific C Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 262 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 262. Changes to Library Interface Scripts for C main() Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	Support for atexit, strerror, and system functions.

Library Members (Object Files): Table 263 on page 318 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 263. Changes to Library Members (Object Files) for C main() Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CATEX	CISO	New	Object Code Only	The atexit function.
CBEPEG	CISO	New	Object Code Only	Internal error input/output (I/O) pegs.
CBKFCB	CISO	New	Object Code Only	Internal.
CBSERR	CISO	New	Object Code Only	The strerror function.
CBSTER	CISO	New	C Language	The internal strerror function.
CCINT	CISO	Changed	Object Code Only	Initialization.
CDMONT	CISO	New	Assembler	Internal \$MONTTC function.
CEXIT	CISO	Changed	Assembler	The exit function.
CEXITF	CISO	New	C Language	The abort function.
CFIXFP	CISO	New	Assembler	The internal atexit function.
CFSINT	CISO	New	Object Code Only	CFSINT, CFSTHINT support (initialization).
CFSZES	CISO	New	Object Code Only	The internal data structure sizes.
CGTLGD	CISO	New	Assembler	The internal get CMMLGD value.
CHDGFN	CISO	New	Object Code Only	Internal to DLL support.
CHDLOK	CISO	New	Object Code Only	Internal to DLL support.
CLMINT	CISO	Changed	Assembler	Preinitialization support.
CSIGDP	CISO	Changed	C Language	Support abort signal.
COPSTR	CISO	New	C Language	Open standard streams.
CPRSMA	CISO	New	C Language	Parse main arguments.
CPSWL	CISO	New	Assembler	The internal LPSW function.
CSTZDF	CISO	New	Object Code Only	The internal set time zone default.
CSYSTEM	CISO	New	C Language	The system support.
CXXFUN	CISO	New	Object-Only	Internal for process cleanup.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 264 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic link module (DLM) if it has changed.

Table 264. Changes to Members (Object Files) for C main() Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CEPI	CEPI	New	Assembler	Environment preinitialization data.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 265 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 265. Changes to Copy Members for C main() Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Changed	The atexit support; call to CXXFUN to clean up the environment.
CCED	Control Program	CCENBK	Changed	Increased the minimum stack size to 16 K.
CCE4	Control Program	CCIISC	Changed	Removed process block allocation.
CHSZ	Control Program	CCNUCL	Changed	Updated to initialize the process block.
CICR	Control Program	CCNUCL	Changed	Updated to include the emergency unlock process block lock.
CIS0	Control Program	CCISOC	Changed	Added the preinitialized data anchor.
CIS1	Control Program	CCISOC	Changed	Changes were made to the TPF C implementation data (CID).
CIS2	Control Program	CCISOC	Changed	Updated comments.
CPSL	Control Program	CCCPSE	Changed	Corrected the third base register setup.
CT38	Control Program	CCCTIN	Changed	Removed the page write protection for segment tables.
CT40	Control Program	CCCTIN	Changed	Updated to allocate the process blocks.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 266 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 266. Changes to Data Macros for C main() Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSCID	Changed	No
IDSDSA	Changed	No
IDSICD	Changed	No
IDSLST	Changed	No
IDSTCA	Changed	No
IEQCE2	Changed	No
IPROC	Changed	No
ISTSA	New	Not Applicable

General Macros: Table 267 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 267. Changes to General Macros for C main() Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
EXITC	Changed	No

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 268 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stgae I deck and run the appropriate job control language (JCL) jobs from the SIP Stgae II deck.

Table 268. Changes to SIP Skeleton and Internal Macros for C main() Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 269 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 269. Changes to SIP Stage II Macros for C main() Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 270 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 270. Changes to System Macros (IBM Use Only) for C main() Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMDC	Changed	No

Segments

Table 271 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 271. Changes to Segments for C main() Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CEPI	Real-Time Assembler	Not Applicable	New	Added environment preinitialization data.
CLIB	Real-Time Assembler	Not Applicable	Changed	Added support for main.
CSTRTD	Real-Time Assembler	Not Applicable	Changed	Changed C initialization linkage.
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Changed C initialization linkage.
NLDT	Offline C Language	TPFLDR	Changed	Added main support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

Table 272 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 272. Changes to Messages and System Errors for C main() Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007101	System Error	New
007102	System Error	New
007106	System Error	New
007200	System Error	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 273 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 273. Changes to TPF Publications for C main() Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP06	Updated with information about support for the main and system functions.
<i>TPF C Language Support User's Guide</i>	GTPCLU06	Updated with information about the use of the abort, atexit, exit, system, and strerror functions.
<i>TPF Library Guide</i>	GTPDOC06	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about system errors that were added for C main() support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG06	Updated with migration considerations for C main() support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The application programming interface (API) has changed with the addition of support for the main, atexit, system, and strerror C functions.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Keep in mind the following during migration:

- The updated E-type loader (TPFLDR) program is required to load DLMs that contain a `main` function. There are no other changes to the loading process.
- The updated CISO library is required to run DLMs that contain a `main` function. The DLMs that contain a `main` function must be linked with the updated CSTRTD.
- You must add the 7 object stub files shipped with C `main()` support to the PLKED.SYSLIB stub library before you link the DLMs with the updated CSTRTD object file. These object stub files are:
 - CBCSG003
 - CEEBETBL
 - CEEMAIN
 - CEEROOTA
 - CEESTART
 - EDCINPL.
- The compiler generates external references to 1 or more of these objects, depending on the compiler options, and the required objects are AUTOCALLED to C load modules during prelink editing. There are no other changes to the DLM build process.
- The new CSTRTD object file and the object stub object files are only required for building new DLMs with `main` functions, although they work for all DLMs, and should be used for all DLM builds. Existing DLMs will run unchanged with C `main()` support and do not need to be relinked.
- The CEPI load module is a new restart segment so it must be allocated and loaded using the auxiliary loader (TLDR) or general file loader (ALDR). The CEPI load module builds a preinitialized copy of the C run-time data, which reduces the path length for an entry control block (ECB) to enter a DLM. In order for the TPF 4.1 system to build and use this preinitialized data, the updated CISO library must also be running at restart. In other words, the updated CISO library must be loaded using TLDR or ALDR to take advantage of preinitialization.
- A control program (CP) that includes C `main()` support can coexist with previous versions of the CISO library and other C load modules. Therefore the CP can be built and tested independently of the CISO library or any other real-time segment updates. The CISO library updated with C `main()` support depends on an updated CP. Until an updated CISO library is loaded into the program base, C run-time preinitialization will not occur and DLMs containing `main` functions will not work correctly.

Threads Precursor (APAR PJ24530)

The following section discusses the migration considerations for threads precursor.

Prerequisite APARs

See the APEDIT for APAR PJ24530 for information about prerequisite APARs.

Functional Overview

Threads precursor provides the following in the TPF 4.1 system:

- An address space change.
The TPF 4.1 system will allocate enough frames and entry control blocks (ECBs) to cover the total size of the ISO-C stack, the ECB heap, and the ECB private area of 1 MB.
- The YIELD macro.
This macro is used to give up control of the processor and allow processing of other entries. The entry is placed on the specified processor list.
- longjmp and setjmp function enhancements.
The longjmp and setjmp functions are not restricted to the same dynamic load module (DLM). Additional programming considerations were added.

Architecture

Before threads precursor, the ISO-C stack and ECB heap were allocated at the top of memory above the system heap. With threads precursor, they are moved in the ECB virtual memory (EVM) to above the ECB private area of 1 MB. In the system virtual memory (SVM), this area is occupied by the 4 KB frames and ECBs.

The size of the ISO-C stack, ECB heap, and the ECB private area of 1 MB can affect the number of frames and ECBs allocated by the TPF 4.1 system. The size of the area occupied by the frames and the ECBs must be greater than or equal to the maximum size of the ISO-C stack plus the maximum size of the ECB heap plus the ECB private area of 1 MB. The TPF 4.1 system will increase the number of ECBs and frames until this condition is satisfied or the system runs out of storage.

Most of the changes to the TPF 4.1 system for threads precursor are modifications to existing control program (CP) segments and modules written in assembler language. There is one new CP segment with several new copy members and several new data macros.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C Language Header Files: Table 274 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 274. Changes to General Use C Language Header Files for Threads Precursor

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	No
c\$proc.h	Changed	Yes
c\$mk0ck.h	Changed	No
c\$thgl.h	New	Not Applicable

Implementation-Specific C Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 275 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 275. Changes to Library Members (Object Files) for Threads Precursor

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CCINT	CISO	Changed	Object-Only	Added Threads precursor.
CLGJMP	CISO	Changed	Object-Only	Added longjmp across DLM support.
CLMINT	CISO	Changed	Object-Only	Added Threads precursor.
CSTJMP	CISO	Changed	Object-Only	Added setjmp across DLM support.
CTRINT	CISO	Changed	Object-Only	Added Threads precursor.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 276 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 276. Changes to CINFC Tags for Threads Precursor

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMCPH	367	New
CMMTHMAX	366	New

Copy Members

Table 277 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 277. Changes to Copy Members for Threads Precursor

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Changed	Added Threads precursor enablement.
CAPT	Control Program	CCNUCL	Changed	Added Threads precursor enablement.
CCEB	Control Program	CCENBK	Changed	Added longjmp across DLM support.
CCED	Control Program	CCENBK	Changed	Added Threads precursor enablement.
CCE4	Control Program	CCIIISC	Changed	Added Threads precursor enablement.
CEFE	Control Program	CCTAPE	Changed	Changed the \$GSVAC macro to INLINE=NO.
CHSZ	Control Program	CCNUCL	Changed	Added Threads precursor enablement.
CICR	Control Program	CCNUCL	Changed	Added the YIELD macro service routine.
CICS	Control Program	CCNUCL	Changed	Updated with address space changes.
CIS1	Control Program	CCISOC	Changed	Added Threads precursor enablement.
CIS2	Control Program	CCISOC	Changed	Added Threads precursor enablement.
CLHH	Control Program	CCSTOR	Changed	Added Threads precursor enablement.
CLHL	Control Program	CCCLHR	Changed	Added virtual file access count (VCT) list processing.
CLHP	Control Program	CCSTOR	Changed	Added Threads precursor enablement.
CLHV	Control Program	CCSTOR	Changed	Added Threads precursor enablement.
CPSE	Control Program	CCCPSE	Changed	Added Threads precursor enablement.
CPSL	Control Program	CCCPSE	Changed	Added support to dump the segment table save area (STSA) block.
CTH0	Control Program	CCTHDS	New	Added Threads precursor enablement.
CTH2	Control Program	CCTHDS	New	Added Threads precursor enablement.
CTH3	Control Program	CCTHDS	New	Added Threads precursor enablement.
CTH4	Control Program	CCTHDS	New	Added Threads precursor enablement.
CTIN	Control Program	CCCTIN	Changed	Added support for address space changes.
CTME	Control Program	CCNUCL	Changed	Added Threads precursor enablement.
CTR0	Control Program	CCISOC	Changed	Added Threads precursor enablement.
CT00	Control Program	CCCTIN	Changed	Added support for address space changes.
CT01	Control Program	CCCTIN	Changed	Added support for address space changes.
CT38	Control Program	CCCTIN	Changed	Added support for address space changes.
CT40	Control Program	CCCTIN	Changed	Added support for address space changes.
CVF3	Control Program	CCVFAC	Changed	Moved VCT processing to the CLHL segment.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 278 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 278. Changes to Data Macros for Threads Precursor

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK1KE	Changed	No
IBOCT	Changed	No
ICPTH	New	Not Applicable
IDSCID	Changed	Yes
IDSFCT	Changed	No
IPROC	Changed	Yes
IPTLB	New	Not Applicable
ISTSA	Changed	No
ITHGL	New	Not Applicable
ITSdT	New	Not Applicable
ITSUT	New	Not Applicable
MK0CK	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 279 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 279. Changes to Selected Equate Macros for Threads Precursor

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZOCP	Changed	No
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 280 on page 328 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 280. Changes to SIP Skeleton and Internal Macros for Threads Precursor

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKA	Changed
SKCTKB	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 281 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 281. Changes to SIP Stage II Macros for Threads Precursor

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 282 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 282. Changes to System Macros for Threads Precursor

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No
\$GSVAC	Changed	Yes
IBMSVC	Changed	Yes

System Macros (IBM Use Only): Table 283 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro.

Table 283. Changes to System Macros (IBM Use Only) for Threads Precursor

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes
YIELD	New	Not Applicable

Segments

Table 284 on page 329 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 284. Changes to Segments for Threads Precursor

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCMCDL	Copy	CPS0	Not Applicable	CCMCDL must be reassembled.
CLH0	Real-Time Assembler	Not Applicable	Changed	CK9CSS is now the size of the system heap only. Code changes have been made to the ZCTKA command to reflect this.
CTHA	Real-Time Assembler	Not Applicable	New	Threads precursor enablement.
CVRA	Real-Time Assembler	Not Applicable	Changed	An FKPA message has been added to notify the operator when pages are removed from the TPF 4.1 system.
IB01	Offline Assembler	IPLB	Changed	Address space changes.
IB02	Offline Assembler	IPLB	Changed	Address space changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

Table 285 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 285. Changes to Messages and System Errors for Threads Precursor

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CT400009	Online	New
FKPA0011A	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

The size of the ISO-C stack, ECB heap, and the ECB private area of 1 MB can affect the number of frames and ECBs allocated by the TPF 4.1 system. The size of the area occupied by the frames and the ECBs must be greater than or equal to the maximum size of the ISO-C stack plus the maximum size of the ECB heap plus the size of the ECB private area of 1 MB.

The following equation can be used to evaluate if you have enough storage:

$$\#ECBs \times 12K + \#Frames \times 4K \geq (ESPS + EMPS + 1) \times 1M$$

The TPF 4.1 system will increase the number of ECBs and frames until this condition is satisfied or the system runs out of storage.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 286 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 286. Changes to TPF Publications for Threads Precursor

Publication Title	Softcopy File Name	Description of Change
<i>TPF C Language Support User's Guide</i>	GTPCLU06	Updated with information about the <code>longjmp</code> and <code>setjmp</code> functions that were changed for threads precursor.
<i>TPF Library Guide</i>	GTPDOC06	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages that were added for threads precursor.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG06	Updated with migration considerations for threads precursor.
<i>TPF Program Development Support Reference</i>	GTPPDR06	Updated with new dump tags for threads precursor.
<i>TPF System Generation</i>	GTPSYG06	Updated with new storage considerations for threads precursor.
<i>TPF System Macros</i>	GTPSYS06	Updated with a new macro (YIELD_C) for threads precursor.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install threads precursor in your TPF 4.1 system.

1. Install PUT 6.
2. Perform SIP stage I changes:
 - Determine if you need to punch new keypoint A and B:
 - Enter **ZDKAT KPA** to get the file address of CTKA.
 - To display the 4-byte data, enter **ZDFIL xxxx C4.4**, where xxxx is the file address of keypoint A.
 - If the 4-byte data is not zero, use SKCTKA and SKCTKB SIP macros to punch new keypoints A and B.
3. Assemble, compile, and link-edit any affected programs.
 - Assemble the following CSECTS:

CCCLHR	CCNUCL
CCCPSE	CCSTOR
CCCTIN	CCTAPE
CCENBK	CCTHDS
CCIISC	CCUEXT
CCISOC	CCVFAC
CCMCDC	
 - Assemble the following real-time/offline segments:

CLGJMP	CVRA
CLMINT	ICDF
CSTJMP	IPLB
CTHA	STPP
CTRINT	
 - Assemble any segment using the \$GSVAC macro with the INLINE=YES parameter specified.
 - Compile the CCINT segment and any other real-time segments.
 - Link-edit the following programs:

CPS0	(Control Program)
PPCP	(Offline Dump Formatter)
CISO	(ISO-C Library)
4. Create a new allocator picking up the IBMPAL additions.
5. Verify that the number of frames plus the number of ECBs will accommodate EVM address space.
6. Verify that the number of frames plus the number of ECBs is greater than or equal to the ECB private area of 1 MB plus the size of the ECB heap plus the

size of the ISO-C stack. To do this, enter the ZCTKA DISPLAY command with the ALL parameter specified. Examine the frame and ECB counts as well as the EMPS parameter (number of megabytes of the ECB heap) and the ESPS parameter (number of megabytes of ISO-C stack storage allowed).

7. Create a new image.
8. IPL the loader general file to the new image.
9. IPL the TPF 4.1 system of the new image.
10. Verify that the TPF 4.1 system runs on the new image.

Transmission Control Protocol/Internet Protocol (TCP/IP) Resource Management (APAR PJ24525)

The following section discusses the migration considerations for TCP/IP resource management.

Prerequisite APARs

See the APEDIT for APAR PJ24525 for information about prerequisite APARs.

Functional Overview

TCP/IP resource management provides:

- A socket sweeper program.

If communication across a socket stops, the socket can still stay open until one of the following occurs:

- The TCP/IP offload device associated with the socket is deactivated.
- System cycle-down.
- The socket is closed by the application.

Socket sweeper support closes inactive socket descriptors after a specified period of time so the inactive socket descriptors can be free for another communication session.

- Socket subsystem support.

You can define one or more subsystems in your TPF 4.1 system. Socket subsystem support enables socket applications to issue socket application programming interface (API) function calls from any TPF 4.1 subsystem.

- TCP/IP data collection support.

You can take sample data collection runs during TCP/IP processing and produce a system summary report that contains the number of socket reads for each second. Programmers can analyze the performance of their socket applications with the help of this data.

- Multiple TCP/IP offload device support.

Additional support to systems with multiple TCP/IP offload devices attached and for socket applications that issue a bind with the wildcard option is provided with error code EINACTWS and an update to an existing error code EINACT.

- A socket accept user exit (C542).

C542 screens all connection requests before they are returned to the server application.

Architecture

TCP/IP resource management contains five major items:

- A socket sweeper program, which closes inactive socket descriptors after a specified period of time that can range from every 3 minutes to every 60 minutes. You can specify the period of time with the SOCKSWP parameter of the SNAKEY macro and change the period of time online with the ZNKEY command using the SOCKSWP parameter. Socket applications that do not use a particular socket descriptor in the time that you specify will be closed by the socket sweeper program. You can choose to not use the socket sweeper program by specifying zero. If you specify zero, the socket sweeper is activated but inactive socket descriptors are not closed. If this is the case, the socket application code must close inactive sockets.

- Socket subsystem support, which enables socket applications to issue all socket API function calls from any TPF 4.1 subsystem.
- Data collection support, by counting all socket API reads. When the response to an `activate_on_receipt`, `read`, `recv`, or `recvfrom` socket API function call is received from the TCP/IP offload device, the number of high-speed messages received is increased by 1.
- Additional support to systems with multiple TCP/IP offload devices attached and for socket applications that issue a `bind` with the wildcard option. An additional socket error return code (EINACTWS) indicates when a TCP/IP offload device associated with a socket descriptor has been deactivated during the processing of a socket API function call but the socket descriptor is still open. This return code is different from the current EINACT error return code, which is returned only when the deactivation of a TCP/IP offload device has caused a socket descriptor to be closed. TCP/IP offload support now ensures that server programs that have issued a `bind` with the wildcard option continue to run if one, but not all, of the TCP/IP offload devices attached to a TPF 4.1 system are deactivated.
- A new socket accept user exit (C542) provides a centralized program to screen all connection requests before they are returned to the server application. C542 is entered each time the `accept()` API function call receives a connection request from a client.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 287 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 287. Changes to Build Scripts for TCP/IP Resource Management

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CLCWBS	DLM	New	Build script for the CLCW dynamic load module (DLM).
COMXBS	DLM	Changed	Added library member object file (C542).

Dynamic Load Module (DLM) Stubs: Table 288 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 288. Changes to Dynamic Load Module (DLM) Stubs for TCP/IP Resource Management

DLM Stub	New, Changed, or No Longer Supported?
CLCW	New

General Use C Language Header Files: Table 289 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 289. Changes to General Use C Language Header Files for TCP/IP Resource Management

General Use C Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	Changed	No
c\$iscddt.h	Changed	No
c\$iscfdt.h	Changed	No
c\$iscldt.h	Changed	No
c\$sthr.h	Changed	No
socket.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 290 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 290. Changes to Library Members (Object Files) for TCP/IP Resource Management

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C510	COMX	Changed	Assembler	Changes to allow system programs to locate a socket control block.
C511	COMX	Changed	C Language	Changes for socket accept user exit.
C512	COMX	Changed	C Language	Changes for sweeper function, subsystem support, and multiple TCP/IP offload device support .
C513	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C514	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C515	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C516	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C517	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C518	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C519	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C520	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.

Table 290. Changes to Library Members (Object Files) for TCP/IP Resource Management (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C524	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C525	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C528	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C529	COMX	Changed	C Language	Changes for sweeper function, subsystem support, and multiple TCP/IP offload device support.
C530	COMX	Changed	C Language	Changes for sweeper function, subsystem support, and multiple TCP/IP offload device support.
C531	COMX	Changed	C Language	Changes for multiple multiple TCP/IP offload device support.
C532	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C533	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C534	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C536	COMX	Changed	C Language	Changes for the socket sweeper function.
C537	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C539	COMX	Changed	C Language	Changes for multiple TCP/IP offload device support.
C540	COMX	Changed	C Language	Changes for sweeper function, subsystem support, and multiple TCP/IP offload device support.
C542	COMX	New	C Language	Added the socket accept user exit.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 291 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 291. Changes to Members (Object Files) for TCP/IP Resource Management

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLA1	CLA1	Changed	C Language	Changed WTOPC error message from CLAW0076E to CLAW0038E.
CLA2	CLA2	Changed	C Language	Changed WTOPC error message from CLAW0076E to CLAW0038E.
CLA3	CLA3	Changed	C Language	Changed to issue WTOPC error message only if at computer room agent set (CRAS) state or higher.

Table 291. Changes to Members (Object Files) for TCP/IP Resource Management (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLCE	CLCE	Changed	C Language	Changes for sweeper function, subsystem support, and multiple TCP/IP offload device support.
CLCF	CLCB	Changed	C Language	Changes for sweeper function, subsystem support, and multiple TCP/IP offload device support.
CLCK	CLCK	Changed	C Language	Changes for the sweeper function.
CLCR	CLCR	Changed	C Language	Changes for subsystem support.
CLCW	CLCW	New	C Language	Socket sweeper function.
CLSU	CLSU	Changed	C Language	Changes for socket subsystem support.
CLZI	CLZK	Changed	C Language	Changed to allow data trace and process trace to run at the same time.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 292 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 292. Changes to Copy Members for TCP/IP Resource Management

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CLB4	Control Program	CCLAW1	Changed	Deleted code associated with the DIAG 98 instruction.
CLWP	Control Program	CCLAW3	Changed	Changes for subsystem support, data collection, and multiple TCP/IP offload device support.
CLWW	Control Program	CCLAW3	Changed	Changed to ensure locks for all CLAW control block structures are unheld during system error processing.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 293 on page 338 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 293. Changes to Communication Macros and Statements for TCP/IP Resource Management

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 294 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 294. Changes to Data Macros for TCP/IP Resource Management

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
ISCFDT	Changed	No
ISTHR	Changed	No

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 295 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 295. Changes to SIP Skeleton and Internal Macros for TCP/IP Resource Management

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 296 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 296. Changes to SIP Stage II Macros for TCP/IP Resource Management

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 297 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 297. Changes to Segments for TCP/IP Resource Management

Segment	Type	Linke-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSK0	Real-Time Assembler	Not Applicable	Changed	Added code to change and display the socket sweeper CRET interval.
CTK2	Real-Time Assembler	Not Applicable	Not Applicable	Needs to be reassembled.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 298. Changes to ECB User Exits for TCP/IP Resource Management

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Socket Accept User Exit	C511	C542	New	Provides a centralized program to screen all connection requests before they are returned to the socket application. C542 is entered each time the accept() API function call receives a connection request from a client.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 299 on page 340 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 299. Changes to Commands for TCP/IP Resource Management

Command	New, Changed, or No Longer Supported?	Description of Change
ZNKEY	Changed	Added support for the SOCKSWP parameter.

Messages and System Errors

Table 300 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 300. Changes to Messages and System Errors for TCP/IP Resource Management

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CLAW0038E	Online	Changed

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 301 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 301. Changes to TPF Publications for TCP/IP Resource Management

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF06	Updated with the SOCKSWP parameter for the SNAKEY macro that was added for TCP/IP resource management.
<i>TPF Library Guide</i>	GTPDOC06	Updated with definitions for new terminology in the master glossary.

Table 301. Changes to TPF Publications for TCP/IP Resource Management (continued)

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, or no longer supported for TCP/IP resource management.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG06	Updated with migration considerations for TCP/IP resource management.
<i>TPF Operations</i>	GTPOPR06	Updated with information about the commands that were added or changed for TCP/IP resource management.
<i>TPF System Installation Support Reference</i>	GTPINR06	Updated with the socket accept user exit, which was added for TCP/IP resource management.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW02	Updated with information about the error codes that were added or changed, and the new SOCKSWP parameter (of the SNAKEY macro) which was added for TCP/IP resource management.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TCP/IP resource management in your TPF 4.1 system.

1. Install PUT 6.
2. Update the socket activation user exit (CLCH), socket cycle-up user exit (CLCV), and all other appropriate socket applications to switch to subsystems other than the basic subsystem (BSS) if socket subsystem support is needed. See *TPF System Installation Support Reference* for more information about these user exits.
3. Update the socket accept user exit (C542). See *TPF System Installation Support Reference* for more information about this user exit.
4. If you will be attaching more than one TCP/IP offload device for each processor, update all socket applications to test for the EINACTWS error code. See *TPF Transmission Control Protocol/Internet Protocol* for more information about the EINACTWS error code.
5. Set the SOCKSWP parameter in the SNAKEY macro to define the socket sweeper CRET interval in keypoint record 2 (CTK2).
See *TPF Transmission Control Protocol/Internet Protocol* for information about the value to specify for this parameter. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

6. Load the updated keypoint record 2 (CTK2).
7. Recompile all changed ISO-C DLMs (both system and application code), prelink, link-edit, and reload. See “Interface Changes” on page 334 for more information about the updated ISO-C programs.
8. Run the system allocator (SALO) to include the new CLCW segment.
9. Reassemble the CCLAW1 and CCLAW3 CSECTs.
10. Link-edit the control program (CPS0).
11. Link-edit the COMX library because of changes to the library members.
12. Reassemble CSK0 and C510 assembler segments.
13. Perform an initial program load (IPL).

Additional Migration Considerations for Program Update Tape (PUT) 6

This section discusses the migration considerations for authorized program analysis reports (APARs) other than the small programming enhancements (SPEs) discussed previously.

Information Provided	Where to Go For More Information
Critical APARs shipped on Program Update Tape (PUT) 6	"Critical APARs"
APARs that correct incorrect APARs shipped on previous PUTs	"APARs that Correct Incorrect APARs Shipped on Previous PUTs" on page 344
APARs that correct incorrect APARs shipped on PUT 6	"APARs that Correct Incorrect APARs Shipped on Program Update Tape (PUT) 6" on page 346

Critical APARs

Table 302 summarizes critical APARs shipped on PUT 6. These critical APARs are valid at the time PUT 6 ships and are subject to change later. Please see the APAR response information that accompanies each APAR and your IBM service representative for more information about critical APARs.

This information is presented in numeric order based on the APAR number.

Table 302. Critical APARs Shipped on PUT 6

APAR Number	Description	Base or Feature
PJ20868	SPE – User Exit Enhancements	Base
PJ22177	Error Recovery From a CTL-4D4 System Error Corrupts Core	Base
PJ22366	SPE – Enhancement for SNA I/O Trace Table	Base
PJ22399	SPE – TPF MPLF supports VM/XA MPLF	Base
PJ22727	SPE - DBR Performance Improvement	Base
PJ22843	SPE – Coverage Tool: Display Blocked Tapes	Base
PJ23095	3270 Local CRT Terminals (Including the PRC) May Hang	Base
PJ23135	SPE – Support> 3339 Cylinders on 3390 DASD Devices	Base
PJ23158	A CTL-C Can Occur During RCS Restart When # Modules> # ECBs	Base
PJ23297	SPE – Coverage Tool: Display FCTB Data (ZDFCT)	Base
PJ23311	A Catastrophic Error May Occur if a Tape Error Occurs in Preemptive Mode	Base
PJ23329	SPE – Support MVS/ESA 3.2 C/C++ Compiler	Base
PJ23338	SPE – Coverage Tool: ZDWGT Display WGTA Entries	Base
PJ23352	SPE – Support C/370 Compare and Swap Functions	Base
PJ23430	SPE – Coverage Tool: ZCHCH Chain Chase	Base
PJ23434	SPE – Coverage Tool: ZDTOD Display TOD Clock	Base
PJ23464	Program Check in CCCPSE May Occur When Dump Data Exit is Active	Base
PJ23493	SPE – C Function Trace Enhancement	Base
PJ23501	CTL-6DF Because of VFA Reserve Chain Depletion	Base
PJ23504	CTL-1 Occurs During XID7 Failure Processing for an SNACTC Link	Base
PJ23526	Offline Modules May Erroneously be Brought Online	Base

Table 302. Critical APARs Shipped on PUT 6 (continued)

APAR Number	Description	Base or Feature
PJ23532	SPE – Increase Range of SDAs Defined for a MPIF Device.	Multi-Processor Interconnect Facility
PJ23543	A CTL-05A Catastrophic Error May Occur	Base
PJ23620	SPE – LU 6.2 APPN Enhancement	Base
PJ23674	DB2 Post-Processor Does Not Recognize Square Brackets (TPFAR).	TPF Application Requester
PJ23699	A CTL-00C Dump Can Occur Losing an MPLF Connect Device	Base
PJ23718	When CS96 Issues the CXFRC Macro, TPF System May Take a CTL-002	Base
PJ23742	When FDCTC E Takes an Error, Core Block is not Attached to the ECB	Base
PJ23781	PCI Interrupt on BSC Line During System Error Causes Catastrophic	Base
PJ23859	CTL-001 From CJIC Can Occur When Pseudo Modules are Defined	Base
PJ23917	SPE – Support for 3270 Consoles with No RO Defined	Base
PJ23923	SPE – Mechanism to Create Multiple Child ECBs	Base
PJ23985	Tape Label Mask Record Data May Be Corrupted	Base
PJ24017	Events Using the ISO-C Stack or Heap May Corrupt Main Storage	Base
PJ24221	An ECB Hang Can Occur During CFLF Locking	Base
PJ24268	SPE – Support for DASD Prefix Architecture	Base
PJ24323	SPE – Support for OS/390 V1R2 and R3 C/C++ Compilers	Base
PJ24344	TPFDF Users – This is a Corequisite APAR to TPFDF APAR PQ02138	Base
PJ24359	Several CTL-108 Dumps Were Generated for SNA CTC Area	Base
PJ24418	A PRIME/DUP DASD Module Mismatch May Occur During a File Copy	Base

APARs that Correct Incorrect APARs Shipped on Previous PUTs

Table 303 summarizes APARs contained on PUT 6 that fix incorrect APARs shipped with the current PUT or previous PUTs. This table is ordered in numeric order based on the correcting APAR number.

Table 303. APARs Correcting Incorrect APARs Shipped on Previous PUTs — PUT 6

Correcting APAR Number (PUT 6)	Incorrect APAR Number	PUT That Shipped the Incorrect APAR
PJ22538	PJ13764	PUT 1
PJ22548	PJ14010	PUT 1
PJ23176	PJ13562	PUT 1
PJ23284	PJ21714	PUT 5
PJ23384	PJ21548	PUT 4
PJ23505	PJ21167	PUT 4
PJ23587	PJ19898	PUT 4
PJ23651	PJ23116	PUT 5
PJ23694	PJ16526	PUT 3
PJ24025	PJ14698	PUT 1
PJ24135	PJ22189	PUT 5

Table 303. APARs Correcting Incorrect APARs Shipped on Previous PUTs — PUT 6 (continued)

Correcting APAR Number (PUT 6)	Incorrect APAR Number	PUT That Shipped the Incorrect APAR
PJ24246	PJ22297	PUT 5
PJ24337	PJ23130	PUT 6
PJ24444	PJ15873	PUT 3

APARs that Correct Incorrect SPE APARs Shipped on Program Update Tape (PUT) 6 and on Previous PUTs

Table 304 summarizes APARs contained on PUT 6 that fix incorrect SPE APARs shipped on Program Update Tape (PUT) 6 and on previous PUTs. This table is ordered in numeric order based on the correcting APAR number.

Table 304. APARs Correcting Incorrect APARs Shipped on PUT 6 and on Previous PUTs

Correcting APAR Number (PUT 6)	Incorrect SPE APAR Number (PUT 6)	PUT That Shipped the Incorrect APAR
PJ22325	PJ17852	PUT 2
PJ22451	PJ17852	PUT 2
PJ22845	PJ17852	PUT 2
PJ22990	PJ19949	PUT 3
PJ23068	PJ17852	PUT 2
PJ23113	PJ21044	PUT 4
PJ23133	PJ19949	PUT 3
PJ23143	PJ20551	PUT 4
PJ23159	PJ21044	PUT 4
PJ23253	PJ21791	PUT 4
PJ23256	PJ17852	PUT 2
PJ23269	PJ21313	PUT 4
PJ23271	PJ17852	PUT 2
PJ23283	PJ21044	PUT 4
PJ23295	PJ21313	PUT 4
PJ23312	PJ19272	PUT 4
PJ23320	PJ21044	PUT 4
PJ2333	PJ22975	PUT 5
PJ23343	PJ21044	PUT 4
PJ23385	PJ21791	PUT 4
PJ23426	PJ22369	PUT 5
PJ23435	PJ17778	PUT 2
PJ23487	PJ17852	PUT 2
PJ23657	PJ21791	PUT 4
PJ23695	PJ21044	PUT 4
PJ23709	PJ17852	PUT 2
PJ23711	PJ19966	PUT 3
PJ23753	PJ19949	PUT 3
PJ23762	PJ19949	PUT 3
PJ23817	PJ21167	PUT 4
PJ23822	PJ17852	PUT 2

Table 304. APARs Correcting Incorrect APARs Shipped on PUT 6 and on Previous PUTs (continued)

Correcting APAR Number (PUT 6)	Incorrect SPE APAR Number (PUT 6)	PUT That Shipped the Incorrect APAR
PJ23833	PJ21313	PUT 4
PJ23868	PJ19949	PUT 3
PJ23900	PJ21167	PUT 4
PJ23922	PJ21044	PUT 4
PJ24020	PJ21044	PUT 4
PJ24033	PJ17852	PUT 2
PJ24035	PJ23297	PUT 6
PJ24091	PJ21167	PUT 4
PJ24119	PJ19949	PUT 3
PJ24202	PJ21313	PUT 4
PJ24208	PJ21044	PUT 4
PJ24243	PJ21044	PUT 4
PJ24312	PJ19966	PUT 3
PJ24344	PJ21694	PUT 6
PJ24396	PJ19949	PUT 3
PJ24475	PJ21044	PUT 4
PJ24548	PJ23931	PUT 6
PJ24588	PJ24472	PUT 6
PJ24593	PJ24530	PUT 6
PJ24549	PJ23493	PUT 6
PJ24600	PJ23931	PUT 6

APARs that Correct Incorrect APARs Shipped on Program Update Tape (PUT) 6

Table 305 summarizes APARs contained on PUT 6 that fix incorrect APARs also shipped on PUT 6. This table is ordered in numeric order based on the correcting APAR number.

Table 305. APARs Correcting Incorrect APARs Shipped on PUT 6

Correcting APAR Number (PUT 6)	Incorrect APAR Number (PUT 6)	PUT That Shipped the Incorrect APAR
PJ24344	PJ21694	PUT 6
PJ24337	PJ23130	PUT 6
PJ24035	PJ23297	PUT 6
PJ24549	PJ23483	PUT 6
PJ24069	PJ23556	PUT 6

Program Update Tape 7 (PUT 7)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 7 (PUT 7).

SPE	Where to Go For More Information
Link Map Support	"Link Map Support for C Load Modules (APAR PJ24845)" on page 348
C++ Support	"C++ Support (APAR PJ25084)" on page 358
File System Support	"File System Support (APAR PJ25089)" on page 370
Virtual File Access (VFA) Synchronization	"Virtual File Access (VFA) Synchronization (APAR PJ25094)" on page 386
TPF Collection Support	"TPF Collection Support (APAR PJ25098)" on page 403
TPF Transaction Services	"TPF Transaction Services (APAR PJ25094)" on page 423

TPF 4.1 PUT 7 is compiled with the IBM C/C++ for MVS/ESA Version 3 Release 2, IBM OS/390 C/C++ Version 1 Release 2, and IBM OS/390 C/C++ Version 1 Release 3 compilers. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Link Map Support for C Load Modules (APAR PJ24845)

The following section discusses the migration considerations for link map support for C load modules, referred to as link map support in the remainder of this section.

Prerequisite APARs

See the APEDIT for APAR PJ24845 for information about prerequisite APARs.

Functional Overview

Link map support gives you the ZDMAP command to display the link maps for C load modules to help you debug C load modules online. The link map consists of a list of object files included in the C load module, a list of C function names in the object files, and the addresses of the object files and C functions.

Because the link map is part of the C load module itself (see “Architecture” on page 348), you can look at the link map in several ways:

- Display the link map online and on demand by using the ZDMAP command.
- Look at the formatted link map data directly after the C load module in a dump.

Modifications for link map support have been made in both the C load module build tool (CBLD) and the offline loader (TPFLDR) to build the link map and make it part of the C load module. After you have link-edited a C load module with the modified output from the updated C load module build tool and have loaded it with the updated TPFLDR, you can easily display its object files and functions with the ZDMAP command.

Architecture

Link map support expands the format of the C load module by appending the link map data to the end of the link-edited C load module. The link map is now part of the C load module itself. This format has key advantages:

- The link map structure takes advantage of address constant (ADCON) relocation processing when the C load module is fetched into main storage to locate object files and functions.
- Because the link map is part of the C load module, if the C load module is dumped, the link map is available in the dump and can be formatted by the diagnostic output formatter (DOF).

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 306 on page 349 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 306. Changes to Build Scripts for Link Map Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CDM0BS	DLM	New	Build script containing routines that make up the root C load module for the ZDMAP command.
CDM1BS	DLM	New	Build script containing the retrieve C load module routine for the ZDMAP command.
CDM2BS	DLM	New	Build script containing the process ZDMAP request routine for the ZDMAP command.
CDM3BS	DLM	New	Build script containing the release C load module routine for the ZDMAP command.

Dynamic Load Module (DLM) Stubs: Table 307 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 307. Changes to Dynamic Load Module (DLM) Stubs for Link Map Support

DLM Stub	New, Changed, or No Longer Supported?
CDM1	New
CDM2	New
CDM3	New

General Use C/C++ Language Header Files: Table 308 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 308. Changes to General Use C/C++ Language Header Files for Link Map Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
bldtol.h	Changed	Yes
c\$dmaph.h	New	No
c\$icili.h	Changed	Yes
c\$idslst.h	Changed	No
c\$idsprg.h	Changed	No
c\$lmap.h	New	No
nldtci.h	Changed	Yes
nldtif.h	Changed	Yes
reusable.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 309 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 309. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Link Map Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$cdm0.h	New	No

Table 309. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Link Map Support (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$1map.h	New	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 310 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 310. Changes to Members (Object Files) for Link Map Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CDMAIN	CDM0	New	C Language	Mainline routine for the ZDMAP command.
CDMDSP	CDM0	New	C Language	Display routine for the ZDMAP command.
CDMER1	CDM0	New	C Language	Display error messages in the 1000 range for the ZDMAP command.
CDMER2	CDM0	New	C Language	Display error messages in the 2000 range for the ZDMAP command.
CDMER3	CDM0	New	C Language	Display error messages in the 3000 range for the ZDMAP command.
CDMHLP	CDM0	New	C Language	Display help information for the ZDMAP command.
CDMPRC	CDM2	New	C Language	Process the ZDMAP request for the ZDMAP command.
CDMPRS	CDM0	New	C Language	Parsing routine for the ZDMAP command.
CDMREL	CDM3	New	C Language	Release C load module routine for the ZDMAP command.
CDMRTR	CDM1	New	C Language	Retrieve C load module routine for the ZDMAP command.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 311 on page 351 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 311. Changes to Copy Members for Link Map Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CEDI	Control Program	CCNUCL	Changed	Call CP translation user exit UCCWTOP if it is active to allow you to translate characters in the output message text. Whether the user exit is active or not, unconditionally translate specific characters in the message text to periods (X'4B') (.).
CPSL	Control Program	CCCPSE	Changed	Create link map dump records.
CUSR	Control Program	CCUEXT	Changed	Create CP translation user exit entry point UCCWTOP, which allows you to translate lowercase and special characters in output message text before CEDI (in CCNUCL) performs its own translation.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 312 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 312. Changes to Data Macros for Link Map Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CZOCP	Changed	No
DCTUCL	Changed	No
IDSPRG	Changed	No
IFUNC	New	No
ILMAP	New	No
IOBJF	New	No

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 313 on page 352 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in

alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 313. Changes to SIP Skeleton and Internal Macros for Link Map Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 314 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 314. Changes to SIP Stage II Macros for Link Map Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Macros: Table 315 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 315. Changes to System Macros for Link Map Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
UXITC	Changed	No

System Macros (IBM Use Only): Table 316 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro.

Table 316. Changes to System Macros (IBM Use Only) for Link Map Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes

Segments

Table 317 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 317. Changes to Segments for Link Map Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CBLD	Offline C Language	CBLD	Changed	Added ESD, TXT, and END cards for each included object file.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added code to define and recognize the ZDMAP command.

Table 317. Changes to Segments for Link Map Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
NLDT	Offline C Language	TPFLDR	Changed	Added support to create C load module link map data.
NLDTRL	Offline C Language	TPFLDR	Changed	Added support to create C load module link map data.
REATXT	Offline C Language	REATXT	New	Rearrange CSECTs (TXTs) for C source files compiled with the NORENT option and link-edited with the VM linkage editor (VM LKED). Note: This is sample code only.
TLDR	Offline Assembler	TPFLDR	Changed	Added support to create C load module link map data.
TLDRMN	Offline C Language	TPFLDR	Changed	Added support to create C load module link map data.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 318. Changes to Control Program (CP) User Exits for Link Map Support

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CEDI	UCCWTOP	New	Added the WTOPC translation user exit to allow you to translate characters in the message output text to whatever you want before CEDI (in CCNUCL) does its own translation. Commentary in the prolog describes an approach for doing the translation. This user exit is particularly useful for translating special characters or lowercase characters in function names if you have display terminals that do not support these characters.

ECB User Exits: There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 319 on page 354 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 319. Changes to Commands for Link Map Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZDMAP	New	Add the ability to display link map data for C load modules.

Messages and System Errors

Table 320 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 320. Changes to Messages and System Errors for Link Map Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ALDR0910W	Offline	New
ATTENTION - CONTAINS NO LINK MAP DATA	Offline	New
CBLD0411W	Offline	New
CBLD0412W	Offline	New
CBLD0802E	Offline	No Longer Supported
CBLD0803E	Offline	New
CBLD0804E	Offline	New
CBLD1201T	Offline	No Longer Supported
CBLD1202T	Offline	New
DMAP0001I	Online	New
DMAP0002I	Online	New
DMAP1000E	Online	New
DMAP1001E	Online	New
DMAP2000E	Online	New
DMAP2001E	Online	New
DMAP2002E	Online	New
DMAP2003E	Online	New
DMAP2004E	Online	New
DMAP2005E	Online	New
DMAP2006E	Online	New
DMAP2007E	Online	New
DMAP2008E	Online	New
DMAP2009E	Online	New
DMAP2010E	Online	New
DMAP2011E	Online	New
DMAP2012E	Online	New

Table 320. Changes to Messages and System Errors for Link Map Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DMAP2013E	Online	New
DMAP2014E	Online	New
DMAP2015E	Online	New
DMAP3000E	Online	New
DMAP3001E	Online	New
DMAP3002E	Online	New
DMAP3003E	Online	New
DMAP3004E	Online	New
DMAP3005E	Online	New
OLDR0090W	Offline	New
TPFL0005W	Offline	New
TPFL0010E	Offline	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

C load modules with link maps will be slightly larger than C load modules without link maps both in main storage and on file. Testing showed the increase to be approximately 1% for a sample of 210 C load modules. The actual increase that you can expect will vary and will depend on the makeup of each C load module. You can still use the current formulas to calculate the required number of #XPRGn and #OLDn records. See *TPF System Generation* for more information about the formulas for calculating the number of system utilized record types.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 321 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 321. Changes to TPF Publications for Link Map Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP07	Updated with information about using link map support, changes to the offline C load module build tool (CBLD), and a description of an offline tool (sample code only), REATXT, for link map support.
<i>TPF Library Guide</i>	GTPDOC07	Updated with definitions for new terminology in the master glossary.

Table 321. Changes to TPF Publications for Link Map Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Main Supervisor Reference</i>	GTPMSR05	Updated with information about displaying link map data for link map support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages that were added, changed, and no longer supported for link map support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG07	Updated with migration considerations for link map support.
<i>TPF Operations</i>	GTPOPR07	Updated with information about the command that was added for link map support.
<i>TPF Program Development Support Reference</i>	GTPPDR07	Updated with information showing formatted link map data appended at the end of a C load module in a dump for link map support.
<i>TPF Programming Standards</i>	GTPPSM07	Updated with information about the changed standard to the allowed character set for output messages for link map support. Also, added information about names that are reserved for link map support.
<i>TPF System Installation Support Reference</i>	GTPINR07	Updated with information about the user exit UCCWTOP that was added for link map support and information about the TRACE parameter for the offline loader (TPFLDR).

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

You must consider the following if you want to use link map support:

- If you want any existing C load modules to contain link map data, you must rebuild and reload them using the link map versions of the the offline C load module build tool (CBLD) and the offline loader (TPFLDR). A C load module that has been rebuilt and reloaded will have some link map data inserted between CSECTs and after the last CSECT. Other than this, the content of the C load module is unchanged. If you load your existing C load modules with the link map version of TPFLDR, these C load modules will not contain any link map data. TPFLDR output will produce a message for each C load module, which states that it has no link map. See *TPF Application Programming* for more information about CBLD and *TPF System Installation Support Reference* for more information about TPFLDR.
- Because function names are displayed as they are coded in a source file, there can be any combination of lowercase and special characters. If you have display terminals that do not support lowercase and special characters or you do not

want these characters displayed, you must write code to translate them to meet your specific needs. Use the control program (CP) translation user exit, UCCWTOP, for this translation code. See *TPF System Installation Support Reference* for more information about this user exit.

You must build a new CP that contains CCNUCL (CEDI) and CCUEXT (CUSR) with link map support to take advantage of the user exit for WTOPC translation.

- Create a new system allocator (SALO) that includes the ZDMAP command DLMs CDM0, CDM1, CDM2, and CDM3.

Note: CDM0, CDM1, CDM2 and CDM3 require restrict authorization.

- Create stubs for CDM1, CDM2, and CDM3.
- You must build a new CP that contains CCCPSE (CPSL) with link map support if you want new link map dump records created during dump processing that can be processed by the link map version of the diagnostic output formatter (DOF).
- You must build a new DOF that contains CFMCC and CFMDC with link map support if you want formatted link map data after the DLM in a dump.

You can apply all of link map support or parts of the support without impacting your offline system and your online TPF 4.1 system. The following examples show you how you can apply parts of link map support:

- If you apply link map support to CBLD, you can safely load C load modules built using the new version of CBLD with your current version of TPFLDR. These C load modules will not contain link map data that can be displayed or dumped.
- You can apply link map support to CBLD and TPFLDR, load the ZDMAP command DLMs and the modified CVAB, and delay applying link map support to the CP (CPSL in CCCPSE) and the DOF. You will be able to display link maps online, but any C load module that is dumped will not have formatted link map data in the dump.

If you do not have special requirements for which characters can be displayed in output messages, you can also delay applying link map support to CEDI in CCNUCL and CUSR in CCUEXT in the CP.

Note: CP copy member CEDI unconditionally translates the following to X'4B' (.):

- X'4E' (+), which is the end-of-message control character
- X'6E' (>), which is the start-of-message control character.

No compatibility or coexistence concerns have been identified. C load modules that have been built either with or without link maps can be loaded to systems that have link map support online as well as to those that do not. No modifications are required to any of the online loaders, so there are no compatibility issues between online and offline loaders.

C++ Support (APAR PJ25084)

The following section discusses the migration considerations for C++ support.

Prerequisite APARs

See the APEDIT for APAR PJ25084 for information about prerequisite APARs.

Note: Be sure you have applied APAR PJ24541 before you apply APAR PJ25084.

Functional Overview

The TPF 4.1 system now provides support for the C++ language, which is designed to take advantage of object-oriented programming concepts. Except for minor details, the C++ language is a superset of C language. In addition to the facilities provided by C language, the C++ language provides flexible and effective facilities for defining new data types. You can partition an application program into manageable pieces by defining new data types that closely match the logical design of the application program. When used well, these techniques result in shorter, easier to understand, and easier to maintain programs.

Dynamic link libraries (DLLs) are now supported. A DLL is a collection of one or more functions or variables gathered in a load module that can be run or accessed from a separate application load module.

Architecture

The key concept in the C++ language is *class*. A class is a user-defined data type. These classes provide data hiding, guaranteed initialization of data, implicit type conversion for user-defined types, dynamic typing, user-controlled memory management, and mechanisms for overloading operators. The C++ language provides better facilities than C language for type checking and for expressing modularity.

The key concept in DLLs is that functions or variables can be dynamically linked while the application program is running rather than statically when the application program is built. You can, therefore, call a function or use a variable in a load module other than the one that contains the definition.

You need the following to use C++ support on the TPF 4.1 system:

- IBM MVS support for standard dynamic link libraries (DLLs)
- Run-time library support for C++ support functions.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with C++ support, you must create the required operating environment. The following section describes hardware and software requirements specific to C++ support.

"Operating Environment Requirements and Planning Information" on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

You can use the following C/C++ compilers to compile C programs with the DLL compiler option and to compile C++ programs:

- IBM C/C++ for MVS/ESA Version 3 Release 2 (C/MVS compiler component only) or later release. See *IBM C/C++ for MVS/ESA C++/MVS Language Reference* for more information about this compiler.

Note: The TPF 4.1 system does not provide C++ support for the IBM C/C++ for MVS/ESA Version 3 Release 1 compiler. The TPF 4.1 system provides C++ support for the IBM C/C++ for MVS/ESA Version 3 Release 2 compiler.

- IBM OS/390 C/C++ Version 1 Release 2 compiler or later release. See *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.

Keep in mind the following:

- The interprocedural analysis (IPA) through the IBM OS/390 IPA compiler option is not supported by the TPF 4.1 system. You must use the prelinker to build all programs that will run on the TPF 4.1 system.
- C++ support requires you to run the language environment (LE) compiler on an IBM MVS or IBM OS/390 system. You cannot run the C++ compiler with the TPF 4.1 system.
- IBM VM compilers do not provide C++ support or DLL support.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 322 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 322. Changes to Build Scripts for C++ Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CISOBS	DLM	Changed	Added functions to support DLLs.
CPP1BS	DLM	New	Build script containing C++ run-time functions. CPP1 is a DLL and does not need a library interface script.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 323 on page 360 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 323. Changes to General Use C/C++ Language Header Files for C++ Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
bldtol.h	Changed	No
c\$idse1v.h	Changed	No
c\$idslst.h	Changed	No
c\$idspat.h	Changed	No
c\$idsprg.h	Changed	No
c\$idspvr.h	Changed	No
c\$iduxt.h	Changed	No
new.hpp	New	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 324 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 324. Changes to Library Interface Scripts for C++ Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	Added functions for DLL support.

Library Members (Object Files): Table 325 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 325. Changes to Library Members (Object Files) for C++ Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CLMINT	CISO	Changed	Assembler	Added support for DLLs.
CSSDLL	CISO	New	C Language	Subsystem-shared DLL validation routine.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 326 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 326. Changes to Members (Object Files) for C++ Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CDMRTR	CDM1	Changed	C Language	Added support for DLLs to link map support.

Table 326. Changes to Members (Object Files) for C++ Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CELL	CELA	Changed	C Language	Added DLL checks.
CEL4	CEL4	Changed	C Language	Added support for detecting an error when a run-time library contains a DLL module.
CEL8	CEL8	Changed	C Language	Added DLL checks.
CILD	CILD	Changed	C Language	Added DLL checks.
CIL6	CILA	Changed	C Language	Added DLL checks.
CLDF	CLDF	Changed	C Language	Added DLL checks.
CLDJ	CEL2	Changed	C Language	Added support for the DLL type to the OLDR2026T message.
CLDL	CEL2	Changed	C Language	Added support for detecting an error when a run-time library contains a DLL module.
CLDZ	CELA	Changed	C Language	Added DLL checks.
CLEW	CLEW	Changed	C Language	Added DLL checks.
COL2	COL1	Changed	C Language	Added DLL checks.
CRLY	COLO	Changed	C Language	Added DLL checks.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 327 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 327. Changes to Copy Members for C++ Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Changed	Added DLL checks and added a DLL error message.
CCEC	Control Program	CCENBK	Changed	Added DLL checks.
CCEG	Control Program	CCENBK	Changed	Changed a comment to mention DLLs.
CIS1	Control Program	CCISOC	Changed	Added a field to be used by the DLL support functions in the CISO library.
CIS2	Control Program	CCISOC	Changed	Added support for DLL load to allocate and initialize storage for DLLs.
CLHH	Control Program	CCSTOR	Changed	Added support for freeing DLL storage.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 328 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 328. Changes to Data Macros for C++ Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
IDSCID	Changed	No
IDSELD	Changed	No
IDSLST	Changed	No
IDSPAT	Changed	No
IDSPRG	Changed	No
IDSPVR	Changed	No
IDSTTR	Changed	No

General Macros: Table 329 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 329. Changes to General Macros for C++ Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
FREEC	Changed	No

Selected Equate Macros: Table 330 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 330. Changes to Selected Equate Macros for C++ Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 331 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 331. Changes to SIP Skeleton and Internal Macros for C++ Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPEDCC	Changed
SPGLB	Changed

Table 331. Changes to SIP Skeleton and Internal Macros for C++ Support (continued)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPBLD	Changed
SPPGML	Changed
SPTABS	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 332 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 366 for a description of other system generation changes you must make.

Table 332. Changes to SIP Stage I Macros and Statements for C++ Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 333 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 333. Changes to SIP Stage II Macros for C++ Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed
SPCOMP	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 334 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 334. Changes to System Macros (IBM Use Only) for C++ Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes

Segments

Table 335 on page 364 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 335. Changes to Segments for C++ Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
ACPL	Real-Time Assembler	Not Applicable	Changed	Added DLL checks.
ALDR	Offline Assembler	TPFLDR	Changed	Changed a comment to mention DLL.
CBLD	Offline C Language	CBLD	Changed	Added DLL support including support for the new DLL keyword to include DLL startup code CSTDLL.
CIPY	Real-Time Assembler	Not Applicable	Changed	Added DLL checks.
CLIB	Real-Time Assembler	Not Applicable	Changed	Added support for detecting an error when a run-time library contains a DLL module.
CPRE	Real-Time Assembler	Not Applicable	Changed	Added support for detecting an error when a run-time library contains a DLL module.
CSTDLL	Real-Time Assembler	Not Applicable	New	C++ startup code.
CSTRTL	Real-Time Assembler	Not Applicable	New	Added support for detecting an error when a run-time library contains a DLL module.
CVAW	Real-Time Assembler	Not Applicable	Changed	Added support to recognize DLL as a linkage type for the ZAPAT and ZDPAT commands.
CVA6	Real-Time Assembler	Not Applicable	Changed	Added support to recognize DLL as a linkage type for the ZAPAT and ZDPAT commands.
DRVA	Offline Assembler	DRIVERA	Changed	Added C++ support.
MASM	Offline Assembler	MASM	Changed	Added C++ support.
NLDT	Offline C Language	TPFLDR	Changed	Added DLL checks and set appropriate indicators.
OLDR	Offline C Language	TPFLDR	Changed	Added DLL checks.
TLDR	Offline Assembler	TPFLDR	Changed	Added DLL checks.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 336. Changes to ECB User Exits for C++ Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Program History	CIL7	UELM	Changed	Added the passing of new value UXT_PH_DLL (to indicate a DLL) in the ph_linkage_type field.
	CIPY			
	CLDJ			
	CLDZ			
	CLEJ			
	CLEW			
	COLC			
	COLK			
	COLO			
	CRLD			
	CVAW			

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 337 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 337. Changes to Commands for C++ Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZAPAT	Changed	Added support to recognize DLL as a linkage type.
ZDPAT	Changed	Added support to recognize DLL as a linkage type.

Messages and System Errors

Table 338 on page 366 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 338. Changes to Messages and System Errors for C++ Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
094015	System Error	New
094016	System Error	New
094017	System Error	New
094018	System Error	New
094101	System Error	New
094201	System Error	New
CBLD0805E	Offline	New
OLDR2026T	Online	Changed
OLDR2053T	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

Keep in mind the following:

- Using the system initialization program (SIP) you can:
 - Compile C programs with the DLL option
 - Compile C++ programs and load them to the TPF 4.1 system.
- You must code the SPPBLD macro in SPPGML for any C++ source code or dynamic link libraries (DLLs) you have because the SPPBLD macro supports:
 - A new program type, which is the C++ source code library (CPP)
 - A new parameter, which is DLL=YES|NO. You can use this parameter to specify whether the source code for the ISC type (C source) should be part of the DLL. NO is the default for the ISC type.

If the source code is the CPP type, you must do one of the following:

 - Code DLL=YES.
 - Do not code the DLL parameter. You will receive an error message if you code DLL=NO for the CPP type.
- The multiple assembly program (MASM) will correctly handle the job control language (JCL) from a SIP stage 2 deck to compile, link, and load programs.

See *TPF System Generation* for more information about SIP and MASM.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 339 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 339. Changes to TPF Publications for C++ Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP07	Updated with information about application programming processes using C++ support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU07	Updated with information about the functions that were added for C++ support and for the ACP.IMPORTS.RELv definition side-deck.
<i>TPF Concepts and Structures</i>	GTPCON05	Updated with information about the concepts and structures that were added or changed for C++ support.
<i>TPF General Macros</i>	GTPGEN07	Updated with information about the general macros that were changed for C++ support.
<i>TPF Library Guide</i>	GTPDOC07	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added and changed for C++ support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG07	Updated with migration considerations for C++ support.
<i>TPF Operations</i>	GTPOPR07	Updated with information about the commands that were changed for C++ support.
<i>TPF Programming Standards</i>	GTPPSM07	Updated with information about the standards and conventions that were added for C++ support.
<i>TPF System Macros</i>	GTPSYS07	Updated with information about the system macros that were changed for C++ support.
<i>TPF System Installation Support Reference</i>	GTPINR07	Updated with information about MASM and the system initialization program (SIP) macros and processes that were changed for C++ support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

You must consider the following if you want to use C++ support:

- See “Software (Programming Requirements)” on page 359 for a list of the compilers you can use to compile C programs with the DLL option or to compile C++ programs.

You must code the SPPBLD macro in SPPGML for any C++ source code or dynamic link libraries (DLLs) you have because the SPPBLD macro supports:

- A new program type, which is C++ language source code library (CPP).
- A new parameter, which is DLL=YES|NO.

See “System Initialization Program (SIP) and System Generation Changes” on page 366 for a description of SIP changes. See *TPF System Generation* for a complete description of the SIP Stage I macros.

- There is no RENT compiler option in the family of IBM C++ compilers on the System/390 platform. Source code written in C++ and compiled with a C++ compiler will automatically be compiled as RENT. See *TPF Application Programming*, *TPF Programming Standards*, and the *OS/390 C/C++ User's Guide* for more information about the RENT option.
- You must allocate the ACP.IMPORTS.RELv SYSDDEFSD definition side-deck data set. This data set contains the functions and variables exported by DLLs. If you do not create this data set and you run SIP stage II, the linkedit jobs will fail because the linkedit jobs cannot find the definition side-deck data set. See *TPF System Generation* for more information about this data set.
- C++ language source files are contained in the following existing data sets:

ACP.CSRCE.RT.RELv	All C/C++ source files. Build scripts and library interface scripts are also included.
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ACP.CHDR.RELv	All C/C++ headers.
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- You must create a new system allocator (SALO) that includes the CPP1 DLL. The CPP1 DLL contains functions that provide DLL support.
- Before you can load and use a DLL, you must rebuild and reload the following TPF system components that contain C++ and DLL support:
 - Control programs (CPs):
 - CCENBK (CCEB, CCEC, CCEG)
 - CCISOC (CIS1, CIS2)
 - CCSTOR (CLHH).
 - Offline loader program (TPFLDR). See *TPF System Installation Support Reference* for more information about TPFLDR.
 - The C load module build tool (CBLD), which uses the new DLL keyword to include C++ startup code CSTDLL. See *TPF Application Programming* for more information about CBLD and CSTDLL.
 - CISO run-time library. Run the library interface tool (LIBI) to generate the library stubs added for DLL functions and then run CBLD to rebuild the CISO library. See *TPF Application Programming* for more information about LIBI.
 - Dynamic load modules (DLMs). Use CBLD to rebuild the following DLMs:
 - CDM1 (CDMRTR)
 - CELA (CELL, CLDZ)
 - CEL2 (CLDJ, CLDL)
 - CEL4 (CEL4)
 - CEL8 (CEL8)
 - CILA (CIL6)
 - CILD (CILD)
 - CLDF (CLDF)
 - CLEW (CLEW)
 - COLO (CRLY)

- COL1 (COL2).
- CPP1 DLL. Use CBLD to build the CPP1 DLL.

Notes:

1. DLLs do not have library interface scripts. Therefore, you do not have to run LIBI for CPP1.
 2. Load the CP changes and the DLM changes before you load the CPP1 DLL.
- A new UXT_PH_DLL variable (to indicate a DLL) is passed in the ph_linkage_type field to the UELM user exit. Check your UELM user exit code to determine if you must change your code to handle the UXT_PH_DLL variable. See *TPF System Installation Support Reference* for more information about the UELM user exit.

File System Support (APAR PJ25089)

The following section discusses the migration considerations for file system support.

Prerequisite APARs

See the APEDIT for APAR PJ25089 for more information about prerequisite APARs.

Apply the following APARs after you apply file system support (APAR PJ25089):

- PJ25240
- PJ25263
- PJ25266.

See “PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)” on page 1269 for more information about the interface changes for these APARs.

Functional Overview

The TPF 4.1 system now provides support for a file system. The key concepts of file system support are an application programming interface (API) and C run-time environment supporting main functions. Implementation of file system support eases porting of application programs by providing a standard and open interface.

The file access API contains all of the standard C library functions and part of the Portable Operating System Interface for Computer Environments (POSIX) standards, and reduces the complexity of TPF application programs suited to flat files by providing a flat-file data model as a simpler alternative to the TPF linked-record architecture.

Architecture

This section explains what a file system is, as well as providing functional summary and characteristics information.

What Is the File System?

The file system is a standard file access method that is ANSI Standard C compliant. File system support completes the TPF 4.1 system implementation of the ANSI compliant Standard C library that began with ISO-C support.

File system support implements most of the POSIX.1, sections 5 (Files and Directories), 6 (Input and Output Primitives), and 8.2 (C Language Input/Output Functions) standard. The file system also includes functions from the POSIX.1b (ftruncate and fsync) and from the POSIX.1a drafts (the fchown, lstat, readlink and symlink C functions).

Standard input, output, and error streams are also supported in the file system.

Functional Summary

File system support introduces the concepts of path names and directories (for example, /name/name) and provides the following:

- An application program interface that is a set of C library functions.
- A hierarchical file system tree based on directories.
- The logical model of a file as an ordered stream of bytes, directly accessible by offset.
- Various types of files, including directories, regular files, character special files, and symbolic links.

- File ownership and access protection.
- Multiple hard links to files.
- File attributes that can be modified including mode, owner ID, group ID, and time stamps.
- Customizable standard streams (stdin, stdout and stderr) and redirection of those standard streams.

However, file system support does not extend to TPF programs (executables) and can only be used by ISO-C programs.

Additional Characteristics

The file system is subsystem unique, processor shared, and subsystem user shared. Therefore, each subsystem has its own root and directory hierarchy.

In addition, the file system uses TPF collection support as a data store. The file data is contained in pool records. Each file requires a set of #INODE and #FLOCK fixed file records, which contain the file characteristics and the name of the current working directory. These records are allocated at system generation time and assigned when the file is created. File system support also uses TPF transaction services to ensure atomicity. See “TPF Transaction Services (APAR PJ25094)” on page 423 for more information about TPF transaction services.

A *file descriptor* represents the file to the application program. A file descriptor is an unsigned integer that is first returned by the open or creat C functions and passed to the read, write, lseek, and close C functions. These file input/output (I/O) functions are building blocks for the C library file functions that deal with streams. File descriptors 0, 1, and 2 are initially reserved for the standard input, output, and error streams.

The ZOODB INIT command is used to initialize both the file system (including establishing the root directories) and TPF collection support (TPFCS). The ZFINT command can be used to add additional #INODE and #FLOCK fixed file record pairs to an already established file system. If you enter the ZOODB INIT command when some subsystems are not in NORM state, the ZFINT command is also used to initialize file system support in those subsystems.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 340 on page 372 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 340. Changes to Build Scripts for File System Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CBOTBS	DLM	New	Added #INODE fixed file record and root directory initialization.
CFINBS	DLM	New	Added ZFINT command support.
CFZFBS	DLM	New	Added file system initialization.
CISOBS	DLM	Changed	Added file system API support.
COMXBS	DLM	Changed	Added file system functions.
CTALBS	DLM	Changed	Added support for the tpf_mvec library function.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 341 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 341. Changes to General Use C/C++ Language Header Files for File System Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ddsm.h	New	Not Applicable
c\$ddtb.h	New	Not Applicable
c\$eb0eb.h	Changed	No
c\$fer0.h	Changed	No
c\$fsqu.h	New	Not Applicable
c\$fva0.h	Changed	No
c\$proc.h	Changed	No
c\$spif.h	New	Not Applicable
c\$uprs.h	Changed	No
dirent.h	New	Not Applicable
errno.h	Changed	No
limits.h	Changed	No
modes.h	Changed	No
socket.h	Changed	No
stat.h	New	Not Applicable
stdio.h	Changed	No
sysapi.h	Changed	No
unistd.h	Changed	No
utime.h	New	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 342 on page 373 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 342. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only). for File System Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$back.h	New	No
i\$call.h	New	No
i\$des.h	New	No
i\$fsct.h	New	No
i\$fsdd.h	New	No
i\$fsqu.h	Changed	No
i\$glue.h	New	No
i\$gulp.h	New	No
i\$link.h	New	No
i\$make.h	New	No
i\$node.h	New	No
i\$opfd.h	New	No
i\$path.h	New	No
i\$psxl.h	New	No
i\$tdat.h	New	No
i\$tenv.h	New	No
i\$tran.h	New	No
i\$treq.h	New	No
i\$tres.h	New	No
i\$trth.h	New	No
i\$zero.h	New	No

Library Interface Scripts: Table 343 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 343. Changes to Library Interface Scripts for File System Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	Added file system API functions.
COMXXV	Changed	Added file system library functions.
CTALXV	Changed	Added the tpf_movec library member.

Library Members (Object Files): Table 344 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 344. Changes to Library Members (Object Files) for File System Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CASSRT	CISO	Changed	C Language	Changed the use of the puts C function to fputs.
CATOF	CISO	Changed	Object-Only	Internal changes.
CBCLSE	CISO	New	Object-Only	Added the fclose C function.
CBDFMT	CISO	Changed	Object-Only	Internal changes.

Table 344. Changes to Library Members (Object Files) for File System Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CBFLGS	CISO	New	Object-Only	Added the clearerr, feof, and ferror C functions.
CBFLSH	CISO	New	Object-Only	Added the fflush C function.
CBGETC	CISO	New	Object-Only	Added the fgetc, getc, and getchar C functions.
CBGETS	CISO	No Longer Supported	Assembler	Replaced by the CCGETS library member.
CBGPOS	CISO	New	Object-Only	Added the fgetpos and ftell C functions.
CBKFCB	CISO	Changed	Object-Only	Internal use.
CBOPEN	CISO	New	Object-Only	Added the fopen C function.
CBPERR	CISO	New	Object-Only	Added the perror C function.
CBPUTC	CISO	New	Object-Only	Added the fputc, putc, and putchar C functions.
CBPUTS	CISO	No Longer Supported	Assembler	Replaced by the CCPUTS library member.
CBREAD	CISO	New	Object-Only	Added the fread C function.
CBREOP	CISO	New	Object-Only	Added the freopen C function.
CBRPOS	CISO	New	Object-Only	Added the fseek, fsetpos, and rewind C functions.
CBSTBF	CISO	New	Object-Only	Added the setbuf and setvbuf C functions.
CBSTER	CISO	Changed	C Language	Added new errno messages.
CBUNGT	CISO	New	Object-Only	Added the ungetc C function.
CBWRIT	CISO	New	Object-Only	Added the fwrite C function.
CCGETS	CISO	New	Object-Only	Added the gets C function.
CCLOCP	CISO	Changed	Object-Only	Internal changes.
CCLOCS	CISO	Changed	Object-Only	Internal changes.
CCPRTF	CISO	New	Object-Only	Added the printf C function.
CCPUTS	CISO	New	Object-Only	Added the puts C function.
CCSCNF	CISO	New	Object-Only	Added the scanf C function.
CDDNUL	COMX	New	C Language	Added the null device driver.
CDDSOC	COMX	New	C Language	Added the socket device driver.
CDDTBL	COMX	New	C Language	Added a file system device driver table.
CDOECV	CISO	Changed	Object-Only	Internal changes.
CDOFCV	CISO	Changed	Object-Only	Internal changes.
CFPRTF	CISO	New	Object-Only	Added the fprintf C function.
CFSCNF	CISO	New	Object-Only	Added the fscanf C function.
CFSINT	CISO	Changed	Object-Only	Internal changes.
CFS001	COMX	New	C Language	Added the access C function.
CFS002	COMX	New	C Language	Added the chdir C function.
CFS003	COMX	New	C Language	Added the chmod C function.
CFS004	COMX	New	C Language	Added the chown C function.
CFS005	COMX	New	C Language	Added the close C function.
CFS006	COMX	New	C Language	Added the closedir C function.
CFS007	COMX	New	C Language	Added the creat C function.

Table 344. Changes to Library Members (Object Files) for File System Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS008	COMX	New	C Language	Added the dup C function.
CFS009	COMX	New	C Language	Added the dup2 C function.
CFS010	COMX	New	C Language	Added the fchmod C function.
CFS011	COMX	New	C Language	Added the fchown C function.
CFS012	COMX	New	C Language	Added the fcntl C function.
CFS013	COMX	New	C Language	Added the fstat C function.
CFS014	COMX	New	C Language	Added the fsync C function.
CFS015	COMX	New	C Language	Added the ftruncate C function.
CFS016	COMX	New	C Language	Added the getcwd C function.
CFS017	COMX	New	C Language	Added the link C function.
CFS018	COMX	New	C Language	Added the lseek C function.
CFS019	COMX	New	C Language	Added the lstat C function.
CFS020	COMX	New	C Language	Added the mkdir C function.
CFS021	COMX	New	C Language	Added the mknod C function.
CFS022	COMX	New	C Language	Added the open C function.
CFS023	COMX	New	C Language	Added the opendir C function.
CFS024	COMX	New	C Language	Added the read C function.
CFS025	COMX	New	C Language	Added the readdir C function.
CFS026	COMX	New	C Language	Added the readlink C function.
CFS027	COMX	New	C Language	Added the remove C function.
CFS028	COMX	New	C Language	Added the rename C function.
CFS029	COMX	New	C Language	Added the rewinddir C function.
CFS030	COMX	New	C Language	Added the rmdir C function.
CFS031	COMX	New	C Language	Added the stat C function.
CFS032	COMX	New	C Language	Added the symlink C function.
CFS033	COMX	New	C Language	Added the tmpfile C function.
CFS034	COMX	New	C Language	Added the tmpnam C function.
CFS035	COMX	New	C Language	Added the umask C function.
CFS036	COMX	New	C Language	Added the unlink C function.
CFS037	COMX	New	C Language	Added the utime C function.
CFS038	COMX	New	C Language	Added the write C function.
CFS102	COMX	New	C Language	Added the internal FDUPFD function.
CFS103	COMX	New	C Language	Added the internal FGETFD function.
CFS104	COMX	New	C Language	Added the internal FGETFL function.
CFS106	COMX	New	C Language	Added the internal FILENODE function.
CFS108	COMX	New	C Language	Added the internal FINDNODE function.
CFS109	COMX	New	C Language	Added the internal FREEFD function.
CFS111	COMX	New	C Language	Added the internal FREENODE function.
CFS113	COMX	New	C Language	Added the internal FSETFD function.
CFS114	COMX	New	C Language	Added the internal FSETFL function.
CFS115	COMX	New	C Language	Added the internal FUNLCK function.
CFS116	COMX	New	C Language	Added the internal FWRLCK function.
CFS119	COMX	New	C Language	Added the internal GETFS function.

Table 344. Changes to Library Members (Object Files) for File System Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS121	COMX	New	C Language	Added the internal GETNODE function.
CFS123	COMX	New	C Language	Added the internal IACCESS function.
CFS126	COMX	New	C Language	Added the internal ICHMOD function.
CFS127	COMX	New	C Language	Added the internal ICHOWN function.
CFS130	COMX	New	C Language	Added the internal ILINK function.
CFS131	COMX	New	C Language	Added the internal INAMETOI function.
CFS135	COMX	New	C Language	Added the internal IREADLNK function.
CFS139	COMX	New	C Language	Added the internal ISTAT function.
CFS145	COMX	New	C Language	Added the internal LOCKNODE function.
CFS147	COMX	New	C Language	Added the internal LOCKPROC function.
CFS148	COMX	New	C Language	Added the internal LOCKZERO function.
CFS149	COMX	New	C Language	Added the internal MAKEFILE function.
CFS150	COMX	New	C Language	Added the internal PATHTOII function.
CFS152	COMX	New	C Language	Added the internal SUBSUME function.
CFS153	COMX	New	C Language	Added the internal TESTFD function.
CFS154	COMX	New	C Language	Added the internal TRANPATH function.
CFS157	COMX	New	C Language	Added the internal UNLKNODE function.
CFS159	COMX	New	C Language	Added the internal UNLKPROC function.
CFS160	COMX	New	C Language	Added the internal UNLKZERO function.
CFS164	COMX	New	C Language	Added the internal FILEBACK function.
CFS165	COMX	New	C Language	Added the internal FINDBACK function.
CFS166	COMX	New	C Language	Added the internal LOCKBACK function.
CFS167	COMX	New	C Language	Added the internal UNLKBACK function.
CFS168	COMX	New	C Language	Added the internal TRANMDN function.
CFS169	CISO	New	C Language	Added support to initialize the POSIX layer.
CFS304	COMX	New	C Language	Added the internal CLOSE04 function.
CFS354	COMX	New	C Language	Added the internal GET04 function.
CFS404	COMX	New	C Language	Added the internal OPEN04 function.
CFS454	COMX	New	C Language	Added the internal PURGE04 function.
CFS504	COMX	New	C Language	Added the internal PUT04 function.
CFS554	COMX	New	C Language	Added the internal RESIZE04 function.
CFS604	COMX	New	C Language	Added the internal SIZE04 function.
CGSCAN	CISO	Changed	Object-Only	Internal macro changes.
CHDGFN	CISO	Changed	Object-Only	Internal changes.
CILG10	CISO	New	Object-Only	Added an internal function.
CLLOAD	CISO	Changed	Object-Only	Internal changes.
CMOVEC	CTAL	New	Assembler	Added the tpf_movec C function.
COFLNO	CISO	New	Object-Only	Added the fileno C function.
COFLOK	CISO	New	Object-Only	Added an internal function.
COPSTR	CISO	Changed	Object-Only	Added an internal function.
CPRSMA	CISO	Changed	C Language	Updated for redirection of standard I/O.
CPRTF	CISO	No Longer Supported	C Language	Replaced by the CCPRTF library member (object file).

Table 344. Changes to Library Members (Object Files) for File System Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CSCNF	CISO	No Longer Supported	C Language	Replaced by the CCSCNF library member (object file).
CSFMON	CISO	Changed	Object-Only	Internal changes.
CSGFAE	CISO	New	C Language	Internal changes.
CSITOA	CISO	New	Object-Only	Added an internal function.
CSPRTF	CISO	Changed	Object-Only	Added the sprintf C function.
CSSCNF	CISO	Changed	Object-Only	Added the scanf C function.
CSTLCL	CISO	Changed	Object-Only	Internal changes.
CSTOLD	CISO	Changed	Object-Only	Internal changes.
CSYSTEM	CISO	Changed	C Language	Enhanced for file system support
CVFPTF	CISO	New	Object-Only	Added the vfprintf C function.
CVPRTF	CISO	New	Object-Only	Added the vprintf C function.
CVSPTF	CISO	Changed	Object-Only	Added the vsprintf C function.
CWLEN	CISO	Changed	Object-Only	Internal changes.
CWNCPY	CISO	Changed	Object-Only	Internal changes.
CXXFUN	CISO	Changed	Object-Only	Added C exit cleanup.
C1FDOP	CISO	New	Object-Only	Added the fdopen C function.
C1MHFS	CISO	New	Object-Only	Added an internal function.
C1OHFS	CISO	New	Object-Only	Added an internal function.
C1OPST	CISO	New	Object-Only	Added an internal function.
C1P124	CISO	New	Object-Only	Added an internal function.
C514	COMX	Changed	C Language	Changed internal function.
C528	COMX	Changed	C Language	Changed internal function.
C537	COMX	Changed	C Language	Changed internal function.
UDDIPM	COMX	New	C Language	Sample input message device driver.
UDDTBL	COMX	New	C Language	User device driver table.
UDDWTC	COMX	New	C Language	Sample WTOPC output device driver.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 345 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 345. Changes to Members (Object Files) for File System Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CBOT	CBOT	New	C Language	Added initialization of #INODE fixed file records and setup of root directories.
CENV	CENV	Changed	C Language	Added defaults for the current working directory and the stdin, stdout, and stderr C functions.

Table 345. Changes to Members (Object Files) for File System Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFIN	CFIN	New	C Language	Added verification of the integrity of #INODE 0 fixed file record.
CFZF	CFZF	New	C Language	Initialized the file system.
UBOT	CBOT	New	C Language	Provided for user exit at file system initialization.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 346 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 346. Changes to Copy Members for File System Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCIT	Control Program	CCNUCL	Changed	Internal changes.
CHSZ	Control Program	CCNUCL	Changed	Initialized the new fields in page 2 of the entry control block (ECB).
CICR	Control Program	CCNUCL	Changed	Added file system initialization.
CLW5	Control Program	CCLAW3	Changed	Added a test for file system file descriptors.
CLW7	Control Program	CCLAW3	Changed	Added a test for file system file descriptors.

Fixed File Records

Table 347 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 347. Changes to Fixed File Records for File System Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#INODE	New	Fixed file records used for the file system.
#FLOCK	New	Fixed file records used for the file system.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 348 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 348. Changes to Data Macros for File System Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
DCTPFX	Changed	No
EB0EB	Changed	No
GROUP	Changed	No
ICLAW	Changed	No
IDSDSA	Changed	No
IEQCE2	Changed	No
INODE	New	Not Applicable
IPROC	Changed	No

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 349 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 349. Changes to SIP Skeleton and Internal Macros for File System Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed
SPRIAT	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 350 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 350. Changes to SIP Stage II Macros for File System Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 351 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 351. Changes to Segments for File System Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BKD7	Real-Time Assembler	Not Applicable	New	Added a recoup descriptor for file system records.
CJ01	Real-Time Assembler	Not Applicable	Changed	Added file system initialization for all subsystems in the ZOODB command.
CTKO	Real-Time Assembler	Not Applicable	Changed	Added a call to file system initialization (CFIN).
CLMINT	Real-Time Assembler	Not Applicable	Changed	Added code to complete file system initialization.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added support for the ZFINT command.
CVCX	Real-Time Assembler	Not Applicable	Changed	Added a call to the CBOT segment.
FTER00	Offline C Language	FCTBG	Changed	Added file system error messages.
FTVA02	Offline C Language	FCTBG	Changed	Added validation of the file system record types.
FTVA03	Offline C Language	FCTBG	Changed	Added file system records to the list of valid record types.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 352. Changes to User Exits for File System Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Initialization	CBOT	UBOT	New	Allows you to create directories or set up device drivers at file system initialization time.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 353 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 353. Changes to Commands for File System Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZFINT	New	Sets the file system initialization flag.

Messages and System Errors

Table 354 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 354. Changes to Messages and System Errors for File System Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007510	System Error	New
007511	System Error	New
007512	System Error	New
007513	System Error	New
007514	System Error	New
007515	System Error	New
007516	System Error	New
007517	System Error	New
CBOT0001E	Online	New
CBOT0002E	Online	New
CBOT0004I	Online	New
CBOT0005E	Online	New
CFIN0001W	Online	New
CFIN0002E	Online	New
CFIN0003I	Online	New
CFIN0004I	Online	New
CFIN0005W	Online	New
FCTB0108E	Offline	New
FILE0005W	Online	New
FINT0001I	Online	New
FINT0002I	Online	New

Table 354. Changes to Messages and System Errors for File System Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
FINT0005E	Online	New
FINT0006I	Online	New
FINT0007I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 355 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 355. Changes to TPF Publications for File System Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP07	A general description of file system support considerations has been added.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU07	Added file system API C functions.
<i>TPF Concepts and Structures</i>	GTPACON05	Updated with high-level file system concepts.
<i>TPF Library Guide</i>	GTPDOC07	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for file system support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG07	Updated with migration considerations for file system support.
<i>TPF Operations</i>	GTPOPR07	Updated with information about the commands that were added and changed for file system support.
<i>TPF System Installation Support Reference</i>	GTPINR07	Updated with information about the new UBOT user exit.
<i>TPF Programming Standards</i>	GTPPSM07	Updated with information about modified and additional C programming standards.
<i>TPF System Generation</i>	GTPSYSG07	Added information about #INODE and #FLOCK fixed file records.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

File system support has changed the implementation of the perror and assert C functions by ISO-C support as follows:

- The default behavior of perror has changed to now write to stderr. Previously, the perror C function was not supported by ISO-C support.
- The assert function now writes to stderr. Previously, the assert C function wrote to the console through WTOPC or to a dump through SERRC.

Both of these C functions can be directed to WTOPC if opened on a WTOPC special file or a SERRC special file.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

This section provides information about how to install file system support on your TPF 4.1 system, as well as how to customize file system support after installation. Instructions are also provided about installing file system support without affecting your existing systems.

To Install File System Support on Your TPF 4.1 System

Use the following procedure to use the file system in your TPF 4.1 system.

- Install PUT 7.

See the APEDIT for APAR PJ25089 for more information. The key items in the PUT 7 installation to focus on for file system support are:

- Create and allocate the new #INODE and #FLOCK fixed file records for each subsystem. You need one #INODE and one #FLOCK fixed file record for each file (or directory or symbolic link) that will be created on the file system.
- Recompile the FTVA02, FTVA03, and FTER00 segments.
- Relink the file address compute program (FACE) table.
- Relink the COMX and CISO libraries.
- Allocate the new programs and create a new program allocation table (IPAT).
- Link the CCNUCL and CCLAW3 CSECTs.
- Load the new control program (CP) to a new image using the auxiliary loader (TLDR).
- IPL the new image and cycle the TPF 4.1 system to NORM state.
- Enter the ZOODB INIT command. This initializes TPFCS, which is a prerequisite to the file system support, as well as the file system.
 - If a subsystem is not in NORM state when you enter the ZOODB INIT command, you initialize the file system on that subsystem by entering the ZFINT command in 1052 state.

- When initialization is complete, the file system can be used.

Additional Information:

See *TPF Operations* for more information about the ZFINT and ZOODB INIT commands.

To Customize File System Support after Installation

You can customize file system support in the following ways:

- By implementing additional device drivers

The following device drivers are provided with file system support:

- The null file (/dev/null)
- The input messages (/dev/tpf.imsf)
- The output messages (/dev/tpf.omsf).

The following device drivers are **optional**:

- The standard I/O device driver, which builds a device driver from the code previously used by the CBPUTS and CBGETS library members. Application programs that currently use the scanf and printf C functions will not work with file system support until this device driver is set up.
- Set the TPF_STDIN_PATHNAME and TPF_STDOUT_PATHNAME environment variables to point to the new device drivers. You can modify the UENV segment to change these environment variables if a different default is required. To do so, enter the ZOLDR ACCEPT and ZRIPL commands. You can alternatively load the UENV segment with the CP change required by file system support.
- By modifying the criteria for granting access to directories and files
- By using the ZFINT command to add additional #INODE and #FLOCK fixed file record pairs to an initialized file system.

To Install File System Support without Affecting Existing TPF 4.1 Systems

APAR PJ25089 requires that changes to existing C language applications that call the assert, gets, printf, puts, or scanf C functions be made at the same time the APAR is applied. Another APAR, PJ25240, permits you to install file system support without affecting existing C language applications, and permits C language applications that require the old versions of the assert, gets, printf, puts, or scanf C functions to coexist with new applications that use full file system support.

Note: APAR PJ25240 does not permit an ECB to call both old and new file system functions.

The previous version of the scanf C function scans one line of input, even if there are more or fewer formatters than can be scanned in the line. (Standard C treats a newline as a whitespace character.)

With the new file system functions you can intermix whichever of the text-oriented I/O functions as are convenient to read or write the same stream. This is not possible to do with the old functions.

Migration to File System Support: The new migration to file system support works as follows:

- By default, the only file system functions that are available are the previous versions of the assert, gets, printf, puts, or scanf C functions.

- The selection of previous file system functions is controlled by an environment variable named `TPF_FILE_SYSTEM_MIGRATION`. This is set globally to `USE_OLD_FUNCTIONS` during restart by the CENV segment.

Note: There is a brief window during restart (between CLIB and CENV) when the old `<stdio.h>` I/O functions cannot be selected.

- The selection of old or new file system functions occurs when a process enters its first DLM, as part of C runtime initialization. If at that time `TPF_FILE_SYSTEM_MIGRATION` is set to `USE_OLD_FUNCTIONS`, the old functions are selected and the process cannot use the new file system functions.
- To select the new file system functions, either unset `TPF_FILE_SYSTEM_MIGRATION` or set it to a value other than `USE_OLD_FUNCTIONS` before the process calls its first DLM. You can do this globally by coding an `unsetenv` or `setenv` call in the UENV realtime restart user exit, loading and accepting UENV (UENV runs before E-type loader restart, so UENV must be in the program base) and IPLing the processor again. Individual applications can select the old or new file system functions by calling the `CENVC` macro before entering any DLMs.

Note: The global environment list is subsystem specific. To globally default to using the new file system functions, an updated UENV must be loaded into the BSS.

Virtual File Access (VFA) Synchronization (APAR PJ25094)

The following section discusses the migration considerations for virtual file access (VFA) synchronization. Transaction Processing Facility (TPF) transaction services is also part of APAR PJ25094. See “TPF Transaction Services (APAR PJ25094)” on page 423 for more information about TPF transaction services.

Prerequisite APARs

See the APEDIT for APAR PJ25094 for information about prerequisite APARs.

Functional Overview

Virtual file access (VFA) is a storage management facility that dynamically allocates frequently referenced records to real main storage, and provides an intermediate staging area between the application program data and the direct access file database so you can avoid maintaining file completion information in an entry control block (ECB). When an application program issues a file, the TPF 4.1 system copies the data record into VFA whether the record is a VFA synchronization candidate or not. The record, which can be a fixed file record or a pool record, is then written from VFA by the control program. The VFA candidacy of the record determines whether it is retained in VFA after the write has been completed. Records are identified as VFA synchronization candidate in the record ID attribute table (RIAT).

You can use VFA to effectively manage the real main storage that cannot be efficiently used by TPF working storage and main storage resident application programs. Because the VFA area is in real main storage, you can obtain much higher access rates. In addition, input/output (I/O) channel load is reduced because VFA permits multiple updates to be applied to a record resident in VFA without the updates affecting the database copy until necessary.

Before VFA synchronization:

- Very few records (except for read-only data records and processor-unique records) were good candidates for VFA in a loosely coupled environment.
- Synchronization of records did not exist. If a record located in the VFA area of several processors is updated on one processor, the other processors then refer to old data until a FIND and HOLD macro is issued. Although you may find this process acceptable for records that are seldomly updated but frequently referenced (such as credit verification files that are updated only once a week), you may **not** find it acceptable for records that are accessed and updated frequently. Such records may include fare data in an airline application program.

With VFA synchronization:

- There is an effective way in a loosely coupled environment to support VFA synchronization candidacy for records that are updated by application programs during normal system operation. VFA synchronization provides the capability to synchronize updates to frequently referenced records in VFA across all processors in a complex. This synchronization ability allows a wider range of data, such as fare data in an airline application, to be accurately and quickly accessible to application programs on all processors in a loosely coupled environment.

Synchronization across processors occurs when each processor is notified as a record is modified; then, each processor referencing that record is notified to

refresh its copy so that the record is always current. The synchronization is done by using the locking capabilities of the IBM 3990 Model 3 or later models with the multi-path lock facility (MPLF) installed.

- Overall TPF 4.1 system performance is improved by allowing increased use of VFA. This lowers the number of physical I/O operations performed from the TPF 4.1 system to attached DASD control units and improves the effectiveness of accessing data and communication between application programs, which results in quick response times even during high system activity.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

To ensure your TPF 4.1 system performs correctly with VFA synchronization you must establish the required operating environment. The following section describes the hardware and software requirements specific to VFA synchronization.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Storage Devices: The following section discusses storage devices such as tape units and direct access storage device (DASD).

Direct Access Storage Device (DASD) and DASD Control Units: VFA synchronization uses the contention notification function of the IBM 3990 Model 3 or later models with the multi-path lock facility (MPLF) installed. Verify that the control units in your complex are running with the current levels of MPLF microcode.

Software (Programming Requirements)

There are no software requirements.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 356 on page 388 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 356. Changes to General Use C/C++ Language Header Files for VFA Synchronization

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	No
c\$pi1dt.h	Changed	No
c\$syseq.h	Changed	No
c\$systc.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 357 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 357. Changes to CINFC Tags for VFA Synchronization

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMLTT	361	New

Copy Members

Table 358 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 358. Changes to Copy Members for VFA Synchronization

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CICR	Control Program	CCNUCL	Changed	Updated for VFA synchronization.
CIDP	Control Program	CCCPSE	Changed	Updated for VFA synchronization.
CJIC	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJIE	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJIF	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJII	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJIM	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJIO	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJIQ	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJIT	Control Program	Changed	CCSONS	Updated for VFA synchronization.
CJIU	Control Program	CCRCSC	Changed	Updated for VFA synchronization.

Table 358. Changes to Copy Members for VFA Synchronization (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CJIV	Control Program	CCRCSC	Changed	Updated for VFA synchronization.
CJIX	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CJIY	Control Program	CCSONS	Changed	Updated for VFA synchronization.
CT05	Control Program	CCCTIN	Changed	Updated for VFA synchronization.
CT41	Control Program	CCCTIN	Changed	Updated for VFA synchronization.
CVF3	Control Program	CCVFAC	Changed	Updated for VFA synchronization.

Fixed File Records

Table 359 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 359. Changes to Fixed File Records for VFA Synchronization

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMM4	Changed	Updated for VFA synchronization to include ordinal record 149 for the control record of the ZRTDM commands.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 360 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 360. Changes to Data Macros for VFA Synchronization

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
DC0DC	Changed	Yes
DCTMFS	Changed	Yes
DCTMIO	Changed	Yes
DCTRDF	Changed	No
DCTRIT	Changed	No
DCTSOI	Changed	No
DLTEC	Changed	No
IDSCFW	Changed	Yes
IDSCS2	Changed	No
IDSFLV	Changed	No
IDSSST	Changed	No
MRLNQ	Changed	No
PI1DT	Changed	No
RITEQ	Changed	No
SYSTG	Changed	Yes

Table 360. Changes to Data Macros for VFA Synchronization (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
VF0AC	Changed	Yes

General Macros: There are no changes.

Selected Equate Macros: Table 361 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 361. Changes to Selected Equate Macros for VFA Synchronization

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	Yes
SYSEQ	Changed	Yes
TPFGLB	Changed	Yes

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 362 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 362. Changes to SIP Skeleton and Internal Macros for VFA Synchronization

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 363 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 363. Changes to SIP Stage II Macros for VFA Synchronization

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed
RIATA	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 364 on page 391 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See

TPF System Macros for a complete description of all system macros.

Table 364. Changes to System Macros for VFA Synchronization

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
FCTL	Changed	Yes
IDATB	Changed	Yes
\$LCKRC	New	Yes
\$ULKRC	New	Yes

System Macros (IBM Use Only): There are no changes.

Segments

Table 365 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Note: The CZ1SE segment was updated with system error equates for VFA synchronization but you do **not** need to reassemble programs that call this segment.

Table 365. Changes to Segments for VFA Synchronization

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
ACPL	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
AMX2	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
ARD3	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
BDBM	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
BXAT	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
BXCL	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
BXET	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CACA	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CACR	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CAC1	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that call this segment.
CAC2	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.

Table 365. Changes to Segments for VFA Synchronization (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CAC4	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CAC5	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CAC6	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CAC8	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CAC9	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CFDS	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CLMA	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CLMB	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMC	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMD	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLME	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMF	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CLMG	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMH	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMI	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMM	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMN	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLMP	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CLM1	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLM2	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CLM3	Real-Time Assembler	Not Applicable	Changed	This segment was not updated but changes were made to DSECTs that this segment calls.

Table 365. Changes to Segments for VFA Synchronization (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CNPR	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAA	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAB	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAC	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAD	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAE	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAF	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAG	Real-Time Assembler	Not Applicable	Not Applicable	Updated for VFA synchronization.
CPAH	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPAI	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CPSI	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSS1	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSS2	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSS3	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSS5	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSS6	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSS7	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSY0	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.

Table 365. Changes to Segments for VFA Synchronization (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSY1	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CSY2	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CTKR	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CTKT	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVAX	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVFS	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CVFX	Real-Time Assembler	Not Applicable	New	Created for VFA synchronization as a user exit for VFA restart part 2.
CVF2	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization for VFA restart part 2 and to allow for a user exit for file down of the DFIL candidate when the TPF 4.1 system is cycled to 1052 state.
CVF4	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVF7	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CVF8	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVF9	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
CVGD	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVGE	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVGG	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVPP	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVPR	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVQB	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVRM	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.

Table 365. Changes to Segments for VFA Synchronization (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVUE	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVUF	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVX0	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CVX6	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYEA	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYEB	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYED	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYEM	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYEN	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYEP	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYGN	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYMA	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPB	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPC	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPD	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPE	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPH	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPI	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.

Table 365. Changes to Segments for VFA Synchronization (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYPL	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPM	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPR	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPS	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYPU	Real-Time Assembler	Not Applicable	Not applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYSA	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYSM	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
CYYI	Real-Time Assembler	Not Applicable	Not Applicable	This segment was not updated but changes were made to DSECTs that this segment calls.
DRD0	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
DRD1	Real-Time Assembler	Not Applicable	Changed	Updated because of modifications to the record ID attribute table (RIAT).
DRD2	Real-Time Assembler	Not Applicable	Changed	Updated because of modifications to the record ID attribute table (RIAT).
DRD3	Real-Time Assembler	Not Applicable	Changed	Updated because of modifications to the record ID attribute table (RIAT).
DRD5	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization.
DRD6	Real-Time Assembler	Not Applicable	New	Created for VFA synchronization.
DRD7	Real-Time Assembler	Not Applicable	New	Created for VFA synchronization.
JCD0	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization with changes made to DSECTs that call this segment and for data collection reports.
JCD1	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization with changes made to DSECTs that call this segment and for data collection reports.
JCD2	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization with changes made to DSECTs that call this segment and for data collection reports.
JCD3	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization with changes made to DSECTs that call this segment and for data collection reports.
JCD4	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization with changes made to DSECTs that call this segment and for data collection reports.

Table 365. Changes to Segments for VFA Synchronization (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
JCD6	Real-Time Assembler	Not Applicable	Changed	Updated for VFA synchronization with changes made to DSECTS that call this segment and for data collection reports.
JRA2	Offline PL/I	Not Applicable	Changed	Updated for VFA synchronization with changes made to DSECTS that call this segment and for data collection reports.
IB04	Offline Assembler	IPLB	Changed	Updated for VFA synchronization.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 366. Changes to ECB User Exits for VFA Synchronization

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
VFA Restart Part 2	CVF2	CVFX	New	Allows you to decide whether a specific VFA buffer that is marked as delayed file should be filed when the TPF 4.1 system cannot determine if locks are still held in the external lock facility for a specific processor.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 367 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 367. Changes to Commands for VFA Synchronization

Command	New, Changed, or No Longer Supported?	Description of Change
ZRHLD DELETE	Changed	Added the VSYNC parameter, which allows you to delete the VFA synchronization locks.

Table 367. Changes to Commands for VFA Synchronization (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZRHLD DISPLAY	Changed	Added the VSYNC option, which allows you to display information about all the VFA synchronization locks.
ZRTDM DISPLAY	Changed	Added information about the VFA synchronization locks as well as the new CTLVAL parameter.
ZRTDM MODIFY	Changed	Added the SDElay and SIMMed parameters, which allow you to modify the VFA synchronization fixed record candidacy attribute and the pool record candidacy attribute in the record ID attribute table (RIAT).
ZRTDM RESET	New	Use this command to reset the record ID attribute table (RIAT) control value in the RIAT control record.
ZSYSG ALTER	Changed	Added the LTRCE parameter for DASD lock tracing.
ZVFAC DISPLAY	Changed	Added information about VFA-S lock buffers, VFA-X lock buffers, and cached record hold table (RHT) locks.
ZVFAC INDICATE	Changed	Added information about VFA-S hits, VFA-X hits, VFA lock misses, VFA contentions, record hold table (RHT) contentions, cached RHT hits, and VFA lock ageouts.

Messages and System Errors

Table 368 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 368. Changes to Messages and System Errors for VFA Synchronization

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000038	System Error	Changed
006000	System Error	New
006001	System Error	New
006002	System Error	New
006003	System Error	New
006005	System Error	New
006006	System Error	New
006007	System Error	New
006008	System Error	New
006009	System Error	New
00600A	System Error	New
00600B	System Error	New
00600C	System Error	New
00600D	System Error	New
00600E	System Error	New

Table 368. Changes to Messages and System Errors for VFA Synchronization (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
00600F	System Error	New
006010	System Error	New
006012	System Error	New
006013	System Error	New
CPAA0012E	Online	New
RCSC0001W	Online	New
RHLD0002I	Online	New
RHLD0020E	Online	No Longer Supported
RHLD0027E	Online	No Longer Supported
RHLD0030E	Online	New
RHLD0037E	Online	New
RHLD0098I	Online	No Longer Supported
RHLD0110I	Online	New
RTDM0001I	Online	No Longer Supported
RTDM0005I	Online	New
RTDM0006I	Online	New
RTDM0007I	Online	New
RTDM0010I	Online	New
RTDM0032E	Online	New
RTDM0033E	Online	New
RTDM0071E	Online	New
RTDM0072E	Online	New
RTDM0082E	Online	New
RTDM0083E	Online	New
RTDM0084E	Online	New
RTDM0089E	Online	New
VFAC0007I	Online	No Longer Supported
VFAC0014I	Online	No Longer Supported
VFAC0024I	Online	New
VFAC0086I	Online	New
VFAC0110W	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 369 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 369. Changes to TPF Publications for VFA Synchronization

Publication Title	Softcopy File Name	Description of Change
<i>TPF Concepts and Structures</i>	GTPCON05	Updated to include information about VFA synchronization.
<i>TPF Database Reference</i>	GTPDBR05	Updated to include information about VFA synchronization.
<i>TPF Library Guide</i>	GTPDOC07	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about the messages and system errors that were added, changed, and no longer supported for VFA synchronization. See "Messages and System Errors" on page 398 for more information about these messages and system errors.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG07	Updated with migration considerations for VFA synchronization.
<i>TPF Operations</i>	GTPOPR07	Updated with information about the commands that were added and changed for VFA synchronization. See "Commands" on page 397 for more information about these commands.
<i>TPF Program Development Support Reference</i>	GTPPDR06	Updated with a new dump label for VFA synchronization.
<i>TPF System Generation</i>	GTPSYG07	Updated to add SDElay and SIMMed to the VFAP and VFAP parameters on the RIATA START call.
<i>TPF System Installation Support Reference</i>	GTPINR07	Updated information about RIAT processing to include restrictions when using this user exit with VFA synchronization. Add information about the CVFX user exit for VFA restart.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR07	Updated collector information modified by VFA synchronization, the details of file reduction, the content of the VFA summary report, and the content of the random file access summary report.
<i>TPF System Macros</i>	GTPSYS07	Updated to include the new \$LCKRC and \$ULKRC macros. In addition, information for the existing FCTL, FLSPC, FNSPC macros was updated. See "System Macros" on page 390 for more information about these system macros.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install VFA synchronization.

1. Migrate to the appropriate model of the IBM 3990 DASD control unit with the multi-path lock facility (MPLF) installed. See “Hardware” on page 35 for more information about hardware requirements and this DASD control unit.
2. Install program update tape (PUT) 7, which contains VFA synchronization, to your TPF 4.1 system.

Notes:

- a. VFA synchronization must be installed on all processors in your complex **before** you can enter the ZRTDM MODIFY command.
 - b. A TPF 4.1 system with VFA synchronization installed can coexist in the same loosely coupled complex with a TPF 4.1 system without VFA synchronization installed as long as no VFA synchronization candidates are defined.
3. Define VFA synchronization candidates by entering

ZRTDM MODIFY RECID=xx VFAF-SIMM, VFAP-SIMM

where xx is the ID of the fixed file record or pool record you are defining as a VFA synchronization candidate.

Note: Ensure all processors in your complex refer to the same record ID attribute table (RIAT) **before** entering the ZRTDM MODIFY command. For example, different images may refer to different copies of the RIAT.

4. Update the RIAT that is used for the general file loader loads to reflect selection of the VFA synchronization candidate.

Note: If different processors refer to different RIATs such that some have RIAT IDs defined as VFA synchronization candidates while others have the same RIAT IDs defined as something other than a VFA synchronization candidate, there is a data integrity exposure if records with conflicting RIAT IDs are referenced.

Additional Information:

- VFA synchronization can coexist with previous PUTs that were applied to your TPF 4.1 system as long as VFA synchronization candidate records were **not** defined in the RIAT and the ZRTDM MODIFY command was not entered.
- You do not need a migration driver to move from a TPF 4.1 system **without** VFA synchronization installed to a TPF 4.1 system **with** VFA synchronization installed.
- See *TPF Operations* for more information about the ZRTDM MODIFY command.
- See *TPF Database Reference* for general information about VFA and VFA synchronization candidates.
- See *TPF System Generation* for more information about the RIAT START call and general RIAT information.

Fallback Scenarios

There are no fallback considerations until you have VFA synchronization candidates defined, and all loosely coupled processors in your complex must have PUT 7 installed before you can define those candidates.

If necessary, you can fall back to PUT 6 as long as there are no VFA synchronization candidates defined already. If you have already defined VFA synchronization candidates, you must remove them from the RIAT before you can fall back to PUT 6.

TPF Collection Support (APAR PJ25098)

The following section discusses the migration considerations for TPF collection support (TPFCS).

Prerequisite APARs

See the APEDIT for APAR PJ25098 for information about prerequisite APARs.

Functional Overview

TPF collection support (TPFCS) is a database manager service that enables application programs running on TPF to create, modify, and access collections. Collections are abstract representations of data. TPFCS provides three collection lifetimes:

- Persistent long-term
- Persistent short-term
- Temporary.

Collections are said to be *persistent* if they maintain their state beyond the life of the entry control block (ECB) that creates them. Those which are *temporary* maintain their state and are accessible only for the life of the ECB that creates them.

TPFCS transparently integrates database functionality with the application program and eliminates the need for data translation routines.

It is extremely important to be able to use a single, client-level application programming interface (API) for saving and managing data regardless of how that data is physically stored on the database. Most companies store their critical data in several different types of databases. Programs that store and access this data need to be aware of the format that the data is in, which potentially limits code reuse and restricts the data format from changing. With a TPFCS database, application programs can essentially access and manage the data without the TPF 4.1 system having any knowledge of the contents of the data stored. Furthermore, the TPFCS APIs can be called directly from C and C++ programs.

The TPFCS database consists of user-defined components known as *data stores*. Each data store can contain multiple collections with several different abstract collection types available in the TPFCS collection library. Each collection consists of zero or more related elements that are the same type. Each element may be a primitive data type, a structure with subfields, a reference to a TPF file, or a reference to another collection.

To increase the productivity of application programmers, TPFCS provides:

- Improved database integrity:
 - A logical method of database organization
 - A mechanism for concurrency control
 - Utilities for database maintenance and testing
- Implementation solutions:
 - A set of standardized assembler macros or C and C++ functions that forms the application programming interface (API):
 - Several different abstract representations
 - Predefined data manipulation operations

- Central routines for database access and management
- Rapid development time
- Enhanced application program quality:
 - Emphasizes code reuse
 - Hides low-level TPF interfaces.

The collection library enables you to choose the appropriate abstract collection type for a given condition by providing collections that are complete, systematic, and have a consistent combination of basic properties. These properties help you to select abstract collection types that are at the appropriate level of abstraction. For example, in a particular application program you may have the choice between using a bag or a key bag collection. A *bag* is an unordered collection of zero or more elements with no key. A *key bag* is an unordered collection of zero or more elements that have a key. The properties of these two collections will help you decide which one is more appropriate. See *TPF Application Programming* for more information about properties.

Special and Lowercase Characters

The TPF 4.1 system no longer translates special and lowercase characters in output messages into periods (.) for the following commands:

- ZACOR
- ZADCA
- ZAFIL
- ZAPGM
- ZAREC
- ZBROW DISPLAY (with the ENTRY parameter)
- ZDCOR
- ZDDCA
- ZDFIL
- ZDPGM
- ZDREC
- ZNRVT
- ZNSCB.

If you have workstations that do not support special or lowercase characters, translate the output into characters that your workstations do support by using the UCCWTOP user exit. This is **very** important because sending output to a workstation in a format that the workstation does not support can cause results that cannot be predicted.

See *TPF System Installation Support Reference* for more information about the UCCWTOP user exit. See *TPF Programming Standards* for more information about special characters.

Supervisor Call (SVC) User Exit Information

The following information is included for those who have SVC user exits active.

TPF collection support uses a modified form of the FIND and FILE macros. Instead of passing information in the data levels of the entry control block (ECB), TPF collection support passes the corresponding information in a control block called a DECB (IDSDEC). When the FIND or FILE SVC is issued, the data level value is set

to X'FF' and register 14 contains the address of the DECB control block. The information for the request is then retrieved from the passed DECB control block.

TPF collection support uses the following modified FIND and FILE macros:

- FINDC
- FINWC
- FIWHC
- FILEC
- FILNC
- FILUC
- UNFRC.

See *TPF General Macros* for more information about the FIND and FILE macros.

The control program support for these modified macros is found in the CEFL copy segment in CCFADC.

The DECB fields contain the same format as a core block reference word (CBRW), file address reference word (FARW), and extended file address reference word (FAXW). The DECB fields are used as follows:

IDECUCRW	Corresponds to an ECB core block level.	
	IDECUDAD	Contains the address of the core block to be used or 0.
	IDECUCT0	Contains the core block type indicator or X'0001' to signify there is no core block attached.
	IDECUDLH	Contains the data length.
IDECUFRW	Corresponds to an ECB file address reference word.	
	IDECURID	Contains the record ID for the request.
	IDECURCC	Contains the record code check (RCC) value for the request.
	IDECUFA	Contains the file address for the request.
IDECUFX0	Contains the extended file address reference word information.	
IDECUSUD	When completed, this field will be set to the SUD error value or zero if there is no error.	

Because the data level value is set to X'FF', the data level in the macro trace in a dump is printed as an asterisk (*).

In addition, because TPF collection support must be able to easily switch subsystems, the DECB control block also contains the database ID (DBI) and subsystem user (SSU) values to use for the request. The IDECUDBI field contains the DBI value and the IDECUSSU field contains the SSU value. If IDECUDBI is zero, the DBI of the ECB and SSU values are used.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 370 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 370. Changes to Build Scripts for TPF Collection Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CJ00BS	DLM	New	Added build script for the TPFCS central routines.
CJ01BS	DLM	New	Added build script for the ZOODB command.
CJ03BS	DLM	New	Added build script for the TPFCS internal task dispatcher.
CJ04BS	DLM	New	Added build script for the TPFCS restart scheduler.
CJ10BS	DLM	New	Added build script for the ZBROW commnd.
CJ13BS	DLM	New	Added build script for TPFCS recoup persistent identifier (PID) chase build script.
CJ17BS	DLM	New	Added build script for TPFCS recoup build script.
CORMBS	DLM	New	Added build script for external device support.
CTALBS	DLM	Changed	Updated for external device support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 371 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 371. Changes to General Use C/C++ Language Header Files for TPF Collection Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$yseq.h	Changed	No
c\$to2.h	New	No
c\$tpxd.h	New	No
plfapi.h	Changed	No
reusable.h	Changed	No
tpftape.h	Changed	No
types.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 372 on page 407 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 372. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF Collection Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ccw1.h	New	No
c\$tdat.h	New	No
c\$tgdt.h	New	No
c\$to2m.h	New	No

Library Interface Scripts: Table 373 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 373. Changes to Library Interface Scripts for TPF Collection Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CJ00XV	New	Added library interface script for TPFCS.
CTALXV	Changed	Added external device support APIs.

Library Members (Object Files): Table 374 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 374. Changes to Library Members (Object Files) for TPF Collection Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CJ000	CJ00	New	Assembler	Added for TPFCS control, collection, and cursor classes.
CJ003	CJ00	New	Assembler	Added for TPFCS API routines.
CJ004	CJ00	New	Assembler	Added TPFCS structure classes.
CJ005	CJ00	New	Assembler	Added TPFCS C language interface routines.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 375 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 375. Changes to Members (Object Files) for TPF Collection Support

DLM Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CEXTDV	CTAL	New	C Language	Created for TPFCS.
CJ01	CJ01	New	Assembler	Added the ZOODB command parser.
CJ02	CJ01	New	Assembler	Added the ZOODB command parser.
CJ03	CJ03	New	Assembler	Added the TPFCS internal task dispatcher.

Table 375. Changes to Members (Object Files) for TPF Collection Support (continued)

DLM Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CJ04	CJ04	New	Assembler	Added the TPFCS restart handler.
CJ13	CJ13	New	Assembler	Added the TPFCS recoup PID chasing processing.
CJ17	CJ17	New	Assembler	Added the TPFCS recoup processing.
CJ016	CJ00	New	C Language	Added TPFCS C language interface routines.
CJ100	CJ10	New	Assembler	Added the ZBROW command routines.
CJ105	CJ10	New	C Language	Added the ZBROW DOCUMENT command support routines.
CJ106	CJ10	New	C Language	Added the ZBROW NAME command support routines.
CJ107	CJ10	New	C Language	Added the ZBROW PROPERTY command support routines.
CJ109	CJ10	New	C Language	Added the ZBROW report command display routines.
C190	CORM	Changed	Assembler	Added external device support.
CORM	CORM	New	C Language	Added external device support.
CORMAS	CORM	New	Assembler	Added for external device support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 376 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 376. Changes to CINFC Tags for TPF Collection Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMDXVT	371	New

Copy Members

Table 377 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 377. Changes to Copy Members for TPF Collection Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CEFE	Control Program	CCTAPE	Changed	Updated to support the tdspe_v C function.
CICR	Control Program	CCFADC	Changed	Updated for macro service routines (1).
CJ001	Real-Time Assembler	CJ003	New	Created for TPFCS library C function support routines.
CJ002	Real-Time Assembler	CJ000, CJ003, CJ004, CJ005	New	Created for TPFCS common macro definitions.
CJ015	Real-Time Assembler	CJ005	New	Created for TPFCS system services class.

Table 377. Changes to Copy Members for TPF Collection Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CJ020	Real-Time Assembler	CJ000	New	Created for TPFCS directory entry support.
CJ021	Real-Time Assembler	CJ006	New	Created for TPFCS directory entry support.
CJ022	Real-Time Assembler	CJ005	New	Created for TPFCS database support objects.
CJ025	Real-Time Assembler	CJ006	New	Created for TPFCS collection class definitions.
CJ026	Real-Time Assembler	CJ006	New	Created for TPFCS cursor class definitions.
CJ030	Real-Time Assembler	CJ004	New	Created for TPFCS structure class definitions.
CJ036	Real-Time Assembler	CJ004	New	Created for TPFCS index structure support.
CJ037	Real-Time Assembler	CJ004	New	Created for TPFCS flat structure support.
CJ038	Real-Time Assembler	CJ004	New	Created for TPFCS hash structure support.
CJ039	Real-Time Assembler	CJ004	New	Created for TPFCS.
CJ101	Real-Time Assembler	CJ100	New	Created for the ZBROW command.
CJ102	Real-Time Assembler	CJ100	New	Created for the ZBROW command.
CJ103	Real-Time Assembler	CJ100	New	Created for the ZBROW command.
CJ104	Real-Time Assembler	CJ100	New	Created for the ZBROW command.
CPSL	Control Program	CCCPSE	Changed	Write system error dump.
CRTT	Control Program	CCUTIL	Changed	Updated for TPFCS support.
CTSF	Control Program	CCUTIL	Changed	Updated for TPFCS support.
CT01	Control Program	CCCTIN	Changed	Updated to carve storage for the archive control table and put the address of each subsystem (SS) unique table in the appropriate CINF tag.
MPTV	Control Program	CCUTIL	New	Updated for TPFCS support.

Fixed File Records

Table 378 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 378. Changes to Fixed File Records for TPF Collection Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMM4	Changed	Updated for TPFCS to include the #TO2CTL (ordinal 121) and #TO2SHW (ordinal number 148).

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 379 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 379. Changes to Data Macros for TPF Collection Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
ITO2	New	No
ITSTB	Changed	No

General Macros: Table 380 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 380. Changes to General Macros for TPF Collection Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
GLOBZ	Changed	No – Code updates only; there are no updates to <i>TPF General Macros</i> .
SYSEQ	Changed	No – Code updates only; there are no updates to <i>TPF General Macros</i> .
TDSPC	Changed	No – Code updates only; there are no pub updates to <i>TPF General Macros</i> .

Selected Equate Macros: Table 381 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 381. Changes to Selected Equate Macros for TPF Collection Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BRPEQ	Changed	No
GL0BQ	Changed	No
TAPEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 382 on page 411 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 382. Changes to SIP Skeleton and Internal Macros for TPF Collection Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKA	Changed
SPPGML	Changed
SPPROC	Changed
SPRIAT	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 383 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 420 for a description of other system generation changes you must make.

Table 383. Changes to SIP Stage I Macros and Statements for TPF Collection Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 384 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 384. Changes to SIP Stage II Macros for TPF Collection Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 385 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 385. Changes to System Macros for TPF Collection Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BBWRT	Changed	No – Code updates only; there are no updates to <i>TPF System Macros</i> .
FTSTC	Changed	No – Code updates only; there are no updates to <i>TPF System Macros</i> .
IBMSVC	Changed	Yes
INDEX	Changed	No
RITID	Changed	No – Code updates only; there are no pub updates to <i>TPF System Macros</i> .

Table 385. Changes to System Macros for TPF Collection Support (continued)

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
TDTAC	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 386 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 386. Changes to Segments for TPF Collection Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BCC1	Real-Time Assembler	Not Applicable	Changed	Updated for recoup chain chase type F.
BCC2	Real-Time Assembler	Not Applicable	Changed	Updated for recoup chain chase type V.
BAK0	Real-Time Assembler	Not Applicable	Changed	Updated for selective recoup.
BKB0	Real-Time Assembler	Not Applicable	Changed	Updated for selective recoup.
BKDIND	Offline Assembler	BKDI	Changed	Updated for a recoup descriptor summary.
BKP0	Real-Time Assembler	Not Applicable	Changed	Updated for a recoup loosely coupled message preprocessor. Note: This update was made for the High Performance Option (HPO) feature only.
BRCP	Real-Time Assembler	Not Applicable	Changed	Updated for recoup input message analyzer, part 1.
BRPC	Real-Time Assembler	Not Applicable	Changed	Updated for recoup descriptor scheduler (non-MDBF).
BRPE	Real-Time Assembler	Not Applicable	Changed	Updated for recoup abort routine.
BRPI	Real-Time Assembler	Not Applicable	Changed	Updated for recoup start message processor.
BRPT	Real-Time Assembler	Not Applicable	Changed	Updated for recoup status message processor.
BSSC	Real-Time Assembler	Not Applicable	Changed	Updated for recoup MDBF descriptor scheduler. Note: This update was made for the High Performance Option (HPO) feature only.
CJ05	Real-Time Assembler	Not Applicable	New	Created for TPFCS.
CJ12	Real-Time Assembler	Not Applicable	New	Created for TPFCS recoup message handler.
CJ16	Real-Time Assembler	Not Applicable	New	Created for TPFCS recoup interface.
COSB	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS.

Table 386. Changes to Segments for TPF Collection Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
COSD	Real-Time Assembler	Not Applicable	Changed	Updated to allow all ARx (ARA–ARZ, and AR0–AR9) tapes to use the ARC TPLD/TLMR record. ARC is a 3-character name used to identify a tape drive used for the TPFxd_ functions.
COSE	Real-Time Assembler	Not Applicable	Changed	Updated to allow all ARx (ARA–ARZ, and AR0–AR9) tapes to use the ARC TPLD/TLMR record. ARC is a 3-character name used to identify a tape drive used for the TPFxd_ functions.
COSF	Real-Time Assembler	Not Applicable	Changed	Updated to allow all ARx (ARA–ARZ, and AR0–AR9) tapes to use the ARC TPLD/TLMR record. ARC is a 3-character name used to identify a tape drive used for the TPFxd_ functions.
COTL	Real-Time Assembler	Not Applicable	Changed	Updated to allow all ARx (ARA–ARZ, and AR0–AR9) tapes to use the ARC TPLD/TLMR record. ARC is a 3-character name used to identify a tape drive used for the TPFxd_ functions.
CTAPAC	Real-Time C Language	Not Applicable	New	Created for TPFCS.
CTDSPV	Real-Time Assembler	Not Applicable	New	Created for TPFCS.
CTDTAC	Real-Time Assembler	Not Applicable	New	Created for TPFCS.
CTKS	Real-Time Assembler	Not Applicable	New	Created for TPFCS.
CTTPCN	Real-Time Assembler	Not Applicable	New	Created for TPFCS.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS.
CVBN	Real-Time Assembler	Not Applicable	Changed	Updated to allow lowercase and special character displays on several TPF commands.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 387 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 387. Changes to SYSEQ Tags for TPF Collection Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#TO2CTL	121	New
#TO2SHW	148	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 388 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 388. Changes to Commands for TPF Collection Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZBROW CLASS	New	Displays information about a class.
ZBROW COLLECTION	New	Displays information about, and performs maintenance on, the specified collection.
ZBROW NAME	New	Defines, displays, or removes a symbolic name for a persistent identifier (PID) of a collection.
ZBROW PROPERTY	New	Alters or displays a property for a specified collection.
ZBROW QUALIFY	New	Specifies which data store ZBROW command requests apply to.
ZOODB CHANGE	New	Changes the attributes of a current data definition for a specific data store.
ZOODB DEFINE	New	Defines a unique data store to TPFCS, or defines the attributes of a new data definition for a specific data store.
ZOODB DELETE	New	Deletes a data definition for a specific data store.
ZOODB DISPLAY	New	Displays the attributes of a data definition or data store, the names of all the defined data definitions for a specific data store, and a list of all data stores.
ZOODB INIT	New	Initializes TPFCS for the first time.
ZOODB SET	New	Sets on or sets off the method trace table or start of a dump on a T02_getErrorText call.
ZRECP RECALL	Changed	Added the PID parameter for recoup processing of TPFCS.
ZRECP SEL	Changed	Added the PID parameter for recoup processing of TPFCS.
ZRECP TO2	New	Modifies and displays values for TPF collection support recoup support.

Messages and System Errors

Table 389 on page 415 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 389. Changes to Messages and System Errors for TPF Collection Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
020000	System Error	New
0200C8	System Error	New
0200D2	System Error	New
0200DC	System Error	New
0200E6	System Error	New
0200F0	System Error	New
0200FA	System Error	New
020402	System Error	New
020403	System Error	New
020404	System Error	New
020405	System Error	New
020406	System Error	New
041113	System Error	New
BROW0051E	Online	New
BROW0099E	Online	New
BROW0201I	Online	New
BROW0202I	Online	New
BROW0203I	Online	New
BROW0204I	Online	New
BROW0205I	Online	New
BROW0206I	Online	New
BROW0210I	Online	New
BROW0251E	Online	New
BROW0252E	Online	New
BROW0253E	Online	New
BROW0254E	Online	New
BROW0255E	Online	New
BROW0256E	Online	New
BROW0257E	Online	New
BROW0258E	Online	New
BROW0259E	Online	New
BROW0301I	Online	New
BROW0303I	Online	New
BROW0304I	Online	New
BROW0310I	Online	New
BROW0351E	Online	New
BROW0352E	Online	New
BROW0353E	Online	New
BROW0354E	Online	New
BROW0355E	Online	New
BROW0356E	Online	New
BROW0357E	Online	New
BROW0358E	Online	New
BROW0359E	Online	New

Table 389. Changes to Messages and System Errors for TPF Collection Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BROW0360E	Online	New
BROW0399E	Online	New
BROW0402I	Online	New
BROW0403I	Online	New
BROW0404I	Online	New
BROW0405I	Online	New
BROW0406I	Online	New
BROW0407I	Online	New
BROW0408I	Online	New
BROW0410I	Online	New
BROW0411I	Online	New
BROW0412I	Online	New
BROW0413I	Online	New
BROW0415I	Online	New
BROW0416I	Online	New
BROW0417I	Online	New
BROW0418I	Online	New
BROW0419I	Online	New
BROW0420I	Online	New
BROW0421I	Online	New
BROW0422I	Online	New
BROW0423I	Online	New
BROW0424I	Online	New
BROW0451E	Online	New
BROW0452E	Online	New
BROW0453E	Online	New
BROW0454E	Online	New
BROW0455E	Online	New
BROW0456E	Online	New
BROW0457E	Online	New
BROW0458E	Online	New
BROW0459E	Online	New
BROW0460E	Online	New
BROW0461E	Online	New
BROW0462E	Online	New
BROW0463E	Online	New
BROW0464E	Online	New
BROW0465E	Online	New
BROW0466E	Online	New
BROW0467E	Online	New
BROW0468E	Online	New
BROW0469E	Online	New
BROW0470E	Online	New

Table 389. Changes to Messages and System Errors for TPF Collection Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BROW0471E	Online	New
BROW0472E	Online	New
BROW0501I	Online	New
BROW0502I	Online	New
BROW0503I	Online	New
BROW0510I	Online	New
BROW0551E	Online	New
BROW0552E	Online	New
BROW0553E	Online	New
BROW0554E	Online	New
BROW0555E	Online	New
BROW0556E	Online	New
BROW0557E	Online	New
BROW0558E	Online	New
BROW0559E	Online	New
BROW0599E	Online	New
BROW0601I	Online	New
BROW0602I	Online	New
BROW0650W	Online	New
BROW0651E	Online	New
BROW0652E	Online	New
BROW0653E	Online	New
CJ040001I	Online	New
CJ040002I	Online	New
CJ040051E	Online	New
CJ040099E	Online	New
CJ160001E	Online	New
OODB0001I	Online	New
OODB0002I	Online	New
OODB0006I	Online	New
OODB0007I	Online	New
OODB0011I	Online	New
OODB0012I	Online	New
OODB0021I	Online	New
OODB0022I	Online	New
OODB0025I	Online	New
OODB0026I	Online	New
OODB0027I	Online	New
OODB0031I	Online	New
OODB0032I	Online	New
OODB0039E	Online	New
OODB0041I	Online	New
OODB0042I	Online	New

Table 389. Changes to Messages and System Errors for TPF Collection Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OODB0051I	Online	New
OODB0099E	Online	New
OODB0101E	Online	New
OODB0105E	Online	New
OODB0106E	Online	New
OODB0121E	Online	New
OODB0122E	Online	New
OODB0131E	Online	New
OODB0132E	Online	New
OODB0133E	Online	New
OODB0134E	Online	New
OODB0135E	Online	New
OODB0136E	Online	New
OODB0141E	Online	New
OODB0142E	Online	New
OODB0143E	Online	New
OODB0144E	Online	New
OODB0145E	Online	New
OODB0151E	Online	New
OODB0152E	Online	New
OODB0153E	Online	New
OODB0154E	Online	New
OODB0155E	Online	New
OODB0156E	Online	New
OODB0164E	Online	New
OODB0171E	Online	New
OODB0191E	Online	New
OODB0192E	Online	New
OODB0201E	Online	New
OODB0202E	Online	New
OODB0203E	Online	New
OODB0204E	Online	New
OODB0205E	Online	New
RECP0201I	Online	New
RECP0202I	Online	New
RECP0203I	Online	New
RECP0204I	Online	New
RECP0205I	Online	New
RECP0206I	Online	New
RECP0207I	Online	New
RECP0208I	Online	New
RECP0209I	Online	New
RECP0210I	Online	New

Table 389. Changes to Messages and System Errors for TPF Collection Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP0211I	Online	New
RECP0213I	Online	New
RECP0214I	Online	New
RECP0250W	Online	New
RECP0251E	Online	New
RECP0252E	Online	New
RECP0253E	Online	New
RECP0254E	Online	New
RECP0255E	Online	New
RECP0256E	Online	New
RECP0257E	Online	New
RECP0258E	Online	New
RECP0259E	Online	New
RECP0260E	Online	New
RECP0261E	Online	New
RECP0262E	Online	New
RECP0263E	Online	New
RECP0264I	Online	New
RECP0271E	Online	New
RECP0272E	Online	New
RECP0273E	Online	New
RECP0274E	Online	New
RECP0275E	Online	New
RECP0276E	Online	New
RECP0277E	Online	New
RECP0278E	Online	New
RECP0279E	Online	New
RECP0281E	Online	New
RECP0282E	Online	New
RECP0293E	Online	New
RECP0294E	Online	New
RECP0295E	Online	New
RECP0296E	Online	New
RECP0297E	Online	New
RECP0298E	Online	New
RECP0299E	Online	New
TPXD0001A	Online	New
TPXD0002I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The following are the TPFCS default record IDs that are used by data definitions to assign attributes to collections:

- Data record ID (FC10)
- Index record ID (FC11)
- Directory record ID (FC15).

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 390 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 390. Changes to TPF Publications for TPF Collection Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP07	Added information about collections for TPFCS.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU07	Added new C functions for TPFCS.
<i>TPF Concepts and Structures</i>	GTPCON05	Updated with information about TPFCS.
<i>TPF Database Reference</i>	GTPDBR05	Updated with information about TPFCS and recoup information.
<i>TPF Library Guide</i>	GTPDOC07	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPFCS.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG07	Updated with migration considerations for TPFCS.
<i>TPF Operations</i>	GTPOPR07	Updated with information about the commands that were added and changed for TPFCS.
<i>TPF System Macros</i>	GTPSYS07	Updated the TDTAC macro with information for TPFCS.
<i>TPF System Generation</i>	GTPSYG07	Updated with information about record ID information for TPFCS.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The new `tape_access` C function:

- Permits an entry control block (ECB) to gain control of a tape without first checking to see if the tape is already open.
- Allows the ECB to specify a timeout value if the tape is not immediately available.

Note: ARx (ARA–ARZ and AR0–AR9) tape names are reserved for TPFCS capture and restore and **must** not be used by applications even if TPFCS is not being added to your existing TPF 4.1 system.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Adding TPF collection support will have virtually no impact on your existing TPF 4.1 system or on the application programs running on an existing TPF 4.1 system. The only impact will be the inclusion of lowercase characters and special characters in various displays. See “Special and Lowercase Characters” on page 404 for more information about special characters. See *TPF System Installation Support Reference* for more information about the UCCWTOP user exit and *TPF Programming Standards* for information about how to disable this support if your workstations are unable to handle such displays.

To add TPFCS to your existing TPF 4.1 system, do the following:

1. Install PUT 7 and ensure TPF transaction services is installed in your TPF 4.1 system.
2. Install the following:
 - C/C++ language header files listed in Table 371 on page 406
 - Copy members listed in Table 377 on page 408
 - Macros found in “Macros” on page 409.
3. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and SAL table. See Table 386 on page 412 for more information about segments.
4. Ensure that the #IBMM4.79 and #IBMM4.94 ordinals are defined.
5. Ensure that record IDs FC10–FC19 are correctly defined in the record ID attribute table (RIAT).
6. Ensure that you have made any required changes to the UCCWTOP user exit for lowercase and special character support. See *TPF System Installation Support Reference* and *TPF Programming Standards* for more information about special character support.
7. Run the LIBI offline program for all library interface scripts listed in Table 373 on page 407.
8. Run CBLD for build scripts listed in Table 370 on page 406.
9. Reassemble or recompile the following:
 - DLM members listed in Table 375 on page 407
 - CSECTs listed in Table 377 on page 408
 - Segments listed in Table 386 on page 412.
10. Link-edit the build scripts (DLMS) listed in Table 370 on page 406 and Table 375 on page 407.

11. Load the updated object code to your TPF 4.1 system.
12. Perform an IPL.
13. Cycle the TPF 4.1 system to NORM state.
14. Enter the ZOODB INIT command to initialize your TPFCS database.
15. Ensure the TPF 4.1 system is in NORM state before running any application programs.
16. Continue setting up your TPFCS database as described in *TPF Application Programming*.

TPF Transaction Services (APAR PJ25094)

The following section discusses the migration considerations for TPF transaction services. Virtual file access (VFA) synchronization is also part of APAR PJ25094. See “Virtual File Access (VFA) Synchronization (APAR PJ25094)” on page 386 for more information about VFA synchronization.

Prerequisite APARs

See the APEDIT for APAR PJ25094 for information about prerequisite APARs.

Functional Overview

Transaction Processing Facility (TPF) transaction services includes support for a transaction manager (TM), resource managers (RMs), log manager, and recovery log to ensure a consistent view of your database.

- The *transaction manager (TM)* provides a set of application programming interface (APIs) for the application program to define both the scope of a transaction as well as actions to be taken for the transaction. The TM coordinates RMs and determines which data is written to the recovery log at commit time and which data is recovered at restart time.
- The *resource managers (RMs)* work with the TM to identify and harden data used by the application program in a commit scope. TPF DASD and pool support are the RMs provided by IBM. You can write your own RM provided that it adheres to the architected TM and RM interfaces.
- The *log manager* controls the recovery log and recovery actions.
- The *recovery log* is written to DASD; it holds the data necessary to recover resources following a system failure without compromising the integrity of the database.

Together, the previous components add up to significant savings for application developers.

- ***Reducing application program complexity***

Reducing the need for error recovery routines simplifies your design. Fewer error recovery routines also means that your coding and testing phases are shorter.

- ***Reducing application development cycle time***

Knowing that you always have a consistent view of the database affects your application development cycle time. Either ***all*** of your file changes have been completed or ***none*** of them have; it is that simple. You no longer need to worry about a partially updated database so you can reduce the amount of error recovery code you have to write.

- ***Increasing programmer productivity***

The combination of reduced application program complexity and development cycle time means that you can add more functions or you can get your application program to market that much sooner.

- ***Increasing application program reliability***

The order of updates is no longer of paramount importance. At any time, the application program could stop processing and request that the TPF 4.1 system ignore all of its previous updates.

Architecture

TPF transaction services is based on the X/Open specification.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 391 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 391. Changes to Build Scripts for TPF Transaction Services

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CLUDBS	DLM	New	Build script for the deadlock user exit.
CL12BS	DLM	New	Build script for the TM restart program.
CL13BS	DLM	New	Build script for the TM recovery program.
CL14BS	DLM	New	Build script for the TM restart program.
CL15BS	DLM	New	Build script for the TM cleanup routine.
CL16BS	DLM	New	Build script for the TM cleanup routine.
CL40BS	DLM	New	Build script for deadlock detection.
CL4BBS	DLM	New	Build script for building the deadlock detection global table.
CL4RBS	DLM	New	Build script for receiving the deadlocked entry control block (ECB) and input/output block (IOB) address.
CL42BS	DLM	New	Build script for the ZCORO command.
CL44BS	DLM	New	Build script for the TXBGC macro.
CL45BS	DLM	New	Build script for the TXCMC macro.
CL46BS	DLM	New	Build script for the TXRBC macro.
CL47BS	DLM	New	Build script for the TXSPC macro.
CL48BS	DLM	New	Build script for the TXRSC macro.

Dynamic Load Module (DLM) Stubs: Table 392 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 392. Changes to Dynamic Load Module (DLM) Stubs for TPF Transaction Services

DLM Stub	New, Changed, or No Longer Supported?
CLUD	New
CL41	New
CL43	New

General Use C/C++ Language Header Files: Table 393 on page 425 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 393. Changes to General Use C/C++ Language Header Files for TPF Transaction Services

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	No
c\$cklke.h	Changed	No
c\$eb0eb.h	Changed	No
c\$fer0.h	Changed	No
c\$fva0.h	Changed	No
c\$miob.h	New	No
c\$rhtb.h	New	No
c\$stck.h	New	No
c\$syseq.h	Changed	No
c\$sysyc.h	Changed	No
c\$tmcr.h	New	No
i\$dlok.h	New	Yes
i\$tmcr.h	New	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 394 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 394. Changes to Library Interface Scripts for TPF Transaction Services

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Added tx API and addlc, enqc, deqc, and tancc C functions.
CTBXXV	Changed	Added the tpf_STCK C function.

Library Members (Object Files): Table 395 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 395. Changes to Library Members (Object Files) for TPF Transaction Services

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CADDLC	CTAL	New	Assembler	Process the addlc C function.
CDEQC	CTAL	New	Assembler	Process the deqc C function.
CENQC	CTAL	New	Assembler	Process the enqc C function.
CSTCK	CTBX	New	Assembler	Process the tpf_STCK C function.
CTANCC	CTAL	New	Assembler	Add, delete, or locate a transaction manager control record (TMCR) through the transaction manager anchor table (TANC).
CTMEND	CTAL	New	Assembler	Process the xa_end C function.
CTMSTR	CTAL	New	Assembler	Process the xa_start C function.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 396 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 396. Changes to Members (Object Files) for TPF Transaction Services

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLUD	CLUD	New	C Language	Deadlock detection user exit.
CL12	CL12	New	C Language	TM restart program.
CL13	CL13	New	C Language	TM recovery program.
CL14	CL14	New	C Language	TM restart program.
CL15	CL15	New	C Language	TM cleanup routine.
CL16	CL16	New	C Language	TM restart cleanup routine.
CL40	CL40	New	C Language	Root segment for deadlock detection processing.
CL4A	CL4A	New	C Language	Builds the deadlock detection global table for a loosely coupled complex.
CL4B	CL4B	New	C Language	Building the deadlock detection global table.
CL4D	CL4D	New	C Language	Deadlock detection processing.
CL4R	CL4R	New	C Language	Receives the deadlocked ECB and IOB address.
CL42	CL42	New	C Language	ZCORO command.
CL44	CL44	New	C Language	TXBGC macro service routine.
CL45	CL45	New	C Language	TXCMC macro service routine.
CL46	CL46	New	C Language	TXRBC macro service routine.
CL47	CL47	New	C Language	TXSPC macro service routine.
CL48	CL48	New	C Language	TXRSC macro service routine.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 397 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 397. Changes to CINFC Tags for TPF Transaction Services

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMCRT	365	New
CMMGFA	369	New

Copy Members

Table 398 on page 427 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 398. Changes to Copy Members for TPF Transaction Services

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CL10	Control Program	CCTLOG	New	Adds support for the CPLKC service routine.
CL20	Control Program	CCTLOG	New	Adds support for the WLOGC service routine.
CL30	Control Program	CCTLOG	New	Adds support for the commit and rollback control record service routines.

Fixed File Records

Table 399 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 399. Changes to Fixed File Records for TPF Transaction Services

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMM4 Ordinals 130, 141–147	New	IBMM4 ordinal numbers.
#RLOG1–#RLOG8	New	Recovery log fixed file records.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 400 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 400. Changes to Data Macros for TPF Transaction Services

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
CK1KE	Changed	No
CZ1SE	Changed	No
DCTMFS	Changed	No
DCTMIO	Changed	No
DCTRDF	Changed	No
DCTRIT	Changed	No
DCTSOI	Changed	No
DCTUCL	Changed	No
DC0DC	Changed	No
EB0EB	Changed	No
ICRCR	New	Not Applicable
ICRCT	New	Not Applicable
IDSCFW	Changed	No
IDSFLV	Changed	No
IDSRHT	Changed	No

Table 400. Changes to Data Macros for TPF Transaction Services (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
IDSSST	Changed	No
IDSTTR	Changed	No
IXAHD	New	No
PI1DT	Changed	No

General Macros: Table 401 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 401. Changes to General Macros for TPF Transaction Services

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
DLTEC	Changed	Yes
EXITC	Changed	No
FILEC	Changed	No
FILNC	Changed	No
FILUC	Changed	No
FINDC	Changed	No
FINHC	Changed	No
FINWC	Changed	No
FIWHC	Changed	No
GCFLC	Changed	No
GCFSC	Changed	No
GETFC	Changed	No
GETLC	Changed	No
GETSC	Changed	No
RCRFC	Changed	No
RCUNC	Changed	No
RLCHA	Changed	No
ROUTC	Changed	No
TXBGC	New	No
TXCMC	New	No
TXRBC	New	No
TXRSC	New	No
TXSPC	New	No
UNFRC	Changed	No

Selected Equate Macros: Table 402 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 402. Changes to Selected Equate Macros for TPF Transaction Services

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
ECBEQ	Changed	No

Table 402. Changes to Selected Equate Macros for TPF Transaction Services (continued)

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IEQCE2	Changed	No
MRLNQ	Changed	No
RITEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 403 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 403. Changes to SIP Skeleton and Internal Macros for TPF Transaction Services

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKA	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 404 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 435 for a description of other system generation changes you must make.

Table 404. Changes to SIP Stage I Macros and Statements for TPF Transaction Services

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed
RIATA	Changed

System Initialization Program (SIP) Stage II Macros: Table 405 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 405. Changes to SIP Stage II Macros for TPF Transaction Services

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 406 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 406. Changes to System Macros for TPF Transaction Services

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IDATB	Changed	No
\$GETRC	New	No
\$RELRC	New	No
\$RETRC	New	No
CPLKC	New	No
FLFAC	Changed	No
FLVFC	Changed	No
IBMSVC	Changed	Yes
TANCC	New	No
WLOGC	New	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 407 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 407. Changes to Segments for TPF Transaction Services

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLM0	Real-Time Assembler	Not Applicable	New	Reconnects to an IBM 3990 Model 3 or later models with multi-path lock facility (MPLF) installed and CTKI lock.
CLUD	Real-Time C Language	Not Applicable	New	Deadlock detection user exit.
CL10	CSECT	Not Applicable	New	CPLKC service routine.
CL11	Real-Time Assembler	Not Applicable	New	Commit and rollback table initialization and restart.
CL12	Real-Time C Language	Not Applicable	New	TM restart program.
CL13	Real-Time C Language	Not Applicable	New	TM recovery program.
CL14	Real-Time C Language	Not Applicable	New	TM restart program.
CL15	Real-Time C Language	Not Applicable	New	TM cleanup program.
CL16	Real-Time C Language	Not Applicable	New	Failed log takeover cleanup transaction.
CL20	CSECT	Not Applicable	New	WLOGC service routine.
CL21	Real-Time Assembler	Not Applicable	New	Log manager restart and recovery.
CL22	Real-Time Assembler	Not Applicable	New	Write buffers to recovery log.
CL23	Real-Time Assembler	Not Applicable	New	Recovery log checkpoint routine.

Table 407. Changes to Segments for TPF Transaction Services (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CL24	Real-Time Assembler	Not Applicable	New	Read track from recovery log.
CL30	CSECT	Not Applicable	New	TPF transaction services restricted macro service routines.
CL31	Real-Time Assembler	Not Applicable	New	DASD RM recovery program.
CL40	Real-Time C Language	Not Applicable	New	Root segment for deadlock detection processing.
CL41	Real-Time Assembler	Not Applicable	New	Exit deadlocked ECB.
CL42	Real-Time C Language	Not Applicable	New	ZCORO command.
CL43	Real-Time Assembler	Not Applicable	New	Convert system time to floating point number.
CL44	Real-Time C Language	Not Applicable	New	TXBGC service routine.
CL45	Real-Time C Language	Not Applicable	New	TXCMC service routine.
CL46	Real-Time C Language	Not Applicable	New	TXRBC service routine.
CL47	Real-Time C Language	Not Applicable	New	TXSPC service routine.
CL48	Real-Time C Language	Not Applicable	New	TXRSC service routine.
CL4B	Real-Time C Language	Not Applicable	New	Building the deadlock detection global table.
CL4D	Real-Time C Language	Not Applicable	New	Deadlock detection processing.
CL4R	Real-Time C Language	Not Applicable	New	Receives the deadlocked ECB and IOB address.
CL99	Real-Time Assembler	Not Applicable	New	Log recovery error user exit.
CT09	CSECT	Not Applicable	New	Allocate storage for TPF transaction services control tables.
CVFX	Real-Time Assembler	Not Applicable	New	Created for VFA synchronization as a user exit for VFA restart.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 408 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 408. Changes to SYSEQ Tags for TPF Transaction Services

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#CRCPR0	130	New
#CRCPR1	141	New
#CRCPR2	142	New
#CRCPR3	143	New

Table 408. Changes to SYSEQ Tags for TPF Transaction Services (continued)

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#CRCPR4	144	New
#CRCPR5	145	New
#CRCPR6	146	New
#CRCPR7	147	New
#LUPD	139	New

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 409. Changes to Control Program (CP) User Exits for TPF Transaction Services

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CL20	UCCWLOG	New	Adds the transaction log write user exit.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 410. Changes to ECB User Exits for TPF Transaction Services

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Deadlock detection	CL40	CLUD	New	Adds support for modifying deadlock detection notification.
Log recovery	CL21, CL24	CL99	New	Adds support for modifying log recovery error processing.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 411 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 411. Changes to Commands for TPF Transaction Services

Command	New, Changed, or No Longer Supported?	Description of Change
ZCORO	New	Process a TPF transaction services request.
ZCTKA ALTER	Changed	Added the MCMTB and RLBUF parameters.

Table 411. Changes to Commands for TPF Transaction Services (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZCTKA DISPLAY	Changed	Added the MCMTB and RLBUF parameters.
ZPSMS	Changed	The processor from which the FORCE DEACTIVATE parameter is specified takes over the recovery log of the processor that will be deactivated before its locks are released.
ZSYSG ALTER	Changed	Added the DLOCK parameter.
ZVFAC DISPLAY	Changed	Added the number of buffers in a commit scope to the display.

Messages and System Errors

Table 412 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 412. Changes to Messages and System Errors for TPF Transaction Services

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000038	System Error	Changed
00C100	System Error	New
00C101	System Error	New
00C102	System Error	New
00C103	System Error	New
00C104	System Error	New
00C105	System Error	New
00C106	System Error	New
00C107	System Error	New
00C108	System Error	New
00C109	System Error	New
00C10A	System Error	New
00C10B	System Error	New
00C10C	System Error	New
00C10D	System Error	New
00C10E	System Error	New
00C10F	System Error	New
00C110	System Error	New
00C111	System Error	New
00C112	System Error	New
00C113	System Error	New
00C114	System Error	New
00C115	System Error	New

Table 412. Changes to Messages and System Errors for TPF Transaction Services (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
00C116	System Error	New
00C117	System Error	New
00C118	System Error	New
00C119	System Error	New
00C11A	System Error	New
00C11B	System Error	New
00C11C	System Error	New
00C11D	System Error	New
00C11E	System Error	New
00C11F	System Error	New
00C120	System Error	New
00C121	System Error	New
00C130	System Error	New
00C131	System Error	New
00C132	System Error	New
00C133	System Error	New
00C134	System Error	New
00C135	System Error	New
00C136	System Error	New
00C137	System Error	New
00C139	System Error	New
00C13A	System Error	New
00C13C	System Error	New
CLM00001E	Online	New
CL110001I	Online	New
CL110002I	Online	New
CL110003I	Online	New
CL110004E	Online	New
CL140011I	Online	New
CL210001I	Online	New
CL210002E	Online	New
CORO0001I	Online	New
CORO0002E	Online	New
CORO0003I	Online	New
CORO0004E	Online	New
CORO0005I	Online	New
CORO0006I	Online	New
CTIN0019I	Online	New
CTIN0090E	Online	New
DLOK0001E	Online	New
DLOK0002I	Online	New

Performance or Tuning Changes

You may have to increase the size of virtual file access (VFA) when you add TPF transaction services support to your TPF 4.1 system because of nested commit scopes. The number of records is not necessarily equal to the number of buffers. You can have a higher buffer count than the number of records when you have nested commit scopes. See *TPF System Performance and Measurement Reference* for more information about when to increase the size of VFA.

You may also need to increase the number of system work blocks (SWBs) that are allocated to your TPF 4.1 system with the addition of TPF transaction services. TPF transaction services uses SWBs for control records.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 413 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 413. Changes to TPF Publications for TPF Transaction Services

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP07	Updated with information about commit scope processing for TPF transaction services
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU07	Updated with information about the C functions that were added and changed for TPF transaction services.
<i>TPF Concepts and Structures</i>	GTPCON05	Updated with information about the C functions that were added and changed for TPF transaction services.
<i>TPF Database Reference</i>	GTPDBR05	Updated with information about the transaction manager (TM), resource managers (RMs), log manager, and recovery log for TPF transaction services.
<i>TPF General Macros</i>	GTPGEN07	Updated with information about the new and changed general use macros for TPF transaction services.
<i>TPF Library Guide</i>	GTPDOC07	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF transaction services.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG07	Updated with migration considerations for TPF transaction services.
<i>TPF Operations</i>	GTPOPR07	Updated with information about the commands that were added and changed for TPF transaction services.

Table 413. Changes to TPF Publications for TPF Transaction Services (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Program Development Support Reference</i>	GTPPDR07	Updated with information about new CINFC tags and a new dump label for TPF transaction services. Information is also provided for how real-time trace (RTT), program test vehicle (PTV), and selective file dump and trace (SFDT) work in a commit scope.
<i>TPF System Generation</i>	GTPSYG07	Updated with new record ID attribute table (RIAT) IDs.
<i>TPF System Installation Support Reference</i>	GTPINR07	Updated with information about the new and changed general use macros for TPF transaction services.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR07	Updated with new information for the system summary report for data collection and reduction.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TPF transaction services in your TPF 4.1 system.

1. Install PUT 7.
2. Perform any SIP stage I changes and allocate new record types #RLOG1–#RLOG8.
3. Assemble and link-edit any affected programs.
4. Perform any SIP stage II changes.
5. Load TPF transaction services support to the TPF 4.1 system.
6. IPL the TPF 4.1 system.
7. Observe any new or changed messages received during the IPL.
8. Perform any loosely coupled migration scenarios, if necessary.

Deadlock detection must be running in all processors in a loosely coupled complex. During the coexistence phase of migration, however, deadlock detection must be disabled by entering the ZSYSG command with the DLOCK parameter specified.

You may see the 000063 system error if the following conditions apply:

- You start the migration on a processor other than the master processor.
- The other processor is not migrated to PUT 7.
- You did not disable deadlock detection.

Either ignore the system error or disable deadlock detection.

Log takeover provides the ability for one processor to process the log of another processor. During the coexistence phase of migration, processors on an earlier level must not be permitted to force the deactivation of a processor on a later level because a forced deactivation means that the forcing processor recovers the log of the other processor.

If it is necessary for the processor at an earlier level to force the deactivation of the migrated processor (using the ZPSMS command with the PR FORCE DEACT parameters specified), the migrated processor will be deactivated but data that was committed may not be committed any longer.

Program Update Tape 8 (PUT 8)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 8 (PUT 8).

SPE	Where to Go For More Information
Transmission Control Protocol/Internet Protocol (TCP/IP) Application Tools	"Transmission Control Protocol/Internet Protocol (TCP/IP) Application Tools (APAR PJ25375)" on page 440

TPF 4.1 PUT 8 is compiled with the IBM C/C++ for MVS/ESA Version 3 Release 2, IBM OS/390 C/C++ Version 1 Release 2, and IBM OS/390 C/C++ Version 1 Release 3 compilers. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Transmission Control Protocol/Internet Protocol (TCP/IP) Application Tools (APAR PJ25375)

The following section discusses the migration considerations for Transmission Control Protocol/Internet Protocol (TCP/IP) application tools.

Prerequisite APARs

See the APEDIT for APAR PJ25375 for information about prerequisite APARs.

Functional Overview

TCP/IP application tools implements the ZDTCP command, used to assess network connectivity as part of TCP/IP diagnosis. TCP/IP application tools provides the following functions:

- You can monitor statistics on socket servers and clients.
- You can test connectivity to an Internet Protocol (IP) host.
- You can determine the network route to an IP host.

To deal with TCP/IP support and the Internet, TPF systems must handle both alphanumeric host names and numeric IP addresses. Included in TCP/IP application tools is support for the `gethostbyaddr` and `gethostbyname` application programming interface (API) functions to enable socket applications like the Domain Name System (DNS) application to:

- Get a host name when given the Internet Protocol (IP) address
- Get an IP address when given the host name.

Architecture

TCP/IP application tools provides you with the ability to use alphanumeric host names and numeric IP addresses through programs that query a DNS server for information about a specific domain. TCP/IP application tools uses the `gethostbyaddr` API function to allow the DNS application to get the host name when given the IP address and the `gethostbyname` API function to allow the DNS application to get the IP address when given the host name.

TCP/IP application tools implements common Internet commands to display a requested IP address, the amount of time the request took to travel the network, and to indicate the IP addresses used to reach the requested node.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 414 on page 441 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 414. Changes to Build Scripts for TCP/IP Application Tools

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CISOBS	DLM	Changed	Added the CGTIME library member object file.
CLTNBS	DLM	New	Build script for the CLTN dynamic load module (DLM).
CLTRBS	DLM	New	Build script for the CLTR DLM.
COMXBS	DLM	Changed	Added the CGTHBA, CGTHBN, and CINTOA library object files.
CPG0BS	DLM	Changed	Changed to pair with the E0I1 translate table.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 415 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 415. Changes to General Use C/C++ Language Header Files for TCP/IP Application Tools

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
icmp.h	New	Not Applicable
ioctl.h	Changed	No
ip.h	Changed	No
i\$tcpc.h	New	Not Applicable
i\$tcpn.h	New	Not Applicable
nameser.h	New	Not Applicable
netdb.h	New	Not Applicable
sysgtime.h	New	Not Applicable
socket.h	Changed	No
udp.h	New	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 416 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 416. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TCP/IP Application Tools

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	Changed	No
c\$iscfdt.h	Changed	No
c\$iscInt.h	Changed	No
c\$syseq.h	Changed	No

Library Interface Scripts: Table 417 on page 442 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 417. Changes to Library Interface Scripts for TCP/IP Application Tools

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	Added linkage for the gettimeofday function.
COMXXV	Changed	Added linkage for the gethostbyaddr, gethostbyname, and inet_ntoa API functions.

Library Members (Object Files): Table 418 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 418. Changes to Library Members (Object Files) for TCP/IP Application Tools

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CGTHBA	COMX	New	C Language	Processes the gethostbyaddr API function.
CGTHBN	COMX	New	C Language	Processes the gethostbyname API function.
CGTIME	CISO	New	C Language	Processes the gettimeofday API function.
CINTOA	COMX	New	C Language	Processes the inet_ntoa API function.
C511	COMX	Changed	C Language	Changed for NETSTAT support.
C513	COMX	Changed	C Language	Changed for NETSTAT, PING, and TRACERTE support.
C514	COMX	Changed	C Language	Changed for NETSTAT support.
C515	COMX	Changed	C Language	Changed for NETSTAT support.
C525	COMX	Changed	C Language	Changed for NETSTAT support.
C536	COMX	Changed	C Language	Changed for PING and TRACERTE support.
C539	COMX	Changed	C Language	Changed for PING and TRACERTE support.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 419 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 419. Changes to Members (Object Files) for TCP/IP Application Tools

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLCA	CLCA	Changed	C Language	Changed to obtain storage for the NETSTAT table.
CLCE	CLCE	Changed	C Language	Changes for NETSTAT support.
CLTN	CLTN	New	C Language	ZDTCP command parser.
CLTQ	CLTN	New	C Language	ZDTCP command with the PING parameter message handler.
CLTR	CLTR	New	C Language	TCP/IP restart.

Table 419. Changes to Members (Object Files) for TCP/IP Application Tools (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLTS	CLTN	New	C Language	ZDTCP command with the NETSTAT parameter message handler.
CLTT	CLTN	New	C Language	ZDTCP command with the TRACERTE parameter message handler.
CLTU	CLTN	New	C Language	ZDTCP command with the DNS parameter message handler.
CPGS	CPGSBS	Changed	C Language	Updated the TPF Application Requester (TPFAR) translation table.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

Table 420 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 420. Changes to Fixed File Records for TCP/IP Application Tools

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMM4	Changed	A new miscellaneous record is used to retain the primary and secondary name servers. Ordinal numbers 150 to 157 must be available.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 421 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 421. Changes to Data Macros for TCP/IP Application Tools

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
CK2SN	Changed	No
ISCFDT	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 422 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 422. Changes to Selected Equate Macros for TCP/IP Application Tools

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 423 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. See *TPF System Generation* for a complete description of the SIP skeleton and internal macros. If the skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 423. Changes to SIP Skeleton and Internal Macros for TCP/IP Application Tools

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 424 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. See *TPF System Generation* for a complete description of the SIP Stage II macros. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 424. Changes to SIP Stage II Macros for TCP/IP Application Tools

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 425 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 425. Changes to Segments for TCP/IP Application Tools

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLC0	Real-Time Assembler	Not Applicable	Changed	Changed to issue cremc to the CLTR program during system restart.

Table 425. Changes to Segments for TCP/IP Application Tools (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVAB	Real-Time Assembler	Not Applicable	Changed	Added the entry for the ZDTCP command.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 426 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 426. Changes to SYSEQ Tags for TCP/IP Application Tools

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
\$TCPIPCT	150	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 427 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 427. Changes to Commands for TCP/IP Application Tools

Command	New, Changed, or No Longer Supported?	Description of Change
ZDTCP	New	Added the ZDTCP command with the DNS, NETSTAT, PING, and TRACERTE parameters.

Messages and System Errors

Table 428 on page 446 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 428. Changes to Messages and System Errors for TCP/IP Application Tools

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CLCA0001E	Online	New
CLTR0001I	Online	New
CLTR0002E	Online	New
CLTR0003E	Online	New
CLTR0004E	Online	New
CLTR0005E	Online	New
DTCP0001I	Online	New
DTCP0003I	Online	New
DTCP0004I	Online	New
DTCP0005I	Online	New
DTCP0006I	Online	New
DTCP0009I	Online	New
DTCP0010E	Online	New
DTCP0011E	Online	New
DTCP0013I	Online	New
DTCP0020E	Online	New
DTCP0022E	Online	New
DTCP0023E	Online	New
DTCP0024E	Online	New
DTCP0025E	Online	New
DTCP0026E	Online	New
DTCP0027I	Online	New
DTCP0028E	Online	New
DTCP0030E	Online	New
DTCP0031E	Online	New
DTCP0040E	Online	New
DTCP0041E	Online	New
DTCP0042I	Online	New
DTCP0051E	Online	New
DTCP0052E	Online	New
DTCP0053E	Online	New
DTCP0054E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 429 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See *TPF Library Guide* for more information about the TPF library.

Table 429. Changes to TPF Publications for TCP/IP Application Tools

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU08	Updated with information about the <code>gettimeofday</code> function.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TCP/IP application tools.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG08	Updated with migration considerations for TCP/IP application tools.
<i>TPF Operations</i>	GTPOPR08	Updated with information about the commands that were added and changed for TCP/IP application tools.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW04	Updated with information about the <code>gethostbyaddr</code> , <code>gethostbyname</code> , and <code>inet_ntoa</code> API functions.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The following API functions were ported to the TPF 4.1 system:

- `gethostbyaddr`
- `gethostbyname`
- `inet_ntoa`.

See *TPF Transmission Control Protocol/Internet Protocol* for information about these API functions. See *TPF C/C++ Language Support User's Guide* and *OS/390 C/C++ Run-Time Library Reference* for information about the `gettimeofday` API function.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

To verify that TCP/IP application tools has been installed correctly, do the following.

1. Cycle the TPF 4.1 system to NORM state.
2. Enter **ZCLAW DISPLAY ALL** and ensure that at least one offload device is connected.

3. Enter **ZDTCP DNS DISPLAY** and check that no DNS server information is displayed.
4. Enter **ZDTCP PING** *ipaddress* (where *ipaddress* is the dotted decimal address of a node in your network). If the node is connected, the TPF 4.1 system then responds with the time it took to travel the network.
5. Enter **ZDTCP TRACERTE** *host* (where *host* is the dotted decimal form of an IP address connected to your network). If the node is connected, then the TPF 4.1 system responds with the route taken to it. The response is saved until the ZDTCP command completes, so the response may seem slow. Also, the node must be within 16 hops or it is considered unreachable.
6. Enter the ZDTCP command with the NETSTAT parameter specified and ensure that either the DTCP0003I message or the DTCP0042I message is displayed.

Additional Information:

See *TPF Operations* for more information about the ZCLAW and ZDTCP commands.

Migration Scenarios

Use the following procedure to install TCP/IP application tools in your TPF 4.1 system.

1. Install program update tape (PUT) 8.
2. Run the system allocator (SALO) to include the CLTN and CLTR segments.
3. Ensure that #IBMM4 ordinals 150 to 157 are defined.
4. Produce the object code for the changed COMMXV and CISOXV library interface scripts.
5. Recompile all new and changed DLM members and library members.
6. Link-edit the new and changed build scripts, including the COMX and CISO libraries.
7. Reassemble the CLC0 and CVAB segments.
8. Load the updated object code to your TPF 4.1 system.
9. Perform an initial program load (IPL).

Program Update Tape 9 (PUT 9)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 9 (PUT 9).

SPE	Where to Go For More Information
Coupling Facility (CF) Support	"Coupling Facility (CF) Support (APAR PJ25781)" on page 450
High-Performance Routing (HPR) Support	"High-Performance Routing (HPR) Support (APAR PJ25760)" on page 464
TPF MQSeries Local Queue Manager Support	"TPF MQSeries Local Queue Manager Support (APAR PJ25780)" on page 483
TPF Internet Server Support	"TPF Internet Server Support (APARs PJ25589 and PJ25703)" on page 504
TPF Collection Support Enhancements	"TPF Collection Support Enhancements (APAR PJ25332)" on page 526
TPF C Debugger for VisualAge Client	"TPF C Debugger for VisualAge Client (APAR PJ25632)" on page 537

TPF 4.1 PUT 9 is compiled with the IBM OS/390 C/C++ Version 2 Release 4 compiler. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Coupling Facility (CF) Support (APAR PJ25781)

The following section discusses the migration considerations for coupling facility support (referred to as CF support throughout this section).

Prerequisite APARs

See the APEDIT for APAR PJ25781 for information about prerequisite APARs.

Functional Overview

CF support provides data sharing capabilities that allow TPF routines, subsystems, system products, and applications running in a processor configuration to use a CF for high-performance, high-availability data sharing. A *coupling facility (CF)* is an IBM processor (sometimes referred to as a central processing complex (CPC)) that is used to centralize storage for all attached processors in a processor configuration by providing shared storage and shared storage management functions.

At this time, CF support provides connectivity to a CF for use by TPF system functions.

Architecture

With CF support, you can add one or more CFs from a TPF processor to the processor configuration. Applications can connect to CF list structures on CFs that have been added to the processor configuration. A *CF list structure* is a named piece of storage on a CF that enables users to share information organized as entries on a set of lists or queues. A *user* refers to an application or an instance of an application using connection services to access a CF list structure. The first connect request issued to a particular CF list structure causes that list structure to be allocated before establishing the connection.

An application that connects to a CF list structure can monitor individual lists to determine when list entries have been created on that list. When a list changes from empty state to nonempty state (that is, when a list entry is added to a previously empty list), an application-defined exit is called. This eliminates the need for application polling of lists and simplifies programming requirements.

When an application no longer requires access to a CF list structure, the application can disconnect from the list structure. Depending on the parameters specified when the CF list structure was allocated, a disconnect by the last connector to a CF list structure either causes deallocation of the list structure or allows it to remain allocated for subsequent connections to occur.

A CF may be added to multiple processor configurations in a TPF multiprocessor complex. A CF that has been added to a TPF processor configuration may **not** be shared with any other processors that are not in the TPF multiprocessor complex even if the other processor is also running the TPF 4.1 system.

Operating Environment Requirements and Planning Information

See the *S/390 Processor Resource/Systems Manager Planning Guide* for information about CF planning and operating environment requirements.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 430 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 430. Changes to Build Scripts for CF Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CFLCBS	DLM	New	Created by CF support for the common fixed file find.
CFLMBS	DLM	New	Created by CF support for the ZMCFT parser.
CFLNBS	DLM	New	Created by CF support for the ZMCFT service routines.
CFLPBS	DLM	New	Created by CF support for building the core coupling facility status table (CFST) entry.
CFLQBS	DLM	New	Created by CF support to refresh main storage in the CFST.
CFLRBS	DLM	New	Created by CF support for part 1 of CF restart.
CFLSBS	DLM	New	Created by CF support for part 2 of CF restart.
CFLTBS	DLM	New	Created by CF support for the ZDCFT command handler.
CFLUBS	DLM	New	Created by CF support for the ZMCFT common message routine.
CFLYBS	DLM	New	Created by CF support for the CFDISC macro service routine.
CFLZBS	DLM	New	Created by CF support for the CFCONC service routine.
CTALBS	DLM	Changed	Updated by CF support for the TPF application programming interface (API) library.

Dynamic Load Module (DLM) Stubs: Table 431 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 431. Changes to Dynamic Load Module (DLM) Stubs for CF Support

DLM Stub	New, Changed, or No Longer Supported?
CFLC	New
CFLN	New
CFLP	New
CFLQ	New
CFLU	New
CFLY	New
CFLZ	New

General Use C/C++ Language Header Files: Table 432 on page 452 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 432. Changes to General Use C/C++ Language Header Files for CF Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cfaa.h	New	No
c\$cfcb.h	New	No
c\$cfco.h	New	No
c\$cfct.h	New	No
c\$cfdi.h	New	No
c\$cfef.h	New	No
c\$cfesb.h	New	No
c\$cfst.h	New	No
c\$cfstt.h	New	No
c\$cfvb.h	New	No
c\$cinfc.h	Changed	No
c\$fdpi.h	New	No
c\$fvao.h	Changed	No
c\$msct.h	New	No
reusable.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 433 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 433. Changes to Library Interface Scripts for CF Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Updated by CF support for the ISO-C TPF application programming interface (API) library.

Library Members (Object Files): Table 434 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 434. Changes to Library Members (Object Files) for CF Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CCFRQC	CTAL	New	Assembler	Created by CF support for the CFRQC function.
CGCFBC	CTAL	New	Assembler	Created by CF support for the GCFBC function.
CRCFBC	CTAL	New	Assembler	Created by CF support for the RCFBC function.

Link-Edited Modules: Table 435 on page 453 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 435. Changes to Link-Edited Modules for CF Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CPS0	Changed	Updated by CF support to add CCCFCC.

Members (Object Files): Table 436 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 436. Changes to Members (Object Files) for CF Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFCNC	CFLZ	New	C Language	Created by CF support for the CFCONC service routine.
CFDCFT	CFLT	New	C Language	Created by CF support for the ZDCFT command handler.
CFDSC	CFLY	New	C Language	Created by CF support for the CFDISC service routine.
CFFIND	CFLC	New	C Language	Created by CF support for the common fixed file routine.
CFMADD	CFLN	New	C Language	Created by CF support for ZMCFT ADD processing.
CFMDEL	CFLN	New	C Language	Created by CF support for ZMCFT DELETE processing.
CFMDIS	CFLN	New	C Language	Created by CF support for the ZMCFT DISPLAY service routine.
CFMENA	CFLN	New	C Language	Created by CF support for the ZMCFT ENABLE service routine.
CFMFRE	CFLN	New	C Language	Created by CF support for the ZMCFT service routine front end.
CFMPAR	CFLM	New	C Language	Created by CF support for the ZMCFT parser.
CFMRES	CFLN	New	C Language	Created by CF support for ZMCFT RESETLOCK processing.
CFMSGGS	CFLU	New	C Language	Created by CF support for the CF output message processor.
CFRST1	CFLR	New	C Language	Created by CF support for part 1 of CF restart.
CFRST2	CFLS	New	C Language	Created by CF support for part 2 of CF restart.
CFSBFD	CFLZ	New	C Language	Created by CF support to locate the coupling facility structure block (CFSB) in the fixed file records.
CFSBFL	CFLY, CFLZ	New	C Language	Created by CF support to file a new or updated CF list structure.
CFSTBE	CFLP	New	C Language	Created by CF support to build the coupling facility status table (CFST) entry in main storage.
CFSTRF	CFLQ	New	C Language	Created by CF support to refresh the main storage copy of the CFST.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 437 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 437. Changes to CINFC Tags for CF Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMCFC	357	New

Copy Members

Table 438 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 438. Changes to Copy Members for CF Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Changed	Updated by CF support for the control program (CP) table of contents.
CCIO	Control Program	IPLB	Changed	Updated by CF support for the common input/output (I/O) copy code.
CCIT	Control Program	CCNUCL	Changed	Updated by CF support for the interrupt routines.
CEDM	Control Program	CCMDCD	Changed	Updated by CF support for the macro decoder.
CFCC	Control Program	CCCFC	New	Created by CF support for the CF CP constants and equates.
CFCE	Control Program	CCCFC	New	Created by CF support for the CF message error routines.
CFCM	Control Program	CCCFC	New	Created by CF support for CF message initiation and completion.
CFCP	Control Program	CCCFC	New	Created by CF support for the CF macro service routines.
CFCR	Control Program	CCCFC	New	Created by CF support for the CF CFRQC macro service routine.
CFCS	Control Program	CCCFC	New	Created by CF support for the CF general service routines.
CIDP	Control Program	CCCPSE	Changed	Updated by CF support for IBM dump overrides.
CLHL	Control Program	CCCLHR	Changed	Updated by CF support for the dispatch list management services.
CNCE	Control Program	CCMCKH	Changed	Updated by CF support for the machine check handler.
CPSE	Control Program	CCCPSE	Changed	Updated for CF support.
CPSL	Control Program	CCCPSE	Changed	Updated by CF support for the write system error dump.
CSYN	Control Program	CCNUCL	Changed	Updated by CF support.
CTME	Control Program	CCNUCL	Changed	Updated by CF support for the external interrupt handler.
CT38	Control Program	CCCTIN	Changed	Updated by CF support to allocate CF control structures.

Fixed File Records

Table 439 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 439. Changes to Fixed File Records for CF Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#CFREC	New	Created by CF support.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 440 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 440. Changes to Data Macros CF Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
DCTCTL	Changed	No
DCTDOR	Changed	No
DCTIRB	Changed	No
DCTMDR	Changed	No
DCTMFS	Changed	No
DCTMIO	Changed	No
DCTMOR	Changed	No
DCTPFX	Changed	No
DCTSCH	Changed	No
DLTEC	Changed	Yes
DLTGC	Changed	Yes
ICFAA	New	No
ICFCB	New	No
ICFCO	New	No
ICFCT	New	No
ICFDI	New	No
ICFEQ	New	No
ICFPL	New	No
ICFRB	New	No
ICFSB	New	No
ICFST	New	No
ICFTT	New	No
ICFVB	New	No
IFAPI	New	No
IMDDB	New	No

Table 440. Changes to Data Macros CF Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
IMSCT	New	No
STDHD	Changed	No

General Macros: Table 441 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 441. Changes to General Macros for CF Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CC	Changed	No
CINFC	Changed	No
GENMSG	Changed	No

Selected Equate Macros: Table 442 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 442. Changes to Selected Equate Macros for CF Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CLHEQ	Changed	No
CZOCP	Changed	No
CZ1SE	Changed	No
NODEQ	Changed	No
TRMEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 443 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 443. Changes to SIP Skeleton and Internal Macros for CF Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 444 on page 457 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 460 for a description of other system generation changes you must make.

Table 444. Changes to SIP Stage I Macros and Statements for CF Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 445 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 445. Changes to SIP Stage II Macros for CF Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 446 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 446. Changes to System Macros for CF Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFCONC	New	No
CFDISC	New	No
CFVCTC	New	No
IBMSVC	Changed	Yes
IDATB	Changed	Yes
IDATG	Changed	Yes
SLNKC	Changed	No

System Macros (IBM Use Only): Table 447 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 447. Changes to System Macros (IBM Use Only) for CF Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes
CFMDC	Changed	Yes
CFRQC	New	No
GCFBC	New	No
RCFBC	New	No
\$GCFBC	New	No
\$RCFBC	New	No

Segments

Table 448 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 448. Changes to Segments for CF Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCCFCC	CSECT	Not Applicable	New	Created by CF support for the CF control program (CP).
CPLKMP	CSECT	Not Applicable	Changed	Updated by CF support for the copy cards for CP link map.
CTKS	Real-Time Assembler	Not Applicable	Changed	Updated by CF support.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated by CF support.
FTVA03	Offline C Language	Not Applicable	Changed	Updated by CF support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 449 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 449. Changes to Commands for CF Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZDCFT	New	Created by CF support to display entries in the coupling facility trace table (CFTT).
ZMCFT ADD	New	Created by CF support to add a CF to a processor configuration.
ZMCFT DELETE	New	Created by CF support to remove a CF from a processor configuration.
ZMCFT DISPLAY	New	Created by CF support to display the status of one or more CFs in the complex.
ZMCFT ENABLE	New	Created by CF support to resume normal operation of a CF when it becomes inactive because of an error.
ZMCFT RESETLOCK	New	Created by CF support to reset the CF lock to an available state.

Messages and System Errors

Table 450 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 450. Changes to Messages and System Errors for CF Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
005001	System Error	New
005002	System Error	New
005003	System Error	New
005004	System Error	New
005005	System Error	New
005006	System Error	New
005007	System Error	New
005008	System Error	New
005009	System Error	New
00500A	System Error	New
CFCC0020E	Online	New
CFCC0021E	Online	New
CFCC0024W	Online	New
CFCC0025I	Online	New
CFCC0028E	Online	New
CFCC0029E	Online	New
CFCC0031E	Online	New
CFCC0034E	Online	New
CFCE0001E	Online	New
CFCE0002E	Online	New
CFCE0003E	Online	New
CFCE0004E	Online	New
CFCE0005E	Online	New
CFCR0001I	Online	New
DCFT0001I	Online	New
DCFT0002I	Online	New
DCFT0003E	Online	New
MCFT0001I	Online	New
MCFT0002I	Online	New
MCFT0003I	Online	New
MCFT0004I	Online	New
MCFT0005T	Online	New

Table 450. Changes to Messages and System Errors for CF Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MCFT0006T	Online	New
MCFT0007E	Online	New
MCFT0008I	Online	New
MCFT0009T	Online	New
MCFT0010T	Online	New
MCFT0011T	Online	New
MCFT0019E	Online	New
MCFT0020T	Online	New
MCFT0022T	Online	New
MCFT0024I	Online	New
MCFT0025E	Online	New
MCFT0026E	Online	New
MCFT0027E	Online	New
MCFT0028T	Online	New
MCFT0029I	Online	New
MCFT0030T	Online	New
MCFT0031I	Online	New
MCFT0032T	Online	New
MCFT0033T	Online	New
MCFT0034T	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

CF support uses the system work blocks (SWBs) for many types of control blocks. Consider increasing the number of SWBs allocated in your TPF 4.1 system to account for the SWBs used by CF support. The following identifies the additional number of SWBs you will need:

- Each CF that has been added to your processor configuration by using the ZMCFT ADD command requires one SWB. See *TPF Operations* for more information about the ZMCFT ADD command.
- Each CF list structure to which your processor has any connection requires one SWB.
- Each connection established to any CF list structure requires one SWB. In addition, each connection performing list monitoring services requires an additional SWB.
- Each error recovery operation for a CF request requires one SWB. Keep in mind that multiple error recovery operations may occur at the same time.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 451 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 451. Changes to TPF Publications for CF Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU09	Updated with information about new C functions for CF support.
<i>TPF Database Reference</i>	GTPDBR07	Added a new chapter that discusses CF concepts.
<i>TPF General Macros</i>	GTPGEN09	Updated with changed general macros for CF support.
<i>TPF Library Guide</i>	GTPDOC09	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for CF support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG09	Updated with migration considerations for CF support.
<i>TPF Operations</i>	GTPOPR09	Updated with information about the commands that were added for CF support.
<i>TPF Programming Standards</i>	GTPPSM08	Updated with conventions for CF list structure names.
<i>TPF Program Development Support Reference</i>	GTPPDR09	Updated with information about new dump labels that were added for CF support.
<i>TPF System Macros</i>	GTPSYS09	Updated with information about new and changed system macros for CF support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install CF support on your TPF 4.1 system.

1. Update the library system with the contents of program update tape (PUT) 9.
2. In a basic subsystem (BSS), enter the ZIMAG DEFINE command to define a new image using a new program base. This image is referred to as the *new image* throughout the remainder of this procedure.

3. Initialize the new image by copying from the old image to the new image. To do so, enter the ZIMAG COPY command.

Note: You can also initialize the new image by performing a full load to the image.

4. Create a new system allocator (SALO) that includes the newly created segments.
5. Recompile and run SALO to create an updated program allocation table (PAT).
6. Create a new file address compute (FACE) program table that includes the new fixed file records by defining the #CFREC fixed file record. The number of #CFREC fixed file records to define varies on your individual requirements. If you intend to create CF list structures in one or more CFs, use the following formula to determine the number of #CFREC fixed file records you need to define.

In this formula M represents the maximum number of CF list structures that may be in use at any given time by all processors in the processor configuration. ICFSBNUMSLOTS is an equate defined in the ICFSB data macro. The number of #CFREC records to allocate is then given by the formula:

$$1 + (M + (ICFSBNUMSLOTS - 1)) / ICFSBNUMSLOTS$$

For #CFREC ordinal 0, enter **ZIFIL CFREC/FC2E/01/0/0/NNN/N**.

For the remaining #CFREC ordinals that are defined (ordinals 1 through x-1), enter **ZIFIL CFREC/FC2E/02/1/y/NNN/N** where y is x-1.

Notes:

- a. The division operation is integer division where any remainder is ignored.
 - b. Currently ICFSBNUMSLOTS is 9.
 - c. The records must be allocated as 4KB fixed file records.
 - d. No #CFREC fixed file records are required if CF support is not actually being used.
7. Reassemble and recompile all required programs. Be sure to recompile CFMDIS and CFMPAR using the RENT option.
 8. Link all applicable programs again.
 9. Link the control program (CP) again.
 10. Define a load deck for the auxiliary loader (TLDR) that includes the following:
 - Updated programs
 - Updated CP
 - Updated IPLB program
 - Updated IPAT
 - Updated FACE table.
 11. Run TLDR.
 12. Perform a load to the new image.
 13. Perform an IPL CLEAR of the TPF 4.1 system and choose the new image as the active image.
 14. Enter the ZIFIL command to initialize the fixed file records by entering **ZIFIL equate/record/code/start/end/NNN/N**

Where:

equate

Is a 1- to 8-character SYSEQ label (for FACS).

recid

Is a 2-character alphanumeric record ID or a 4-digit hexadecimal record ID.

code

Is the 2-digit hexadecimal value for the record code check (RCC) byte for the records.

start

Is the 1- to 8-character decimal starting ordinal number for the initialization.

end

Is the 1- to 8-character decimal ending ordinal number for the initialization.

15. Re-IPL all processors in the processor configuration. CF support is now installed on your TPF 4.1 system.

Additional Information:

See *TPF Operations* for more information about the ZIMAG COPY, ZIMAG DEFINE, and ZIFIL commands.

High-Performance Routing (HPR) Support (APAR PJ25760)

The following section discusses the migration considerations for HPR support.

Prerequisite APARs

See the APEDIT for APAR PJ25760 for information about prerequisite APARs.

Functional Overview

HPR support allows the TPF 4.1 system to connect to a Systems Network Architecture (SNA) network as an HPR rapid transport protocol (RTP) node. HPR support provides the following benefits:

- Better network availability
- Better end-to-end network performance
- Better congestion control and flow control
- Less storage required and machine cycles used in intermediate nodes.

Before HPR support, if any node along the route of an LU-LU session failed, the LU-LU session failed as well. With HPR support, the LU-LU session is automatically switched to an alternate path and the session remains active. This happens without operator intervention and is transparent to you.

Before HPR support, every node along the route of an LU-LU session performed functions such as segmenting and reassembling messages, detecting lost data, and processing data received out of order. With HPR support, only the two endpoints of the HPR route perform these functions. Intermediate nodes along the HPR route simply forward the message to the next node (hop) along the HPR route without examining it or changing it. Intermediate nodes along the HPR route have no knowledge of sessions, which reduces the amount of storage required in these nodes. Less processing is required by the intermediate HPR nodes, which improves end-to-end throughput and performance.

Before HPR support, flow control was done on a hop-by-hop or node-to-node basis. With HPR support, flow control is done end-to-end, which is a much more effective method for controlling and preventing network congestion.

HPR support requires only new software; no new hardware is required. When an LU-LU session starts, the network automatically determines if HPR support can be used. No new network definitions are required to use HPR support.

All nodes in the network along the route for an LU-LU session do not need to have HPR support installed, but you get the benefits of HPR support only on the HPR-capable part of the route. For example, assume the TPF 4.1 system is connected to a network that has HPR support installed and the remote LU is located in a subarea (PU 5) network. In this example, an LU-LU session can be established between the TPF 4.1 system and the remote LU. However, HPR flows are used only for part of the route, and then subarea flows are used the remainder of the way out to the remote LU.

See the *TPF ACF/SNA Data Communications Reference* for more information about HPR support.

Architecture

HPR support is an extension to the Advanced Peer-to-Peer Networking (APPN) architecture. See the *TPF ACF/SNA Data Communications Reference* for more information about TPF/APPN support. Each node in the network has one of the following levels of HPR support:

- Automatic network routing (ANR) support, which allows the node to be an intermediate node for an RTP connection
- RTP support, which allows the node to be the endpoint of an RTP connection
- No HPR support.

Logical pipelines called RTP connections are set up between a pair of RTP nodes. These two nodes are called the RTP endpoints for the RTP connection. All of the nodes along the route between the RTP endpoints must have HPR support installed. One or more LU-LU sessions use an RTP connection. Each RTP connection is associated with a specific class of service (COS), which means all LU-LU sessions using a given RTP connection must have the same COS. The RTP endpoint is not necessarily the node where the LU resides, which is the condition when only part of the route between two LUs supports HPR.

When an LU-LU session is being activated, an APPN search is performed to calculate a route between the primary logical unit (PLU) and the secondary logical unit (SLU). If the node owning the PLU is an RTP node, that node examines the route calculated by the APPN search to determine if HPR support can be used for this LU-LU session. For HPR support to be used, there must be another RTP node along the route, and all nodes between that RTP node and the node owning the PLU must have HPR support installed. If HPR support can be used, the node owning the PLU either uses an existing RTP connection or starts a new RTP connection.

If an intermediate node along the route of an RTP connection fails, one of the RTP endpoints will detect the failure and start the path switch process to obtain a new route for the RTP connection. No data or sessions are lost when a path switch occurs. All of the LU-LU sessions using an RTP connection switch to the new route when a path switch occurs.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with HPR support, you must establish the required operating environment. The following section describes hardware and software requirements specific to HPR support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for SNA-Based Communication: To use HPR support, you must install it in the TPF 4.1 system. HPR support allows the TPF 4.1 system to be

one endpoint for an RTP connection. You must also install HPR support in the other components in your network between the TPF 4.1 system and the remote LUs. One of those components must be an RTP node so that it can be the other endpoint of the RTP connection.

See “Migration Scenarios” on page 481 for information about installing HPR support in the TPF 4.1 system. See the appropriate product documentation for information about installing HPR support in the other components of your network.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 452 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 452. Changes to Build Scripts for High-Performance Routing (HPR) Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CSFXBS	DLM	Changed	The CSFU segment is no longer supported.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 453 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 453. Changes to General Use C/C++ Language Header Files for High-Performance Routing (HPR) Support

General Use C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	Changed	No
c\$fer0.h	Changed	No
c\$fva0.h	Changed	No
c\$iptbl.h	Changed	No
i\$rtph.h	New	No
c\$rvlvt.h	Changed	See the APEDIT for APAR PJ25760 for a list of segments that must be reassembled.

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 454 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 454. Changes to Members (Object Files) for High-Performance Routing (HPR) Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CSFU	CSFX	No Longer Supported	C Language	Replaced by the CSFW segment. .
CSFW	CSFX	Changed	C Language	Updated the ZNPIU command with the FORMAT or LONG parameter specified to produce a formatted display of HPR network layer packets (NLPs).
CSFX	CSFX	Changed	C Language	Updated the ZNPIU command with new parameters for HPR support.
CSF6	CSFX	Changed	C Language	Updated the ZNPIU command with the COMPACT parameter specified to produce a compacted display of HPR NLPs.
CSF7	CSFX	Changed	C Language	Updated the comments for HPR support in the print_RU function of the ZNPIU command.
CSF9	CSFX	Changed	C Language	Updated the ZNPIU command with the FORMAT or LONG parameter specified to display the RU name in HPR NLPs.
CSRA	CSRA	Changed	C Language	Updated the ZNTRP command with new parameters for HPR support.
CSRB	CSRA	Changed	C Language	Updated the ZNTRP command with the START parameter specified to support the HPR and RTP parameters.
CSRD	CSRA	Changed	C Language	Updated the ZNTRP command to clear the trace indicators in the rapid transport protocol control block (RTPCB) table entries.
CSRF	CSRA	Changed	C Language	Updated the ZNTRP command with the STOP parameter specified to support the HPR and RTP parameters.
CSRG	CSRA	Changed	C Language	Updated the ZNTRP command with the DISPLAY parameter specified for HPR support.
CSRH	CSRA	Changed	C Language	Updated the ZNTRP command to display new informational messages for HPR support.
CSRI	CSRA	Changed	C Language	Updated the ZNTRP command to display new error messages for HPR support.
CSRJ	CSRA	Changed	C Language	Updated the ZNTRP command to trace a single RTP connection.
CSRK	CSRA	Changed	C Language	Updated the ZNTRP command with minor changes for HPR support.
CSRL	CSRA	Changed	C Language	Updated the ZNTRP command with minor changes for HPR support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 455 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 455. Changes to Copy Members for High-Performance Routing (HPR) Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CLVB	Control Program	CCCCP1	Changed	Updated the BSCQC macro with the new HPRCHAIN parameter to return chained blocks.
CPSF	Control Program	CCCPSF	Changed	Updated catastrophic error processing to keypoint the new records that were added for HPR support.
CSX0	Control Program	CCSNA1	Changed	Updated XID processing to build CV X'61' (HPR capabilities) for PU 2.1 links if HPR support is enabled.
CSX2	Control Program	CCSNA1	Changed	Updated XID processing to process CV X'61' (HPR capabilities) for PU 2.1 links if HPR support is enabled.
CS0B	Control Program	CCSNA4	Changed	Updated RVTSCAN to run new functions for HPR support by calling routines in the CS0S copy segment.
CS0C	Control Program	CCSNA4	Changed	Updated RVTSCAN so that the CSNASPIU routine can be called from places other than the CS0B copy segment.
CS0E	Control Program	CCSNA4	Changed	Updated RVTSCAN with a new save area for the base register of the routines that call the CSNASPIU routine.
CS0M	Control Program	CCSNA1	New	Manages the high-performance routing message table (HPRMT).
CS0N	Control Program	CCSNA2	New	HPR OPZERO, which contains routines that process data received out of order, transport header (THDR) chaining, and transmission header (TH) chaining for HPR NLPs.
CS0P	Control Program	CCSNA1	New	Performs new path information unit (PIU) trace functions for HPR support.
CS0R	Control Program	CCSNA1	New	Performs new SOUTC functions for HPR support.
CS0S	Control Program	CCSNA4	New	Performs new RVTSCAN functions for HPR support.
CS06	Control Program	CCSNA1	Changed	Updated PIU trace to call routines in the CS0P copy segment that process HPR NLPs when they are received from the network.
CS07	Control Program	CCSNA1	Changed	Updated the SOUTC macro to process HPR NLPs.

Table 455. Changes to Copy Members for High-Performance Routing (HPR) Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CS10	Control Program	CCSNA2	Changed	Updated SNA OPZERO to call routines in HPR OPZERO (copy segment CS0N) to process HPR NLPs.

Fixed File Records

Table 456 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 456. Changes to Fixed File Records for High-Performance Routing (HPR) Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#RT1RI	New	RTPCB table, part 1.
#RT2RI	New	RTPCB table, part 2.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 457 summarizes changes to the communication macros. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 457. Changes to Communication Macros and Statements for High-Performance Routing (HPR) Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 458 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 458. Changes to Data Macros for High-Performance Routing (HPR) Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
CK2SN	Changed	No
CVTEQ	Changed	No
CW0CC	Changed	No
CZ1SE	Changed	No
IHPMT	New	Not Applicable
IHPSA	New	Not Applicable
IPCID	Changed	No
IP_TBL	Changed	No
IRTPB	New	Not Applicable
ISCB	Changed	Yes
ITAPST	Changed	No

Table 458. Changes to Data Macros for High-Performance Routing (HPR) Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
PIUEQ	Changed	No
PIUTR	Changed	No
RV1VT	Changed	See the APEDIT for APAR PJ25760 for a list of segments that must be reassembled.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 459 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 459. Changes to SIP Skeleton and Internal Macros for High-Performance Routing (HPR) Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 460 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 460. Changes to SIP Stage II Macros for High-Performance Routing (HPR) Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 461 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 461. Changes to System Macros for High-Performance Routing (HPR) Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BSCQC	Changed	No
SOUTC	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 462 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 462. Changes to Segments for High-Performance Routing (HPR) Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCSNA1	CSECT	CPS0	Changed	Updated SNA I/O with new copy segments for HPR support.
CCSNA2	CSECT	CPS0	Changed	Updated SNA OPZERO with a new copy segment for HPR support.
CCSNA4	CSECT	CPS0	Changed	Updated RVT scan with a new copy segment for HPR support.
CHKA	Real-Time Assembler	Not Applicable	Changed	Updated session control block (SCB) keypointing to accommodate the increased size of the RVT and SCB.
CHKB	Real-Time Assembler	Not Applicable	Changed	Updated the routine for building and filing SCB entries to accommodate the increased size of the RVT and SCB.
CHKR	Real-Time Assembler	Not Applicable	Changed	Updated the routine for reloading SCB entries from file to accommodate the increased size of the RVT and SCB.
CHRR	Real-Time Assembler	Not Applicable	Changed	Updated the routine for returning an SCB entry to issue the BSCQC macro if that SCB entry has a pointer to a TH chained message. Also updated to clean up new SCB indicators.
CHSB	Real-Time Assembler	Not Applicable	Changed	Updated the PU 2.1 BIND response handler to call the CSHQ segment to process CV X'62' for HPR LU-LU sessions.
CHZS	Real-Time Assembler	Not Applicable	Changed	Updated the ZNSCB INITIALIZE command with the ALL parameter specified to accommodate the increased size of the RVT and SCB.
COVU	Real-Time Assembler	Not Applicable	Changed	Updated the ZNCVT command with a new parameter for HPR support.
CSBB	Real-Time Assembler	Not Applicable	Changed	Updated the routine for building a BIND request to set up the current hop count (CHC) field for HPR LU-LU sessions.
CSBE	Real-Time Assembler	Not Applicable	Changed	Updated the TPF APPN processor shared table (TAPST) handler to indicate whether the link is HPR-capable and whether the control point (CP) that owns the link supports the RTP tower.
CSBI	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes APPN LOCATE commands to indicate whether an APPN LOCATE command is for a normal LU-LU session or a TPF-initiated path switch.
CSBK	Real-Time Assembler	Not Applicable	Changed	Updated the routine for transmission group (TG) registration to indicate whether the link supports HPR.

Table 462. Changes to Segments for High-Performance Routing (HPR) Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSBL	Real-Time Assembler	Not Applicable	Changed	Updated the routine for building APPN LOCATE commands to clear the path switch flag before calling the CSBP segment.
CSBM	Real-Time Assembler	Not Applicable	Changed	Updated the APPN cycle-up routine to pass control to the CSHL segment after an IPL to restart path switches.
CSBN	Real-Time Assembler	Not Applicable	Changed	Updated comments in the routine that builds general data stream (GDS) variables for APPN LOCATE commands.
CSBO	Real-Time Assembler	Not Applicable	Changed	Updated the routine that sends data over CP-CP sessions to handle the condition where CP-CP sessions are not available when an RTP connection is performing a path switch.
CSBP	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes APPN LOCATE commands to handle the condition where an RTP connection is performing a path switch.
CSBQ	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes APPN LOCATE commands to call the CSHP segment to see if HPR support can be used for the LU-LU session that is starting.
CSBR	Real-Time Assembler	Not Applicable	Changed	Updated the APPN SIPCC receiver with new function codes for HPR support.
CSBS	Real-Time Assembler	Not Applicable	Changed	Updated the APPN SIPCC sender with new function codes for HPR support.
CSBT	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes APPN LOCATE commands received from another TPF processor to indicate in the procedure correlation identification (PCID) table whether the PCID table entry is being added for a path switch.
CSBU	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ25331.
CSBW	Real-Time Assembler	Not Applicable	Changed	Updated the routine that builds control vectors for APPN LOCATE commands to include HPR information in the control vectors.
CSBX	Real-Time Assembler	Not Applicable	Changed	Updated the routine called when CP-CP sessions are started to call the CSHL segment to restart any path switches that need to be restarted.
CSBZ	Real-Time Assembler	Not Applicable	Changed	Updated the APPN cleanup routine to handle RTP connections that are currently performing a path switch.
CSB0	Real-Time Assembler	Not Applicable	Changed	Updated the ZNAPN command with the TOPOLOGY parameter specified for HPR support.
CSCD	Real-Time Assembler	Not Applicable	Changed	Updated the SNA command scheduler for HPR support.
CSCI	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes a PU 2.1 BIND response for HPR support.
CSCQ	Real-Time Assembler	Not Applicable	Changed	Updated Lost Terminal processing for HPR support.

Table 462. Changes to Segments for High-Performance Routing (HPR) Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSDT	Real-Time Assembler	Not Applicable	Changed	Updated the SNA command timeout routine for HPR support.
CSEJ	Real-Time Assembler	Not Applicable	Changed	Updated the link failure routine for HPR support. If an ALS fails, do not mark HPR LU-LU sessions for cleanup. Instead, start a path switch for all RTP connections that used the failing ALS.
CSE3	Real-Time Assembler	Not Applicable	Changed	Updated the routine that performs conflict checking for the ZNETW commands to no longer check the status of the owning ALS when deactivating HPR LU-LU sessions.
CSFP	Real-Time Assembler	Not Applicable	Changed	Updated the ZNETW DISPLAY command to no longer check whether PIU trace is active.
CSFQ	Real-Time Assembler	Not Applicable	Changed	Updated the ZNDLU command for HPR support.
CSFR	Real-Time Assembler	Not Applicable	Changed	Updated the ZNDLU command for HPR support.
CSFV	Real-Time Assembler	Not Applicable	Changed	Updated the ZNDLU command for HPR support.
CSGA	Real-Time Assembler	Not Applicable	Changed	Updated the SNA cycle-up scheduler for HPR time-initiated processing.
CSGB	Real-Time Assembler	Not Applicable	Changed	Updated the link processing routines in SNA restart for HPR support.
CSGD	Real-Time Assembler	Not Applicable	Changed	Updated SNA restart to no longer check whether PIU trace is active.
CSGH	Real-Time Assembler	Not Applicable	New	Creates the RTPCB table for HPR support.
CSGJ	Real-Time Assembler	Not Applicable	New	Creates the HPRMT and high-performance routing session address table (HPRSAT) for HPR support.
CSG0	Real-Time Assembler	Not Applicable	Changed	Updated SNA restart to call new segments for HPR support.
CSG4	Real-Time Assembler	Not Applicable	Changed	Updated the SNA restart error processor with new messages for HPR support.
CSG7	Real-Time Assembler	Not Applicable	Changed	Updated SNA restart to update the HPRSAT with information about HPR LU-LU sessions.
CSG9	Real-Time Assembler	Not Applicable	Changed	Updated SNA restart to indicate in the TAPST whether HPR support is supported on the TPF processor.
CSHI	Real-Time Assembler	Not Applicable	New	Processes an APPN LOCATE reply for an RTP connection that is performing a path switch.
CSHJ	Real-Time Assembler	Not Applicable	New	Performs the cleanup routines for RTP connections.
CSHL	Real-Time Assembler	Not Applicable	New	Builds an APPN LOCATE request for an RTP connection that is performing a path switch.

Table 462. Changes to Segments for High-Performance Routing (HPR) Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSHP	Real-Time Assembler	Not Applicable	New	Determines whether to start a new RTP connection, use an existing RTP connection, or start a PU 2.1 LU-LU session.
CSHQ	Real-Time Assembler	Not Applicable	New	Manages the HPRSAT.
CSHR	Real-Time Assembler	Not Applicable	New	Builds a ROUTE_SETUP request for a new RTP connection or a path switch.
CSHS	Real-Time Assembler	Not Applicable	New	Processes a ROUTE_SETUP reply for an RTP connection.
CSHT	Real-Time Assembler	Not Applicable	New	Performs time-initiated processes for HPR support.
CSHW	Real-Time Assembler	Not Applicable	New	Processes a path switch that was directed to the wrong TPF processor.
CSHY	Real-Time Assembler	Not Applicable	New	Detects TPF outages for HPR support.
CSH1	Real-Time Assembler	Not Applicable	New	Parses the ZNRTP commands.
CSH2	Real-Time Assembler	Not Applicable	New	Processes the ZNRTP DISPLAY command.
CSH3	Real-Time Assembler	Not Applicable	New	Processes the ZNRTP INACT, ZNRTP INITIALIZE, ZNRTP ROUTE, and ZNRTP SWITCH commands.
CSH4	Real-Time Assembler	Not Applicable	New	Processes a ROUTE_SETUP request for an RTP connection.
CSH5	Real-Time Assembler	Not Applicable	New	Processes the ZNRTP SUMMARY command.
CSH6	Real-Time Assembler	Not Applicable	New	Processes the ZNRTP DISPLAY command with the FORMAT parameter specified.
CSJK	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes a PU 2.1 UNBIND request for HPR support.
CSKH	Real-Time Assembler	Not Applicable	New	Keypoints the RTPCB table.
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated the ZNKEY command for HPR support.
CSMA	Real-Time Assembler	Not Applicable	Changed	Updated the ZNMON command for HPR support.
CSM0	Real-Time Assembler	Not Applicable	Changed	Updated the ZNALS command to no longer check whether PIU trace is active.
CSN0	Real-Time Assembler	Not Applicable	Changed	Updated the SNA command table with the new ZNRTP commands for HPR support.
CSPA	Real-Time Assembler	Not Applicable	Changed	Updated the SNA keypointing routine to keypoint the RTPCB table during cycle-down for HPR support.
CSTC	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes a PU 2.1 BIND request for HPR support.
CSTJ	Real-Time Assembler	Not Applicable	Changed	Updated the routine that processes a PU 2.1 LU 6.2 BIND request for HPR support.
CVYA	Real-Time Assembler	Not Applicable	Changed	Updated the help information for HPR support.

Table 462. Changes to Segments for High-Performance Routing (HPR) Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVYB	Real-Time Assembler	Not Applicable	Changed	Updated the help information for HPR support.
CVYD	Real-Time Assembler	Not Applicable	Changed	Updated the help information for HPR support.
CVYE	Real-Time Assembler	Not Applicable	New	Display help information for the new ZNRTP commands.
FTER00	Offline C Language	Not Applicable	Changed	Added new error messages for processor-unique records.
FTVA02	Offline C Language	Not Applicable	Changed	Updated for processor-unique records.
FTVA03	Offline C Language	Not Applicable	Changed	Added new record definitions for HPR support.
PIUPRT	Offline C Language	PIUPRT	Changed	Updated the offline PIU trace facility for HPR support.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 463. Changes to ECB User Exits for High-Performance Routing (HPR) Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Select an RTP Connection	CSHP	URTP	New	Contains the Select an RTP Connection user exit.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 464 on page 476 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 464. Changes to Commands for High-Performance Routing (HPR) Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZNAPN	Changed	Updated the information that is displayed when the TOPOLOGY parameter is specified to indicate whether the link supports HPR.
ZNCVT	Changed	Added the H parameter to convert a session address (SA).
ZNDLU	Changed	Added the RTP parameter to display the LU-LU sessions using an RTP connection.
ZNKEY	Changed	Added the HPRALIVE, HPRMTSIZ, HPRPST, MAXHPRSA, MAXRTPCB, and RTPRSYNC parameters for HPR support.
ZNMON	Changed	Updated the information that is displayed to include the current number of RTP connections and HPR LU-LU sessions.
ZNPIU	Changed	Added new parameters that allow you to suppress or display HPR control messages, the NHDR and THDR in HPR NLPs, or data.
ZNRTP DISPLAY	New	Displays information about RTP connections.
ZNRTP HPR	New	Enables or disables HPR support and displays the status of HPR support in the TPF 4.1 system.
ZNRTP INACT	New	Deactivates RTP connections.
ZNRTP INITIALIZE	New	Initializes the entries in the RTPCB table.
ZNRTP ROUTE	New	Displays the route of an RTP connection.
ZNRTP SUMMARY	New	Displays summary information about RTP connections and the resources that they use.
ZNRTP SWITCH	New	Changes the route of an RTP connection by starting a path switch.
ZNTRP	Changed	Added new parameters that allow you to trace only HPR traffic, only HPR state changes, or a specific RTP connection. Also added a parameter that allows you to specify the number of bytes of the RU being stored in the PIU trace table for SNA commands, data flowing on CDRM-CDRM sessions, and data flowing on CP-CP sessions.

Messages and System Errors

Table 465 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 465. Changes to Messages and System Errors for High-Performance Routing (HPR) Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0004A8	System Error	Changed
0004A9	System Error	Changed
0004AA	System Error	Changed

Table 465. Changes to Messages and System Errors for High-Performance Routing (HPR) Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
C62200	System Error	New
C62201	System Error	New
C62202	System Error	New
C62203	System Error	New
C62204	System Error	New
C62205	System Error	New
C62206	System Error	New
C62207	System Error	New
C62209	System Error	New
C6220A	System Error	New
C6220B	System Error	New
C6220C	System Error	New
CSGH0001I	Online	New
CSGH0002I	Online	New
CSGH0003I	Online	New
CSGJ0001I	Online	New
CSGJ0002I	Online	New
CSGJ0003I	Online	New
FCTB0115E	Offline	New
FCTB0116E	Offline	New
HPR00001I	Online	New
HPR00002I	Online	New
HPR00003I	Online	New
HPR00004I	Online	New
HPR00009E	Online	New
HPR00010W	Online	New
HPR00011E	Online	New
NAPPN0011I	Online	New
NAPPN0012I	Online	No Longer Supported
NCVT0007I	Online	New
NDLU0029E	Online	New
NMON0001I	Online	No Longer Supported
NMON0002I	Online	New
NPIU0001I	Online	No Longer Supported
NPIU0002I	Online	No Longer Supported
NPIU0003I	Online	No Longer Supported
NPIU0004I	Online	New
NPIU0005I	Online	New
NRTP0001I	Online	New
NRTP0002I	Online	New
NRTP0003I	Online	New
NRTP0004I	Online	New
NRTP0005I	Online	New

Table 465. Changes to Messages and System Errors for High-Performance Routing (HPR) Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NRTP0006I	Online	New
NRTP0007I	Online	New
NRTP0008I	Online	New
NRTP0011I	Online	New
NRTP0012I	Online	New
NRTP0015I	Online	New
NRTP0016I	Online	New
NRTP0018I	Online	New
NRTP0019I	Online	New
NRTP0020I	Online	New
NRTP0021I	Online	New
NRTP0040E	Online	New
NRTP0041E	Online	New
NRTP0042E	Online	New
NRTP0043E	Online	New
NRTP0044E	Online	New
NRTP0045E	Online	New
NRTP0046E	Online	New
NRTP0047E	Online	New
NRTP0048E	Online	New
NRTP0050E	Online	New
NRTP0051E	Online	New
NRTP0052E	Online	New
NRTP0053E	Online	New
NRTP0054E	Online	New
NRTP0055E	Online	New
NRTP0056E	Online	New
NRTP0057I	Online	New
NTRP0007I	Online	No Longer Supported
NTRP0011I	Online	New
NTRP0012I	Online	New
NTRP0013I	Online	New
NTRP0014I	Online	New
NTRP0015I	Online	New
NTRP0016I	Online	New
NTRP0017I	Online	New
NTRP0018I	Online	New
NTRP0019I	Online	New
NTRP0038I	Online	New
NTRP0039I	Online	New
NTRP0040I	Online	No Longer Supported
NTRP0044I	Online	No Longer Supported
NTRP0045I	Online	New

Table 465. Changes to Messages and System Errors for High-Performance Routing (HPR) Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
NTRP0046I	Online	New
NTRP0047I	Online	New
NTRP0048I	Online	New
NTRP0052E	Online	No Longer Supported
NTRP0062E	Online	New
NTRP0063E	Online	New
NTRP0064E	Online	New
NTRP0065E	Online	New
NTRP0066E	Online	New

Performance or Tuning Changes

See the *TPF ACF/SNA Data Communications Reference* for information about the tuning changes.

Storage Considerations and Changes

Two of the new core memory tables introduced by HPR support can become quite large if HPR support is heavily used:

- The RTPCB table contains one entry for every RTP connection. The current size of an RTPCB table entry is 800 bytes.
- The HPRMT is used to save a copy of each output message sent on an RTP connection until the remote RTP endpoint acknowledges receipt of the message. The amount of storage needed for the HPRMT is based on the message rate, message size, and how long it takes the remote RTP endpoints to send back acknowledgments.

The following information describes additional storage considerations that are true regardless of whether or not you use HPR support:

- The amount of core memory needed for part 1 of the resource vector table (RVT) has increased by 40%.
- The amount of core memory needed for part 1 of the session control block (SCB) table has increased by 36%.
- The amount of #RV1RI fixed records necessary to keypoint the RVT has increased by 39%.
- The amount of #SC1RI records necessary to keypoint the SCB has increased by 39%.

System Initialization Program (SIP) and System Generation Changes

Define the following new parameters on the SNAKEY macro in keypoint 2 (CTK2):

- HPRALIVE, which is the value of the alive timer
- HPRMTSZ, which is the size of the HPRMT
- HPRPST, which is the value of the path switch timer that the TPF 4.1 system sends to remote RTP endpoints
- MAXHPRSA, which is the maximum number of HPR LU-LU sessions
- MAXRTPCB, which is the number of the RTPCB table entries

- RTPRSYNC, which determines whether or not the RTP connection resynchronization process is performed after a hardware IPL of the TPF 4.1 system.

See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

Define the #RT1RI and #RT2RI fixed file records that are used to keypoint parts 1 and 2 of the RTPCB table entries. See the *TPF ACF/SNA Data Communications Reference* for more information about the #RT1RI and RT2RI fixed file records.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 466 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 466. Changes to TPF Publications for High-Performance Routing (HPR) Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Data Communications Reference</i>	GTPSNR06	Added detailed, task-oriented information about HPR support.
<i>TPF ACF/SNA Network Generation</i>	GTPACF08	Updated the description of the SNAKEY macro to include information about the new parameters that were added for HPR support.
<i>TPF Library Guide</i>	GTPDOC09	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for HPR support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG09	Updated with migration considerations for HPR support.
<i>TPF Operations</i>	GTPOPR09	Updated with information about the commands that were added and changed for HPR support.
<i>TPF Program Development Support Reference</i>	GTPPDR09	Updated with information about the new dump labels that were added for HPR support.
<i>TPF System Generation</i>	GTPSYG09	Updated with information about the new records for HPR support that are checked by the FACE table generator (FCTBG).
<i>TPF System Installation Support Reference</i>	GTPINR09	Updated with information about the new ECB-controlled program user exit (URTP) that was added for HPR support.
<i>TPF System Macros</i>	GTPSYS09	Updated the description of the BSCQC macro and SOUTC macro to include information about the new parameters that were added for HPR support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install HPR support in your TPF 4.1 system.

1. Install TPF/APPN support to the TPF 4.1 system. See “TPF Advanced Peer-to-Peer Networking (TPF/APPN) Support (APAR PJ19949)” on page 148 for more information about TPF/APPN support.
2. Install program update tape (PUT) 9, which contains APAR PJ25760 for HPR support, to the TPF 4.1 system.
3. Define the following parameters on the SNAKEY macro in keypoint 2 (CTK2):
 - HPRALIVE
 - HPRMTSIZ
 - HPRPST
 - ILWPE
 - ILWPF
 - ILWPI
 - ILWPS
 - MAXHPRSA
 - MAXRTPCB
 - RTPRSYNC
 - UNITSZ.

See the *TPF ACF/SNA Data Communications Reference* for more information about determining appropriate values for these SNAKEY parameters. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

4. Define the #RT1RI and #RT2RI fixed file records that are used to keypoint parts 1 and 2 of the RTPCB table entries. See the *TPF ACF/SNA Data Communications Reference* for more information about the #RT1RI and #RT2RI fixed file records.
5. Determine whether you need to define more #RV1RI records to accommodate the increased size of the RVT entries.
6. Determine whether you need to define more #SC1RI records to accommodate the increased size of the SCB entries.
7. Code the Select an RTP Connection user exit (URTP), if necessary. See *TPF System Installation Support Reference* for more information about the URTP user exit.
8. Load the updated CTK2 to your TPF 4.1 system.
9. IPL the TPF 4.1 system.
10. Once all TPF processors in the loosely coupled complex that can have network connections have been brought up on the image with HPR support, enter **ZNAPN APPN** to enable TPF/APPN support in the TPF 4.1 system. See *TPF Operations* for more information about the ZNAPN command.
11. Enter **ZNRTTP HPR ENABLE** to enable HPR support in the TPF 4.1 system. See *TPF Operations* for more information about the ZNRTTP HPR command.

12. Enter the ZNTRP command to start the PIU trace facility and specify the data that you want to trace. See *TPF Operations* for more information about the ZNTRP command. See the *TPF ACF/SNA Data Communications Reference* for more information about the PIU trace facility.
13. Activate the PU 2.1 links to the TPF 4.1 system.
14. Activate the LU-LU sessions in the network.

Fallback Scenarios

If the conversion to HPR support is not successful, you will need to fall back to your previous network environment, correct the problem, and try the conversion again.

Use the following procedure to fall back your complex from HPR support.

1. Enter **ZNRTTP HPR DISABLE** to disable HPR support. See *TPF Operations* for more information about the ZNRTTP HPR command.
2. Deactivate each PU 2.1 link to the TPF 4.1 system.
3. Activate each PU 2.1 link to the TPF 4.1 system again. At this point, HPR support is disabled.
4. Activate the LU-LU sessions in the network again.

TPF MQSeries Local Queue Manager Support (APAR PJ25780)

The following section discusses the migration considerations for TPF MQSeries local queue manager support.

Prerequisite APARs

See the APEDIT for APAR PJ25780 for information about prerequisite APARs.

Functional Overview

TPF MQSeries local queue manager support implements a local queue manager on the TPF 4.1 system. A TPF MQSeries client was implemented previously to allow applications to interact with queue managers that are remote to the TPF 4.1 system. See “Message Queue Interface (MQI) Client (APAR PJ22434)” on page 268 for more information about the TPF MQSeries client. With TPF MQSeries local queue manager support, TPF applications can now interact with the local queue manager or with the remote queue manager server.

Applications can choose to access TPF MQSeries local queue manager support by referencing the local TPF queue manager name in the MQCONN application programming interface (API). If the local queue manager name is not specified in MQCONN, this call and all subsequent MQSeries API calls will go to the TPF MQSeries client.

TPF MQSeries local queue manager support provides a subset of the functions defined in the MQSeries architecture. Applications that need to use functions that are not included in TPF MQSeries local queue manager support must use the MQSeries client.

The IPRSE parser utility has been enhanced in several ways:

- New parser options:
 - New options for matching grammar to input strings
 - Parsing mixed-case input strings.
- New grammar options:
 - Mixed-case input is accepted.
 - Mixed-case input parameters can be, at your option, translated to uppercase in the parser output.
 - New character types:
 - A national character type of letters A to Z, digits 0 to 9, @, #, \$ (used in some Systems Network Architecture (SNA) names, for example)
 - An unrestricted character type that matches any character.
 - A maximum length for lists and wildcard lists (a character type string enclosed in parentheses and followed by an asterisk) can be specified.
 - The characters parsed as delimiters in the input string can be limited.
- Limits are removed on the length of input strings, parameters, and the number of elements in lists and wildcard lists.

See the *TPF C/C++ Language Support User's Guide* for more information about the IPRSE parser utility.

Architecture

The TPF MQSeries local queue manager support implementation is based on a subset of the standard TPF MQSeries local queue manager support interface used

by other MQSeries product offerings. The following is a list of the standard MQSeries functions that are supported by TPF MQSeries local queue manager support:

- An ISO-C interface is provided for the seven supported functions that make up the Message Queue Interface (MQI):
 - MQCLOSE
 - MQCONN
 - MQDISC
 - MQGET
 - MQOPEN
 - MQPUT
 - MQPUT1.

The MQI is shipped as a new ISO-C dynamic link library (DLL) with the seven functions implemented as external functions in this DLL.

- For TPF MQSeries local queue manager support, ZMQSC commands are provided to change and define channels, profiles, and queues; to delete or display channels and queues; to reset, resolve, start, stop, or trace channels; to display, start, or stop the queue manager; or to move messages from one transmission queue to another.
- A TPF MQSeries message channel agent (MCA) is provided to communicate with adjacent MQSeries systems using TPF sender and receiver channels only. Channels communicate using Transmission Control Protocol/Internet Protocol (TCP/IP) exclusively; therefore, a TCP/IP connection between the TPF 4.1 system and a remote MQSeries system is required.
- Messages are placed on a system-defined local queue called DEAD.LETTER.QUEUE when the TPF MQSeries local queue manager cannot resolve the name of the destination queue.

This can happen, for example, when TPF MQSeries local queue manager support receives persistent messages from remote MQSeries systems for which the destination queue is not defined or when TPF MQSeries cannot find a transmission queue when an application places a persistent message on a remote queue. The message is placed on the dead-letter queue with an MQDLH structure for the header as defined in the *MQSeries Application Programming Reference*. Your applications are responsible for monitoring the dead-letter queue and taking the appropriate action.

- Four new user exits:
 - A user exit to provide security for data is sent or received over TPF MQSeries channels.
 - A trigger user exit. When an application attempts to get a message from a local queue, but the local queue is empty, a flag is set in the queue definition record. When a message is placed on a queue with the flag set, the trigger user exit is called with a trigger message that indicates the queue name. You can modify the user exit to call the correct application depending on the queue name in the trigger message.
 - A user exit that allows you to convert a specified line number, interchange address, and terminal address (LNIATA) for a TPF message into an object handle (Hobj) for a remote queue entry. This allows a non-TPF MQSeries application to communicate with a remote MQSeries system.
 - A user exit that allows you to convert an object handle (Hobj) for a specified remote queue entry into an LNIATA for a TPF message. This allows a remote MQSeries system to communicate with a non-TPF MQSeries application.

- Supported MQSeries network routing methods when defining remote queues to TPF MQSeries local queue manager support. System administrators have the following options:
 - Local definition of remote queues.
A remote queue can be defined as a local definition of a remote queue. When the remote queue is opened, TPF MQSeries local queue manager support will substitute the remote queue manager name and the remote queue name specified when the remote queue was defined (using the ZMQSC DEF QR command). Local definition of remote queues allows the system administrator to determine the destination queue manager and destination queue rather than having the application do it.
 - Queue manager aliasing.
A remote queue can be defined with a queue manager alias. When the remote queue is opened, TPF MQSeries local queue manager support substitutes the remote queue manager name that was specified when the remote queue was defined (using the ZMQSC DEF QR command) for the queue manager name specified during the MQOPEN function call. Queue manager aliasing allows the system administrator to determine the destination queue manager rather than having the application do it.

The TPF 4.1 system can serve as a middle node in a network of TPF MQSeries local queue manager systems as long as the definitions adhere to the previous supported methods.

- Nonpersistent messages.
 - Outbound messages originating from an MQSeries application.
If a TPF MQSeries application places a nonpersistent message on a remote queue whose transmission queue is connected to a fast channel, the TPF MQSeries local queue manager will immediately send the message over the channel without filing a copy of the message. The message is not sent in a batch and is not guaranteed to be delivered.
If the transmission queue of the remote queue is connected to a normal channel, the TPF MQSeries local queue manager will include the message in a batch, guaranteeing delivery to the next node in the network.
 - Inbound messages originating from remote MQSeries systems over fast channels.
Nonpersistent messages that arrive at TPF MQSeries fast receiver channels are passed immediately to applications through a unique TPF mechanism called the TPF MQSeries ROUTC bridge, whereas nonpersistent messages that arrive over normal channels are handled as persistent messages. This unique TPF MQSeries ROUTC bridge function allows nonpersistent messages to arrive through the MQSeries interface, but routes the message to a TPF application. Inbound nonpersistent messages over fast channels are converted into an application message format (AM0SG) and passed immediately to the COA4 segment. You must code a user exit to determine which application will receive the message and what LNIATA is associated with the TPF message. The application must set up the message queuing message descriptor (MQMD) with ReplyToMgr and ReplyToQ. Information about where to send the reply is saved in the entry control block (ECB) and in the terminal address table (WGTA). When the application has completed processing the message, it can issue the ROUTC macro to send a reply. The ROUTC macro is intercepted and converted into an MQSeries nonpersistent outbound message.

- Outbound messages originating from remote MQSeries systems over fast channels.

Nonpersistent messages that originally came to the TPF MQSeries local queue manager over fast channels are returned to their originating TPF MQSeries system over the TPF MQSeries ROUTC bridge interface.

- Channels.

The TPF MQSeries local queue manager supports sender and receiver channels, which can be fast or normal.

- Sender Channels.

Normal sender channels process messages in batches that are guaranteed to be delivered. The sender channel takes messages from its associated transmission queue and sends them in batches whose size is negotiated with the remote receiver channel. If a nonpersistent message is added to a transmission queue that is associated with a normal channel, the message is sent in a batch and guaranteed to be delivered to the next node in the network.

Fast sender channels process nonpersistent messages only. Messages are sent immediately to the remote MQSeries receiver channel. They are not included in a batch and, therefore, are not guaranteed to be delivered. Persistent messages that are placed on a transmission queue that is associated only with a fast channel remain on that queue until a normal channel is activated to service that transmission queue.

You can have both a fast channel and a normal channel associated with a single transmission queue. This combination allows persistent messages placed on a transmission queue to be processed by a normal channel, and nonpersistent messages placed on the same transmission queue to be processed by a fast channel.

- Receiver Channels.

Normal receiver channels receive persistent and nonpersistent messages that are contained in batches. TPF MQSeries local queue manager support guarantees that the messages received over normal receiver channels are delivered to the destination queue or are put on the TPF MQSeries dead-letter queue.

Fast receiver channels receive both persistent and nonpersistent messages. Nonpersistent messages that are received over a fast channel are passed immediately to the application through the TPF MQSeries ROUTC bridge. Persistent messages that are received over a fast channel are treated as if they were received over a normal channel. The messages are included in a batch and TPF MQSeries local queue manager support guarantees the message is delivered to the destination queue or the dead-letter queue.

The following unique TPF functions are provided with TPF MQSeries local queue manager support:

- TPF MQSeries ROUTC bridge.
- Swing queue. Because of the high volume of messages that TPF applications process and to prevent a continuous buildup of messages on a transmission queue whose channel is down, TPF MQSeries local queue manager support provides the ability to move messages from one transmission queue to another. After entering the ZMQSC SWQ command, all subsequent messages destined for the first transmission queue are routed to the new transmission queue, and all messages that were placed on the original transmission queue

are moved to the new transmission queue. Once the original transmission queue and its channel are repaired, you can reset the transmission queue settings back to the original values.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF MQSeries local queue manager support, you must establish the required operating environment. The following section describes hardware and software requirements specific to TPF MQSeries local queue manager support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

General Communication: TPF MQSeries local queue manager support requires TCP/IP connections for channels to communicate with remote MQSeries systems. See *TPF Transmission Control Protocol/Internet Protocol* for more information about how to define and start TCP/IP sessions.

TPF MQSeries local queue manager support uses TPF collection support (TPFCS) for its database manager. A TPFCS database must be installed and initialized before defining a TPF MQSeries local queue manager. See “TPF Collection Support Enhancements (APAR PJ25332)” on page 526 for more information about TPFCS.

The TPF MQSeries local queue manager support receiver channel uses the TPF Internet daemon function to provide the TCP listener function, which is needed to activate new receiver channel connections.

Compilers: You must use the IBM OS/390 C/C++ Version 2 Release 4 compiler or later version or release to compile the TPF MQSeries programs. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 467 on page 488 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 467. Changes to Build Scripts for TPF MQSeries Local Queue Manager Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMQLBS	DLM	New	TPF MQSeries local queue manager support.
CMQRBS	DLM	New	TPF MQSeries local queue manager support.
CMQSBS	DLL	New	TPF MQSeries local queue manager support.
COMXBS	DLM	Changed	TPF MQSeries local queue manager support.
CTALBS	DLM	Changed	Support for the parser and TPF MQSeries local queue manager support.
CTBXBS	DLM	Changed	Support for the parser.
CUIEBS	DLM	New	TPF MQSeries local queue manager support.
CUIFBS	DLM	New	TPF MQSeries local queue manager support.
CUIKBS	DLM	New	TPF MQSeries local queue manager support.
CUIMBS	DLM	New	TPF MQSeries local queue manager support.
CUIRBS	DLM	New	TPF MQSeries local queue manager support.
CUIUBS	DLM	New	TPF MQSeries local queue manager support.
CUIXBS	DLM	New	TPF MQSeries local queue manager support.
CUSCBS	DLM	New	TPF MQSeries local queue manager support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 468 summarizes the general use C language header file changes. This information is presented in alphabetic order by the name of the general use C language header file.

General use means these header files are available for your use.

Table 468. Changes to General Use C/C++ Language Header Files for TPF MQSeries Local Queue Manager Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$an0nt.h	Changed	Yes
c\$cincf.h	Changed	Yes
c\$cmqcf.h	New	Yes
c\$cmqxc.h	New	Yes
c\$eb0eb.h	Changed	Yes
c\$mqdc.h	New	Yes
c\$trmeq.h	Changed	Yes
cmqc.h	Changed	Yes
i\$prse.h	New	Yes
iconv.h	Changed	Yes
socket.h	Changed	Yes
tpfapi.h	Changed	Yes
tpfparse.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 469 on page 489 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 469. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF MQSeries Local Queue Manager Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
amquscw.h	New	Yes
c\$mq.s.h	New	Yes
c\$mqtr.h	New	Yes
i\$netd.h	Changed	Yes

Library Interface Scripts: Table 470 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 470. Changes to Library Interface Scripts for TPF MQSeries Local Queue Manager Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	Changed	Added support for the activate_on_receipt_with_length function.
CTALXV	Changed	Parser changes; added support for the wgtac_ext function.

Library Members (Object Files): Table 471 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 471. Changes to Library Members (Object Files) for TPF MQSeries Local Queue Manager Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CRFA	CTBX	Changed	C Language	Support for the parser.
CRFB	CTBX	Changed	C Language	Support for the parser.
CRFC	CTBX	Changed	C Language	Support for the parser.
CRFD	CTBX	Changed	C Language	Support for the parser.
CRFE	CTBX	Changed	C Language	Support for the parser.
CRFG	CTBX	Changed	C Language	Support for the parser.
CRFH	CTBX	No Longer Supported	C Language	Support for the parser.
CRFI	CTBX	No Longer Supported	C Language	Support for the parser.
CRFJ	CTBX	No Longer Supported	C Language	Support for the parser.
CRFK	CTBX	No Longer Supported	C Language	Support for the parser.
CWGTAE	CTAL	New	Real-Time Assembler	Support for the wgtac_ext function.
C512	COMX	Changed	C Language	TPF MQSeries local queue manager support.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 472 on page 490 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic link module (DLM) if it has changed.

Table 472. Changes to Members (Object Files) for TPF MQSeries Local Queue Manager Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CCCCXA	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CCCITA	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CCCMXA	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CCERRA	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CCLIBA	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CINET1	CLTV	Changed	C Language	TPF MQSeries local queue manager support.
CINET4	CLTX	Changed	C Language	TPF MQSeries local queue manager support.
CMQAPI	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQCOL	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQERR	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CMQGBL	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQGRU	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQHSH	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQI03	CMQ3	Changed	C Language	Support for the parser.
CMQL	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CMQMCA	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CMQMGC	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQMGR	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQMTR	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CMQNPM	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQNPS	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CMQQUE	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CMQR	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CMQUTL	CMQS	New	C++ Language	TPF MQSeries local queue manager support.

Table 472. Changes to Members (Object Files) for TPF MQSeries Local Queue Manager Support (continued)

Table 472. Changes to Members (Object Files) for TPF MQSeries Local Queue Manager Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CUIW	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CUIX	CUIX	New	Object-Only	TPF MQSeries local queue manager support.
CUSCCA	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CUSCCD	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CMQS	New	C++ Language	TPF MQSeries local queue manager support.	
CUSCQL	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CUSCQM	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CUSCQR	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CUSCRW	CUSC	New	C++ Language	TPF MQSeries local queue manager support.
CUSCUL	CMQS	New	C++ Language	TPF MQSeries local queue manager support.
CXCMMW	CMQS	New	Object-Only	TPF MQSeries local queue manager support.
CXCSSW	CMQS	New	Object-Only	TPF MQSeries local queue manager support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 473 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 473. Changes to CINFC Tags for TPF MQSeries Local Queue Manager Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMMQT	374	New

Copy Members

Table 474 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 474. Changes to Copy Members for TPF MQSeries Local Queue Manager Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CDC1	Control Program	CCDCOL	Changed	Support for TPF MQSeries data collection.
CICR	Control Program	CCNUCL	Changed	Support for TPF MQSeries.

Table 474. Changes to Copy Members for TPF MQSeries Local Queue Manager Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CLXA	Control Program	CCCCP1	Changed	Support for TPF MQSeries ROUTC bridge.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 475 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 475. Changes to Data Macros for TPF MQSeries Local Queue Manager Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
DC0DC	Changed	Yes

General Macros: Table 476 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 476. Changes to General Macros for TPF MQSeries Local Queue Manager Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble?
CINFC	Changed	No

Selected Equate Macros: Table 477 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 477. Changes to Selected Equate Macros for TPF MQSeries Local Queue Manager Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble?
CZISE	Changed	No
TRMEQ	Changed	Yes

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 478 on page 494 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the

SIP Stage I deck and run the appropriate job control language (JCL) steps from the SIP Stage II deck.

Table 478. Changes to SIP Skeleton and Internal Macros for TPF MQSeries Local Queue Manager Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 479 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 479. Changes to SIP Stage II Macros for TPF MQSeries Local Queue Manager Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 480 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 480. Changes to Segments for TPF MQSeries Local Queue Manager Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CMQMPP	Offline C Language	CMQMPP	New	Support for TPF MQSeries local queue manager support channel trace.
CTKR	Real-Time Assembler	Not Applicable	Changed	Support for the wgtac_ext function.
CTKT	Real-Time Assembler	Not Applicable	Changed	Support for the wgtac_ext function.
CVAB	Real-Time Assembler	Not Applicable	Changed	Support for the wgtac_ext function.
JCD1	Real-Time Assembler	Not Applicable	Changed	Support for TPF MQSeries data collection.
JCD2	Real-Time Assembler	Not Applicable	Changed	Support for TPF MQSeries data collection.
JCD6	Real-Time Assembler	Not Applicable	Changed	Support for TPF MQSeries data collection.
JCM0	Real-Time Assembler	Not Applicable	Changed	Support for TPF MQSeries data collection.
JRA2	Offline PL/I	DATAREAD	Changed	Support for TPF MQSeries data reduction reports.

Table 480. Changes to Segments for TPF MQSeries Local Queue Manager Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
JRF1	Offline PL/I	DATAREAD	Changed	Support for TPF MQSeries data reduction reports.
JRM1	Offline PL/I	DATAREAD	Changed	Support for TPF MQSeries data reduction reports.
JRM5	Offline PL/I	DATAREAD	Changed	Support for TPF MQSeries data reduction reports.
JRS1	Offline PL/I	DATAREAD	Changed	Support for TPF MQSeries data reduction reports.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 481. Changes to ECB User Exits for TPF MQSeries Local Queue Manager Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
TPF MQSeries Assign LNIATA	Initiating program (TPF MQSeries local queue manager)	CUIW	New	Converts the remote queue name and the remote queue manager name that is associated with the nonpersistent message into a line number, interchange address, and terminal address (LNIATA).
TPF MQSeries Convert to Object Handle	Initiating program (TPF MQSeries local queue manager)	CUIV	New	Converts a line number, interchange address, and terminal address (LNIATA) into an MQSeries object handle that is associated with a remote queue manager and a remote queue.
TPF MQSeries Empty-Queue Trigger	CREEC	CUIR	New	Activates the application to process the local queue specified in the trigger message.
TPF MQSeries Queue Manager MCA Security	Initiating program (TPF MQSeries message channel agent (MCA))	CUIT	New	Provides security protection for data that TPF MQSeries transfers.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 482 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 482. Changes to Commands for TPF MQSeries Local Queue Manager Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZINET ADD	Changed	Added the AORLength parameter.
ZINET ALTER	Changed	Added the AORLength parameter.
ZINET DISPLAY	Changed	Added the AORLength parameter.
ZMQID ALTER	Changed	Added new parser options, grammar options, and character types.
ZMQID DEFINE	Changed	Added new parser options, grammar options, and character types.
ZMQID DELETE	Changed	Added new parser options, grammar options, and character types.
ZMQID DISPLAY	Changed	Added new parser options, grammar options, and character types.
ZMQIT	Changed	Added new parser options, grammar options, and character types.
ZMQSC ALT CHL	New	TPF MQSeries change channel definition.
ZMQSC ALT MQP	New	TPF MQSeries change profile definition.
ZMQSC ALT QL	New	Change a TPF MQSeries local queue definition.
ZMQSC ALT QR	New	Change a transmission queue definition for the MQSeries remote queue.
ZMQSC DEF CHL	New	Define a TPF MQSeries message channel.
ZMQSC DEF MQP	New	Define a TPF MQSeries profile.
ZMQSC DEF QL	New	Define a local queue.
ZMQSC DEF QR	New	Define a remote queue.
ZMQSC DEL	New	Delete a TPF MQSeries resource.
ZMQSC DISPLAY	New	Display a channel definition and status, a TPF MQSeries profile, or a queue definition.
ZMQSC RESET	New	Reset a sender or receiver channel with a sequence number.
ZMQSC RESOLVE	New	Resolve a sender channel.
ZMQSC START	New	Start a TPF MQSeries sender channel or the TPF MQSeries local queue manager.
ZMQSC STOP	New	Stop a TPF MQSeries sender or receiver channel or the TPF MQSeries local queue manager.
ZMQSC SWQ	New	Move messages from one transmission queue to another transmission queue.
ZMQSC TRACE	New	Turn on or turn off the TPF MQSeries message channel agent (MCA) trace switch for a message channel.

Messages and System Errors

Table 483 on page 497 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard

message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 483. Changes to Messages and System Errors for TPF MQSeries Local Queue Manager Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
009300	System Error	New
009301	System Error	New
009304	System Error	New
009305	System Error	New
INET0112E	Online	New
MQSC0001I	Online	New
MQSC0002I	Online	New
MQSC0003E	Online	New
MQSC0004I	Online	New
MQSC0005E	Online	New
MQSC0006I	Online	New
MQSC0007E	Online	New
MQSC0009E	Online	New
MQSC0010I	Online	New
MQSC0011I	Online	New
MQSC0015I	Online	New
MQSC0016I	Online	New
MQSC0017I	Online	New
MQSC0018I	Online	New
MQSC0019I	Online	New
MQSC0020I	Online	New
MQSC0021E	Online	New
MQSC0022E	Online	New
MQSC0023W	Online	New
MQSC0024W	Online	New
MQSC0025E	Online	New
MQSC0026W	Online	New
MQSC0027E	Online	New
MQSC0040E	Online	New
MQSC0041E	Online	New
MQSC0042E	Online	New
MQSC0043E	Online	New
MQSC0044I	Online	New
MQSC0045E	Online	New
MQSC0052I	Online	New
MQSC0054E	Online	New

Table 483. Changes to Messages and System Errors for TPF MQSeries Local Queue Manager Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0055I	Online	New
MQSC0059W	Online	New
MQSC0061E	Online	New
MQSC0062E	Online	New
MQSC0063E	Online	New
MQSC0066E	Online	New
MQSC0071E	Online	New
MQSC0072E	Online	New
MQSC0074E	Online	New
MQSC0075E	Online	New
MQSC0076E	Online	New
MQSC0077E	Online	New
MQSC0078E	Online	New
MQSC0079E	Online	New
MQSC0080I	Online	New
MQSC0081E	Online	New
MQSC0082E	Online	New
MQSC0083E	Online	New
MQSC0084E	Online	New
MQSC0089E	Online	New
MQSC0090E	Online	New
MQSC0091E	Online	New
MQSC0102E	Online	New
MQSC0103E	Online	New
MQSC0104E	Online	New
MQSC0105E	Online	New
MQSC0106E	Online	New
MQSC0107E	Online	New
MQSC0108E	Online	New
MQSC0109E	Online	New
MQSC0110E	Online	New
MQSC0111E	Online	New
MQSC0112E	Online	New
MQSC0113E	Online	New
MQSC0114E	Online	New
MQSC0115E	Online	New
MQSC0116E	Online	New
MQSC0117E	Online	New
MQSC0118E	Online	New
MQSC0119E	Online	New
MQSC0122E	Online	New
MQSC0123E	Online	New
MQSC0125E	Online	New

Table 483. Changes to Messages and System Errors for TPF MQSeries Local Queue Manager Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0126E	Online	New
MQSC0127E	Online	New
MQSC0128E	Online	New
MQSC0129E	Online	New
MQSC0130E	Online	New
MQSC0131E	Online	New
MQSC0132E	Online	New
MQSC0136E	Online	New
MQSC0138E	Online	New
MQSC0139E	Online	New
MQSC0140I	Online	New
MQSC0144E	Online	New
MQSC0151I	Online	New
MQSC0152I	Online	New
MQSC0153E	Online	New
MQSC0154E	Online	New
MQSC0155E	Online	New
MQSC0157E	Online	New
MQSC0158I	Online	New
MQSC0159I	Online	New
MQSC0160I	Online	New
MQSC0161I	Online	New
MQSC0162E	Online	New
MQSC0163E	Online	New
MQSC0164E	Online	New
MQSC0200I	Online	New
MQSC0201I	Online	New
MQSC0202I	Online	New
MQSC0203I	Online	New
MQSC0301E	Online	New
MQSC0302E	Online	New
MQSC0303E	Online	New
MQSC0304E	Online	New
MQSC0305E	Online	New
MQSC0306E	Online	New
MQSC0307E	Online	New
MQSC0308E	Online	New
MQSC0309E	Online	New
MQSC0310E	Online	New
MQSC0311I	Online	New
MQSC0312I	Online	New
MQSC0313E	Online	New
MQSC0314E	Online	New

Table 483. Changes to Messages and System Errors for TPF MQSeries Local Queue Manager Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0315I	Online	New
MQSC0316I	Online	New
MQSC0317E	Online	New
MQSC0318E	Online	New
MQSC0319E	Online	New
MQSC0320I	Online	New
MQSC0321E	Online	New
MQSC0322E	Online	New
MQSC0323E	Online	New
MQSC0324E	Online	New
MQSC0325E	Online	New
MQSC0326E	Online	New
MQSC0327E	Online	New
MQSC0328E	Online	New
MQSC0329E	Online	New
MQSC0330E	Online	New
MQSC0332E	Online	New
MQSC0401E	Online	New
MQSC0402E	Online	New
MQSC0403E	Online	New
MQSC0404E	Online	New
MQSC0405E	Online	New
MQSC0406E	Online	New
MQSC0407I	Online	New
MQSC0408E	Online	New
MQSC0409E	Online	New
MQSC0410E	Online	New
MQSC0411E	Online	New
MQSC0412E	Online	New
MQSC0413E	Online	New
MQSC0414E	Online	New
MQSC0415E	Online	New
MQSC0416E	Online	New
MQSC0417E	Online	New
MQSC0418E	Online	New
MQSC0419E	Online	New
MQSC0420E	Online	New
MQSC0421E	Online	New
MQSC0422E	Online	New
MQSC0502E	Online	New
MQSC0504E	Online	New
MQSC0507E	Online	New
MQSC0511W	Online	New

Table 483. Changes to Messages and System Errors for TPF MQSeries Local Queue Manager Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC9998E	Online	New
MQSC9999E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 484 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 484. Changes to TPF Publications for TPF MQSeries Local Queue Manager Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU08	Updated with APIs added for TPF MQSeries local queue manager support.
<i>TPF Library Guide</i>	GTPDOC08	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF MQSeries local queue manager support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG08	Updated with migration considerations for TPF MQSeries local queue manager support.
<i>TPF Operations</i>	GTPOPR08	Updated with information about the commands that were added and changed for TPF MQSeries local queue manager support.
<i>TPF Program Development Support Reference</i>	GTPPDR08	Updated with information about the channel trace function that was added for TPF MQSeries local queue manager support.
<i>TPF System Generation</i>	GTPSYG08	Updated with information about SIPG6I that was added for TPF MQSeries local queue manager support.
<i>TPF System Installation Support Reference</i>	GTPINR08	Updated with information about the user exits that were added for TPF MQSeries local queue manager support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR07	Updated with information about the two MQSeries reports that were added for TPF MQSeries local queue manager support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW04	Updated with information about the activate_on_receipt_with_length function that was added for TPF MQSeries local queue manager support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

A subset of the Message Queue Interface (MQI) is available through an ISO-C interface which gives the TPF application access to TPF MQSeries local queue manager support. There is no change to MQI for access to the TPF MQSeries client.

In addition, a new function, `activate_on_receipt_with_length`, has been provided to give TCP/IP applications the ability to specify a length rather than the default, 32 KB, when issuing `activate_on_receipt` function calls.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TPF MQSeries local queue manager support on your TPF 4.1 system.

1. Install program update tape (PUT) 9.
2. Compile the TPF MQSeries programs by using the IBM OS/390 C/C++ Version 2 Release 4 compiler or later version or release. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.
3. Run the CBLD program to create the link-edit decks for the DLLs and DLMS. You do not need to compile some of the modules contained in the MQSeries DLL (CMQS) because they are provided to you as object-code-only (OCO) modules.
4. Recompile the C512 module and link-edit the COMX library again to pick up the new `activate_on_receipt_with_length` function.
5. Compile the CINET1 and CINET4 members, and link-edit the CLTV and CLTX modules to pick up the changes to the Internet daemon to support the AORLENGTH parameter on the ZINET commnd.
6. Compile the following Message Queue Interface (MQI) client modules to pick up changes to the `cmqc.h` header file: CMQI01, CMQI03, CQRREQ, CQRMSS, CQCLIB, CQRFPT, CQCCX, CQREXT, CQCCMX, CQCCIC, CNMQI, CNMQJ, and CNMQD. See "Message Queue Interface (MQI) Client (APAR PJ22434)" on page 268 for more information.
7. Link-edit the following MQI client modules to pick up changes to the `cmqc.h` header file: CMQI, CMQ2, CMQ1, and CMQ3. See "Message Queue Interface (MQI) Client (APAR PJ22434)" on page 268 for more information.
8. Do the following for any application programs that currently call the MQI client API functions:
 - a. Use the DLL option to recompile the application programs.

- b. Modify the prelink step to import the CMQS definition side-deck for the application programs.
 - c. Link-edit the application programs.
- 9. Assemble the CWGTAE module and link-edit the CTAL library to pick up the wgtac_ext function.
- 10. Load COMX, CLTV, CLTX, DLMS, and DLLs to your TPF 4.1 system. See Table 472 on page 490.
- 11. Enter the ZMQSC DEF MQP command to define an MQSeries message profile.
- 12. Enter the ZMQSC DEF CHL command to define all MQSeries message channels that are needed by your applications.
- 13. Enter the ZMQSC DEF QL command to define all local queues that are needed by your applications.
- 14. Enter the ZMQSC DEF QR command to define all remote queues that are needed by your applications.
- 15. To establish connections between a TPF MQSeries receiver channel and a remote MQSeries sender channel, define an Internet daemon that will provide the TCP/IP listener function. To do this, enter:
ZINET ADD S-MQS PGM-CMQL MODEL-AOR PORT-1414 AORL-8 P-TCP
- 16. Enter the ZMQSC START command with the QMGR parameter specified to start the queue manager.
- 17. Enter the ZMQSC START command with the CHL parameter specified to start the channel.

TPF Internet Server Support (APARs PJ25589 and PJ25703)

The following section discusses the migration considerations for TPF Internet server support.

Prerequisite APARs

See the APEDIT for APARs PJ25589 and PJ25703 for information about prerequisite APARs.

Functional Overview

The following information describes the enhancements made to the TPF 4.1 system for TPF Internet server support.

TPF As a Web Site

The Internet, or World Wide Web, has taken the world by storm. The basis for the World Wide Web (WWW or Web) is the Hypertext Transfer Protocol (HTTP). The Web today is mostly read-only, a request-response operation. It is slowly moving to a truer transactional state with an increasing number of server updates and application complexity. Many current efforts involve Web enabling transactional applications that are compliant with the Portable Operating System Interface for Computer Environments (POSIX) standards. POSIX support on other systems, including IBM OS/390 and IBM Virtual Machine (VM), enable transactions to be portable.

TPF Internet server support enables the TPF 4.1 system to run Internet servers, such as a Web server, by providing:

- An Internet daemon that manages inbound Internet traffic for Internet servers on the TPF 4.1 system; Internet servers are referred to as Internet server applications in the TPF publications
- A Trivial File Transfer Protocol (TFTP) server as a file transfer server to send and receive files, such as Web site contents.
- The ability to retrieve data from the TPF 4.1 system by starting TPF applications from the Internet
- A process model to assist with the porting of POSIX-compliant Internet server applications from other systems such as UNIX.

Web Pages: An HTTP server retrieves Web pages from the file system for clients on the Internet. The TFTP server stores Web page content in the file system. You can create and edit your Web site pages elsewhere, such as a personal computer (PC) or UNIX system, and then transfer them to the TPF 4.1 system.

Retrieving TPF Data: You can get TPF data from a TPF application by starting the application using an executable script, which is a type of executable file in the file system.

Internet Daemon: The Internet daemon controls the flow of inbound Internet traffic and is the central point from which Internet server applications such as an HTTP server and a TFTP server are managed.

All Internet server applications handled by the Internet daemon follow a defined process model. The process model determines the interface used by the Internet daemon to start the Internet server application.

Trivial File Transfer Protocol (TFTP) Server: The TFTP server is a file transfer server that stores data as files in the file system. Web site files, such as Hypertext Markup Language (HTML) source Web pages or Java applets, are transferred to the TPF 4.1 system using TFTP.

Architecture

The primary objective of TPF Internet server support is to enable a TPF 4.1 system to be a Web site. The following information describes the changes that were made to the TPF 4.1 system to make this possible.

Internet Daemon

The Internet daemon consists of the Internet daemon monitor and Internet daemon listeners. The Internet daemon monitor starts Internet daemon listeners for Internet server applications. Internet daemon listeners create and monitor sockets for Internet server applications.

Automatic Internet Daemon Recovery: It is important that the Internet daemon is always running; therefore, there is an automatic recovery mechanism. When the Internet daemon detects a change in the system activation number because of an online program load (ZOLDR command), it recycles itself by ending and restarting without disruption to network traffic.

Internet Daemon Configuration File (IDCF)

The Internet daemon configuration file (IDCF) controls the behavior of the Internet daemon and contains data to start and control an Internet server application. The IDCF is subsystem unique and processor shared. It is stored in #IBMM4 fixed file records, from ordinal 158 to ordinal 161.

The IDCF can be viewed as a table with an entry defined for each Internet server application. A maximum of 100 entries is allowed.

The IDCF is maintained using the ZINET ADD, ZINET ALTER, ZINET DELETE, and ZINET DISPLAY commands. See *TPF Operations* for more information about the ZINET commands.

Trivial File Transfer Protocol (TFTP) Configuration File

The Trivial File Transfer Protocol (TFTP) configuration file controls the behavior of the TFTP server in the TPF system. Statements called *directives* tell the TFTP server what action to take in various conditions.

Typically, a TFTP configuration file consists of directives that specify:

- The access permissions that are set when a new file is stored in the file system
- The file where the TFTP server stores historical information about file transfers
- The directories that the TFTP server can access for writing or reading
- The directories that the TFTP server cannot access.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about directives and the TFTP configuration file.

Create a file with directives on another system and then transfer it to the TPF 4.1 system using the TFTP server as the TFTP configuration file (/etc/tftp.conf); if the file is not in EBCDIC, it can be converted by the TFTP server.

Note: This file must be the first file transferred.

A Process Model

TPF Internet server support provides a process model to assist with the porting of POSIX-compliant Internet server applications from other systems. This process model consists of a subset of POSIX-compliant application programming interface (API) functions and TPF-unique API functions, including the `tpf_fork` function, which creates a child process. A child process created by the `tpf_fork` function inherits a number of properties from the parent process.

See *TPF Application Programming* for more information about the implementation of the POSIX process model on the TPF 4.1 system, including information about process identifiers (IDs), process groups, and process inheritance. See the *TPF C/C++ Language Support User's Guide* for more information about the `tpf_fork` function and other related functions provided by TPF Internet server support.

Notes:

1. The TPF system is not POSIX-compliant; only a subset of POSIX-compliant API functions are implemented.
2. The `tpf_fork` function is unique to the TPF 4.1 system, but is based on the POSIX `fork` and `exec` functions.

File Access in the File System

Access to a file in the file system is controlled by the effective user ID, effective group ID, and access permissions. See *TPF Application Programming* for more information about effective user ID, effective group ID, and access permissions.

Use the ZFILE `chmod` and ZFILE `chown` commands to maintain file accessibility by changing the access permissions and the owner or group of a file in the file system. See *TPF Operations* for more information about the ZFILE `chmod` and ZFILE `chown` commands.

Executable Script

An executable script is a type of executable file in the file system and is used to start a TPF application. An HTTP server starts the program specified in the executable script. See *TPF Application Programming* for information about writing an executable script.

HTTP Server

Although an HTTP server is not provided as part of the base TPF 4.1 system, using TPF Internet server support, an HTTP server can be installed so that Web pages can be retrieved and TPF applications can be started from the Internet.

Internet Daemon Operations

There are ZINET commands to:

- Maintain the Internet daemon configuration file (IDCF)
- Control the processing of the Internet server applications, including the Internet daemon.

See *TPF Transmission Control Protocol/Internet Protocol* and *TPF Operations* for more information about the ZINET commands.

Performance Measurement

In the I-stream summary report, the count for SWISC entries also includes `tpf_fork` function calls. See *TPF System Performance and Measurement Reference* for more information about the I-stream summary report.

Mixed-Case Terminal Support

Mixed-case text from terminals is now supported for loosely coupled and multiple database function (MDBF) environments. The CE2CRMSG field in page 2 of the entry control block (ECB) is the address of a message buffer that contains message text as it was received by the TPF 4.1 system.

This change does not affect the existing interface on data level 0 (D0).

Mixed-case terminal support is provided for:

- Prime CRAS (1052/3215) terminals
- Local 3270 terminals logged to the system message processor (SMP)
- Remote 3270 terminals logged to the SMP.

The interface remains as uppercase text only for CRAS terminals not logged to the SMP.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF Internet server support, you must establish the required operating environment. The following section describes hardware and software requirements specific to TPF Internet server support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Terminals and Display Devices: To fully use TPF Internet server support, your terminals or display devices must support both uppercase and lowercase characters.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The TPF 4.1 system supports any Trivial File Transfer Protocol (TFTP) client that conforms to the Internet Activity Board (IAB) TFTP draft standard documented in Request for Comments (RFC) 1350.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 485 on page 508 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 485. Changes to Build Scripts for TPF Internet Server Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CFIABS	DLM	New	Build script for the ZFILE ls command.
CFIBBS	DLM	New	Build script for the ZFILE chmod command.
CFICBS	DLM	New	Build script for the ZFILE chown command.
CFIDBS	DLM	New	Build script for the ZFILE rm command.
CFIEBS	DLM	New	Build script for the ZFILE mknod command.
CFIMBS	DLM	New	Build script for the ZFILE command main processor.
CFIZBS	DLM	New	Build script for the ZFILE command error messages.
CISOBS	DLM	Changed	Updated to support inheritable file descriptors.
CLTVBS	DLM	New	Build script for the ZINET command.
CLTWBS	DLM	New	Build script for the Internet daemon monitor.
CLTXBS	DLM	New	Build script for the Internet daemon listener.
CLTYBS	DLM	New	Build script for the Internet daemon cycle handler, Internet daemon start and stop functions, and Internet daemon configuration table (IDCT).
COMXBS	DLM	Changed	Updated to support new functions and inheritable file descriptors.
CTFTBS	DLM	New	Build script for Trivial File Transfer Protocol (TFTP).
CTALBS	DLM	Changed	Updated to support the cinfc_fast_ss function.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 486 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 486. Changes to General Use C/C++ Language Header Files for TPF Internet Server Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	No
c\$ddsm.h	Changed	Yes
c\$dgrp.h	New	Not Applicable
c\$dpwd.h	New	Not Applicable
c\$eb0eb.h	Changed	No
c\$iect.h	New	Not Applicable
c\$ipbt.h	New	Not Applicable
c\$proc.h	Changed	Yes
c\$pwgr.h	New	Not Applicable
c\$spif.h	Changed	Yes
c\$syseq.h	Changed	No
tftp.h	New	Not Applicable
grp.h	New	Not Applicable
pwd.h	New	No

Table 486. Changes to General Use C/C++ Language Header Files for TPF Internet Server Support (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
signal.h	Changed	No
sysapi.h	Changed	No
unistd.h	Changed	No
wait.h	New	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 487 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 487. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF Internet Server Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$cszs.h	Changed	Yes
i\$fdes.h	Changed	Yes
i\$fsdd.h	Changed	Yes
i\$fslk.h	New	Not Applicable
i\$fsqu.h	Changed	No
i\$glue.h	Changed	Yes
i\$gulp.h	No Longer Supported	No
i\$link.h	Changed	Yes
i\$make.h	Changed	Yes
i\$netd.h	New	Not Applicable
i\$node.h	Changed	No
i\$opfd.h	Changed	Yes
i\$path.h	No Longer Supported	No
i\$tcpc.h	Changed	No
i\$tdat.h	No Longer Supported	No
i\$tftp.h	New	Not Applicable
i\$tran.h	Changed	Yes
i\$treq.h	Changed	Yes
i\$res.h	Changed	Yes

Library Interface Scripts: Table 488 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 488. Changes to Library Interface Scripts for TPF Internet Server Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	Changed	Added TPF Internet server support functions.
CTALXV	Changed	Added the new __credbg internal function and the new cinfc_fast_ss function.

Library Members (Object Files): Table 489 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 489. Changes to Library Members (Object Files) for TPF Internet Server Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CBEPEG	CISO	Changed	Object Code Only	Updated to support changes to signals processing.
CCINT	CISO	Changed	C Language	Updated to support changes to signals processing.
CDDNUL	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CDDSOC	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CDMONT	CISO	No Longer Supported	Assembler	The processing that used this segment now uses the cinfc function.
CEXITF	CISO	Changed	C Language	Updated abort function processing for new signals structure.
CFORKA	COMX	New	C Language	Added the C language interface to the \$FORKC macro.
CFORKC	COMX	New	C Language	Added the tpf_fork function.
CFS001	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS002	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS003	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS004	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS005	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS008	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS009	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS010	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS011	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS012	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS013	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS014	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS015	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS016	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS017	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS018	COMX	Changed	C Language	Updated to support inheritable file descriptors.

Table 489. Changes to Library Members (Object Files) for TPF Internet Server Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS019	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS020	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS021	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS022	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS024	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS028	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS031	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS032	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS033	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS034	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS035	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS037	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS038	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS102	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS103	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS104	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS107	COMX	New	C Language	Added to support inheritable file descriptors.
CFS108	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS109	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS110	COMX	New	C Language	Added to support inheritable file descriptors.
CFS111	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS113	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS114	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS115	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS116	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS119	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.

Table 489. Changes to Library Members (Object Files) for TPF Internet Server Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS121	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS123	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS126	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS127	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS130	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS131	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS135	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS139	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS145	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS147	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS148	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS149	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS150	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS152	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS153	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS154	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS157	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS159	COMX	No Longer Supported	C Language	Removed to support inheritable file descriptors.
CFS166	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS167	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS169	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS304	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS354	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS404	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS454	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS504	COMX	Changed	C Language	Updated to support inheritable file descriptors.

Table 489. Changes to Library Members (Object Files) for TPF Internet Server Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS554	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CFS604	COMX	Changed	C Language	Updated to support inheritable file descriptors.
CGETPD	COMX	New	C Language	Added the getpid function.
CGETPP	COMX	New	C Language	Added the getppid function.
CGSWBC	COMX, CISO	New	C Language	Added the C language interface to the GSWBC macro.
CHDFRE	CISO	Changed	Object Code Only	Updated for signals processing.
CINFSS	CTAL	New	Assembler	Added the cinfc_fast_ss function.
COPSTR	CISO	Changed	Object Code Only	Updated to support inheritable file descriptors.
CPSWL	CISO	No Longer Supported	Assembler	The processing that used this segment now uses the keyrc function.
CPWGR0	COMX	New	C Language	Added to support the password user and group file application programming interfaces (APIs).
CRSWBC	COMX, CISO	New	C Language	Added the C language interface to the RSWBC macro.
CSGFAE	COMX	No Longer Supported	C Language	The processing in this segment is no longer needed.
CSIGAL	COMX	New	C Language	Added the alarm function.
CSIGDP	COMX, CISO	Changed	C Language	Updated the default signal handlers.
CSIGKL	COMX	New	C Language	Added the kill function.
CSIGPS	COMX	New	C Language	Added the tpf_process_signals function.
CSIGR	CISO	Changed	Object Code Only	Updated the signal and raise functions.
CSIGSL	COMX	New	C Language	Added the sleep function.
CSIGWP	COMX	New	C Language	Added the waitpid function.
CSIGWT	COMX	New	C Language	Added the wait function.
CXXFUN	CISO	Changed	Object Code Only	Updated to the support inheritable file descriptors.
UDDIPM	COMX	Changed	C Language	Updated to the support inheritable file descriptors.
UDDWTC	COMX	Changed	C Language	Updated to the support inheritable file descriptors.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 490 on page 514 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 490. Changes to Members (Object Files) for TPF Internet Server Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CBOT	CBOT	Changed	C Language	Sets up the root credentials in effective and saved set user IDs.
CFIA	CFIA	New	C Language	Added the ZFILE ls command.
CFIB	CFIB	New	C Language	Added the ZFILE chmod command.
CFIC	CFIC	New	C Language	Added the ZFILE chown command.
CFID	CFID	New	C Language	Added the ZFILE rm command.
CFIE	CFIE	New	C Language	Added the ZFILE mknod command.
CFIM	CFIM	New	C Language	Added the ZFILE command main processor.
CFIZ	CFIZ	New	C Language	Added the ZFILE command error messages.
CINET1	CLTV	New	C Language	Added the ZINET commands.
CINET2	CLTV, CLTY, CTFT	New	C Language	Added the Internet daemon configuration file (IDCF) functions.
CINET3	CLTW	New	C Language	Added the Internet daemon monitor.
CINET4	CLTX	New	C Language	Added the Internet daemon listener.
CINET5	CLTV, CLTY	New	C Language	Added the Internet daemon cycle handler, Internet daemon start and stop functions, and Internet daemon configuration table (IDCT).
CINET6	CTFT	New	C Language	Added functions to access the IDCT.
CTFTP1	CTFT	New	Object Code Only	Provides the entry point for Trivial File Transfer Protocol (TFTP) processing.
CTFTP2	CTFT	New	Object Code Only	Provides the file processing subroutines for TFTP processing.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 491 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 491. Changes to CINFC Tags for TPF Internet Server Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMPRCLK	377	New

Copy Members

Table 492 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 492. Changes to Copy Members for TPF Internet Server Support

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CAPT	Control Program	CCNUCL	Changed	Changed the program update tape (PUT) version from 08 to 09.

Table 492. Changes to Copy Members for TPF Internet Server Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Changed	Updated to handle the parent and child process relationship.
CCE4	Control Program	CCIISC	Changed	Updated to support the \$FORKC macro.
CHSZ	Control Program	CCNUCL	Changed	Updated to initialize new entry control block (ECB) fields.
CICR	Control Program	CCNUCL	Changed	Updated to support the GSWBC and RSWBC macros.
CLPE	Control Program	CCCCP1	Changed	Updated to set up the buffer for mixed-case input.
CPSE	Control Program	CCCPSE	Changed	Added emergency unlock.
CPSL	Control Program	CCCPSE	Changed	Updated to include the file descriptor table (FDT) in dumps.
CTH2	Control Program	CCTHDS	Changed	Updated to handle the parent and child process relationship.
CT40	Control Program	CCCTIN	Changed	Updated to clear the new IPROC fields.
CUSR	Control Program	CCUEXT	Changed	Updated the CMCP user exit to support the \$FORKC macro.

Fixed File Records

Table 493 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 493. Changes to Fixed File Records for TPF Internet Server Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMM4	New	Added #IBMM4 ordinal numbers 158–161.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 494 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 494. Changes to Data Macros for TPF Internet Server Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
DLTEC	Changed	No
IDSECT	Changed	Yes
IEQCE2	Changed	No
IFDES	New	Not Applicable
IFORK	New	Not Applicable
IOPFD	New	Not Applicable
IPROC	Changed	Yes

General Macros: Table 495 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 495. Changes to General Macros for TPF Internet Server Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No

Selected Equate Macros: Table 496 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 496. Changes to Selected Equate Macros for TPF Internet Server Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZOCP	Changed	No
CZ1SE	Changed	No
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 497 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 497. Changes to SIP Skeleton and Internal Macros for TPF Internet Server Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 498 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 498. Changes to SIP Stage II Macros for TPF Internet Server Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 499 on page 517 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 499. Changes to System Macros for TPF Internet Server Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$FORKC	New	Not Applicable
GSWBC	New	Not Applicable
IBMSVC	Changed	No
RSWBC	New	Not Applicable

System Macros (IBM Use Only): Table 500 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 500. Changes to System Macros (IBM Use Only) for TPF Internet Server Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes

Segments

Table 501 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 501. Changes to Segments for TPF Internet Server Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSI3	Real-Time Assembler	Not Applicable	Changed	Added support for mixed-case characters from CRAS terminals.
CTKR	Real-Time Assembler	Not Applicable	Changed	Changed to call the Internet daemon cycle handler to stop the Internet daemon or Internet server application.
CTKT	Real-Time Assembler	Not Applicable	Changed	Changed to call the Internet daemon cycle handler to start the Internet daemon or Internet server application.
CVAA	Real-Time Assembler	Not Applicable	Changed	Updated to support mixed-case commands.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added support for the ZFILE and ZINET commands.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” on page 518 summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: This information is presented in alphabetic order by the name of the control program (CP) user exit.

Table 502. Changes to Control Program (CP) User Exits for TPF Internet Server Support

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	Description of Change
CMCP	UCCCMCP	Changed	Added an indicator for calls from the \$FORKC macro.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 503. Changes to ECB User Exits for TPF Internet Server Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
User Command Processor	CVAA	UME1	Changed	Updated to support mixed-case commands.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 504 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 504. Changes to Commands for TPF Internet Server Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZFILE chmod	New	Changes the access permissions of a file or directory.
ZFILE chown	New	Changes the owner and group of a file or directory.
ZFILE ls	New	Lists the names and attributes of a file or directory.
ZFILE mknod	New	Creates a new character special file.
ZFILE rm	New	Removes the link to a file or directory.
ZINET ADD	New	Adds an Internet server application entry to the Internet daemon configuration file (IDCF).
ZINET ALTER	New	Changes an Internet server application entry in the IDCF.
ZINET DELETE	New	Deletes an Internet server application entry from the IDCF.
ZINET DISPLAY	New	Displays Internet server application entries from the IDCF or the IDCT.
ZINET START	New	Starts the Internet daemon.
ZINET STOP	New	Stops the Internet daemon.

Messages and System Errors

Table 505 on page 519 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 505. Changes to Messages and System Errors for TPF Internet Server Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007510	System Error	No Longer Supported
007540	System Error	New
007544	System Error	New
007700	System Error	New
007701	System Error	New
007702	System Error	New
007703	System Error	New
007704	System Error	New
007705	System Error	New
007706	System Error	New
007707	System Error	New
007750	System Error	New
007751	System Error	New
007752	System Error	New
007753	System Error	New
007754	System Error	New
007777	System Error	New
FILE0001I	Online	New
FILE0002I	Online	New
FILE0003I	Online	New
FILE0096E	Online	New
FILE0097E	Online	New
FILE0098E	Online	New
FILE0099E	Online	New
INET0011I	Online	New
INET0012I	Online	New
INET0013I	Online	New
INET0014I	Online	New
INET0015I	Online	New
INET0016I	Online	New
INET0017I	Online	New
INET0018I	Online	New
INET0019I	Online	New
INET0024I	Online	New
INET0025I	Online	New
INET0026I	Online	New
INET0027I	Online	New
INET0050I	Online	New
INET0051I	Online	New
INET0076E	Online	New
INET0077E	Online	New
INET0078E	Online	New

Table 505. Changes to Messages and System Errors for TPF Internet Server Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
INET0080E	Online	New
INET0081E	Online	New
INET0082E	Online	New
INET0083E	Online	New
INET0084E	Online	New
INET0085E	Online	New
INET0086E	Online	New
INET0087E	Online	New
INET0088E	Online	New
INET0090E	Online	New
INET0091E	Online	New
INET0092E	Online	New
INET0093E	Online	New
INET0094E	Online	New
INET0095E	Online	New
INET0096E	Online	New
INET0097E	Online	New
INET0098E	Online	New
INET0099E	Online	New
INET0100E	Online	New
INET0101E	Online	New
INET0102E	Online	New
INET0103E	Online	New
INET0104E	Online	New
INET0105E	Online	New
INET0106E	Online	New
INET0107E	Online	New
INET0108E	Online	New
INET0109W	Online	New
INET0110E	Online	New
INET0111E	Online	New
TFTP0001E	Online	New
TFTP0002E	Online	New

Performance or Tuning Changes

There are a number of performance and tuning considerations for TPF Internet server support.

System Work Block (SWB) Considerations

You may need to increase the number of system work blocks (SWBs) that are allocated to your TPF 4.1 system. TPF Internet server support uses SWBs for the file descriptor table, open file descriptors, as well as to store the exit status for a child process.

tpf_fork Function Considerations

There are two methods of processing program segments with the `tpf_fork` function:

- A direct call to a C or C++ program that contains the `main` function. This method does not provide access control; however, it requires fewer input/output (I/O) operations.
- An indirect call to an open file system executable file that references a TPF program containing the `main` function. This method provides access control; however, it also requires additional I/O operations to open the file to extract the program name.

See the *TPF C/C++ Language Support User's Guide* for more information about the `tpf_fork` function.

Trivial File Transfer Protocol (TFTP) Server Considerations

The Trivial File Transfer Protocol (TFTP) server is not a high-volume multi-user server. The TFTP server is intended to transfer files to and from the TPF 4.1 system and another platform. The TFTP server uses User Datagram Protocol (UDP); because UDP is a connectionless protocol, the TFTP server must establish a point-to-point connection with the client by opening another UDP socket. Until the second socket is open, the Internet daemon must wait. Otherwise, the Internet daemon will intercept the second packet of the original client and start a new TFTP server.

See *TPF Application Programming* for more information about the TFTP server.

Internet Daemon Considerations

The Internet daemon supports different process models, including the AOR, WAIT, and NOWAIT process models. The AOR, WAIT, and NOWAIT process models provide different levels of control and, as a result, can affect resource overhead.

The AOR process model has the potential to use system resources more effectively than the WAIT and NOWAIT process models. The AOR process model saves system resources by creating the entry control block (ECB) for the Internet server application only after data is received on a connected socket. The WAIT and NOWAIT process models create the ECB immediately using the `tpf_fork` function, which requires the Internet server application to issue the read and then wait for the data to arrive.

The AOR process model does not have any throttling controls; that is, the Internet daemon will continue to start more occurrences of Internet server applications until the system cannot handle any more. The WAIT and NOWAIT process models allow you to set a limit on how many Internet server application occurrences can be started.

See *TPF Application Programming* for more information about the Internet daemon and the process models.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 506 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 506. Changes to TPF Publications for TPF Internet Server Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP08	Updated with information about TPF Internet server support and how to use the Internet daemon and the TFTP server.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU09	Updated with information about C functions that were added or changed for TPF Internet server support.
<i>TPF Concepts and Structures</i>	GTPCON06	Updated with overview information about TPF Internet server support.
<i>TPF Library Guide</i>	GTPDOC09	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF Internet server support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG09	Updated with migration considerations for TPF Internet server support.
<i>TPF Operations</i>	GTPOPR09	Updated with information about the commands that were added and changed for TPF Internet server support.
<i>TPF Programming Standards</i>	GTPPSM08	Updated with information about the input message character set.
<i>TPF System Installation Support Reference</i>	GTPINR09	Updated with information about user exits that were changed for TPF Internet server support.
<i>TPF System Macros</i>	GTPSYS09	Updated with information about system macros that were added for TPF Internet server support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR08	Updated with information for TPF Internet server support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW05	Updated with information about how to maintain the Internet daemon configuration file (IDCF), how to create and maintain the TFTP configuration file, and about operator control for the Internet daemon and the TFTP server.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

TPF Internet server support provides a number of application programming interface (API) additions and changes.

There is a set of C functions that have interfaces identical to the Portable Operating System Interface for Computer Environments (POSIX) standards. If Internet server application code written for the UNIX system is ported to a TPF 4.1 system, these

function calls do not necessarily need to change, but you may need to change the Internet server application to account for differences in the architecture of the TPF 4.1 system and the UNIX system.

There is also a new set of C functions that provide an interface to the password and group files for C or C++ programs to access files on the TPF file system.

See *TPF Application Programming* and the *TPF C/C++ Language Support User's Guide* for more information about the new C functions provided with TPF Internet server support.

File system support contained some deviations from POSIX in program update tape (PUT) 7. See "File System Support (APAR PJ25089)" on page 370 for more information about file system support. With TPF Internet server support, the TPF 4.1 system now supports the following:

- Executable files
- The S_ISUID bit
- The S_ISGID bit; previously this bit was supported for directories only
- Execute access for X bits; previously, X bits were only used for directory search access
- Effective user and group IDs
- Saved set-user-IDs and saved set-group-IDs.

This change affects the following C functions:

- access
- chdir
- chmod
- chown
- creat
- fchmod
- fchown
- open.

See the *TPF C/C++ Language Support User's Guide* for more information about these functions.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before You Begin

- Ensure that your TPF 4.1 system is at program update tape (PUT) 8. In addition, ensure that the file system is enabled; see “File System Support (APAR PJ25089)” on page 370 for more information about enabling the file system.
- If you are using IBM Extended Operations Console Facility/2 (EOCF/2), install APAR IC21067.

Use the following procedure to install TPF Internet server support on your existing TPF 4.1 system.

1. Install PUT 9, which contains TPF Internet server support, on your TPF 4.1 system.

Notes:

- a. Ensure that any display devices you plan to use support mixed-case characters.
 - b. Ensure that #IBMM4 ordinals 158–161 are defined.
2. Perform an initial program load (IPL) and cycle the TPF 4.1 system to 1052 state.
 3. Ensure that your TPF 4.1 system has Transmission Control Protocol/Internet Protocol (TCP/IP) network connectivity.
 4. Build the Internet daemon configuration file (IDCF) by using the ZINET ADD and ZINET ALTER commands to add entries for any Internet server applications that you have.

Notes:

- a. You will receive a 007701 system error message when you add the first Internet server application entry to the IDCF.
- b. For every server entry added to the IDCF, ensure the program that the Internet daemon calls is loaded to the TPF 4.1 system.

If you plan to use Trivial File Transfer Protocol (TFTP), continue with the following steps; otherwise, there are no more actions for you to take.

5. Enter the following to add the TFTP server entry to the IDCF:

**ZINET ADD S-TFTP PGM-CTFT MODEL-*model* PORT-69 P-UDP IP-*ipaddr*
ACT-*acttype* STATE-*state* USER-NOBODY**

Where:

model

is the process model to be used by the TFTP server. Specify WAIT if you want only one occurrence of the TFTP server running at a time. Specify NOWAIT if you want multiple occurrences of the TFTP server running.

ipaddr

is a local intranet Internet Protocol (IP) address or the value ANY. Typically, this type of address is assigned by a local network administrator.

acttype

is how you want to start the Internet server application. Specify OPER if

you want to start and stop the TFTP server manually. Specify AUTO if you want the TFTP server to be automatically started when the Internet daemon is started.

state

is the lowest TPF 4.1 system state in which the TFTP server is allowed to be started. Specify CRAS or NORM.

6. Cycle the TPF 4.1 system to CRAS state or above.
7. Enter **ZFILE ls -ld /** to check the root (/) directory access permission setting.
The root directory must have write access to allow the TFTP server to create new subdirectories, such as /etc and /tmp.
If necessary, enter **ZFILE chmod 777 /** to change the access permission of the root directory.
Enter **ZFILE ls -ld /** again to verify that the root directory has write access.
8. Enter **ZINET START S-TFTP** to start the TFTP server.
9. Create and transfer the TFTP configuration file from your local TFTP client to the TPF 4.1 system using the TFTP server.
10. Enter **ZFILE ls -l /etc** to verify that the TFTP configuration file is initialized.
11. Transfer a test file to force the creation of the log file. This **must** be done before you restrict the creation of new directories as specified in step 12. If you do not do this, the directory used for the log file will not exist and the default user ID for the TFTP server (NOBODY) will not be able to create them. This will cause all the TFTP transfers to fail and the transfers will not be recorded in the log.
12. Enter **ZFILE chmod 755 /** to restore the root directory to its original access permission settings. This setting restricts the creation of new directories.
TFTP is now ready for you to use.

Additional Information:

- See *TPF Transmission Control Protocol/Internet Protocol* for more information about:
 - Configuring TCP/IP for the TPF 4.1 system
 - Adding an Internet server application entry to the IDCf
 - Creating and transferring the TFTP configuration file.
- See *TPF Operations* for more information about:
 - Adding an Internet server application entry to the IDCf
 - The ZINET and ZFILE commands.

TPF Collection Support Enhancements (APAR PJ25332)

The following section discusses the migration considerations for TPF collection support (TPFCS) enhancements. See “TPF Collection Support (APAR PJ25098)” on page 403 for more information about TPFCS.

Prerequisite APARs

See the APEDIT for APAR PJ25332 for information about prerequisite APARs.

Functional Overview

The enhancements to TPFCS are as follows:

- New application programming interfaces (APIs) for processing binary large object (BLOB) collections:
 - T02_getBLOB
 - T02_getBLOBWithBuffer
 - T02_replaceBLOB
 - T02_writeNewBLOB.

See the *TPF C/C++ Language Support User's Guide* for more information.

- Capability to specify whether a new or existing data store (DS) should have an inventory collection. This function is available using either the ZOODB command or with the new APIs. See *TPF Operations* for more information about the ZOODB command. See the *TPF C/C++ Language Support User's Guide* for more information about the new APIs.
- Capability to specify for a new or existing DS whether the deletion of collections should be immediate or delayed. This function is available using either the ZOODB command or with the new APIs. See *TPF Operations* for more information about the ZOODB command. See the *TPF C/C++ Language Support User's Guide* for more information about the new APIs.
- The FA parameter has been added to the ZBROW DISPLAY command to allow you to display attributes of a file address as they relate to TPFCS. See *TPF Operations* for more information about the ZBROW DISPLAY command.
- Two new collection types:
 - Key sorted bag
 - Sorted set.
- Three collection types have been renamed. See “Migration Scenarios” on page 534 for a list of specific APIs that have been renamed.
- Several internal performance changes.
- Cycle-up notification to TPFCS to allow for rescheduling of timer events.
- TPFCS recoup has additional functionality, fewer restrictions, and improved performance:
 - TPFCS collections can contain embedded file addresses as well as persistent identifiers (PIDs).
 - The restriction on the maximum number of PIDs (or file addresses) that can be embedded in a collection has been removed.
 - TPFCS recoup processing now uses an enhanced control mechanism with a user-defined number of entry control blocks (ECBs) activated. If an ECB is available for use by recoup, it will be used immediately without waiting for any other ECBs to end.

- TPFCS recoup processing has been rewritten from Assembler language to C language and slightly restructured for processing simplification.
- A timeout factor that you can set with the ZRECP TO2 command has been implemented (see *TPF Operations*).

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 507 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 507. Changes to Build Scripts for TPF Collection Support Enhancements

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CJ00BS	DLM	Changed	Build script for TPFCS central routines.
CJ10BS	DLM	Changed	Build script for the ZBROW command.
CJ13BS	DLM	Changed	Build script for TPFCS recoup central routines.
CJ17BS	DLM	Changed	Build script for TPFCS recoup central routines.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 508 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 508. Changes to General Use C/C++ Language Header Files for TPF Collection Support Enhancements

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$to2.h	Changed	No
c\$globz.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 509 on page 528 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 509. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF Collection Support Enhancements

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$bk0rp.h	New	No
c\$to2m.h	Changed	No
c\$to2r.h	New	No

Library Interface Scripts: Table 510 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 510. Changes to Library Interface Scripts for TPF Collection Support Enhancements

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CJ00XV	Changed	Changed the library interface script for TPFCS.

Library Members (Object Files): Table 511 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 511. Changes to Library Members (Object Files) for TPF Collection Support Enhancements

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CJ000	CJ00	Changed	Assembler	Updated for TPFCS.
CJ005	CJ00	Changed	Assembler	Updated for TPFCS DS and I/O control.
CJ006	CJ00	New	Assembler	Created for a TPFCS recoup routine.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 512 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 512. Changes to Members (Object Files) for TPF Collection Support Enhancements

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CJ01	CJ01	Changed	Assembler	Updated the ZOODB command parser.
CJ02	CJ01	Changed	Assembler	Updated the ZOODB command parser.
CJ03	CJ03	Changed	Assembler	Updated for the TPFCS task services routine.
CJ04	CJ04	Changed	Assembler	Updated for the TPFCS restart scheduler exit.
CJ106	CJ10	Changed	C Language	Updated for the ZBROW COLLECTION routine.
CJ110	CJ10	New	C Language	Created for the ZBROW DISPLAY FA routine.

Table 512. Changes to Members (Object Files) for TPF Collection Support Enhancements (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CJ13	CJ13	Changed	Assembler	Updated for the TPFCS recoup routine.
CJ14	CJ13, CJ17	New	C Language	Created for the TPFCS recoup routines.
CJ17	CJ17	Changed	Assembler	Updated for the TPFCS recoup routine.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 513 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 513. Changes to Copy Members for TPF Collection Support Enhancements

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CJ001	Real-Time Assembler	CJ003	Changed	Updated for TPFCS library C function support routines.
CJ002	Real-Time Assembler	CJ000, CJ003, CJ004, CJ005, CJ006	Changed	Updated for TPFCS common macro definitions.
CJ015	Real-Time Assembler	CJ005	Changed	Updated for TPFCS system services class.
CJ020	Real-Time Assembler	CJ000	Changed	Updated for base class definitions.
CJ021	Real-Time Assembler	CJ006	Changed	Updated for TPFCS directory entry support.
CJ022	Real-Time Assembler	CJ005	Changed	Updated for TPFCS database support objects.
CJ025	Real-Time Assembler	CJ006	Changed	Updated for TPFCS collection class definitions.
CJ026	Real-Time Assembler	CJ006	Changed	Updated for TPFCS cursor class definitions.
CJ030	Real-Time Assembler	CJ004	Changed	Updated for TPFCS structure class definitions.
CJ036	Real-Time Assembler	CJ004	Changed	Updated for TPFCS index structure support.
CJ037	Real-Time Assembler	CJ004	Changed	Updated for TPFCS flat structure support.
CJ038	Real-Time Assembler	CJ004	Changed	Updated for TPFCS hash structure support.
CJ101	Real-Time Assembler	CJ100	Changed	Updated for the ZBROW command.
CJ102	Real-Time Assembler	CJ100	Changed	Updated for the ZBROW command.
CJ103	Real-Time Assembler	CJ100	Changed	Updated for the ZBROW command.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 514 summarizes the data macro (DSECT) changes. This information is presented in alphabetic order by the name of the data macro (DSECT).

Table 514. Changes to Data Macros (DSECTs) for TPF Collection Support Enhancements

Data Macro (DSECT)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
BK0RP	Changed	No
ITO2	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 515 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 515. Changes to Selected Equate Macros for TPF Collection Support Enhancements

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BRPEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 516 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 516. Changes to SIP Skeleton and Internal Macros for TPF Collection Support Enhancements

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 517 on page 531 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new

program allocation table (PAT) to the TPF 4.1 system.

Table 517. Changes to SIP Stage II Macros for TPF Collection Support Enhancements

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 518 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 518. Changes to System Macros for TPF Collection Support Enhancements

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
GROUP	Changed	Yes (BRFM, BPM0, BPM1, and BKDIND (offline))

System Macros (IBM Use Only): There are no changes.

Segments

Table 519 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 519. Changes to Segments for TPF Collection Support Enhancements

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BKA0	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS recoup.
BKB0	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS recoup.
BRPC	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS recoup.
BRPI	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS recoup.
BSSC	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS recoup. Note: This update was made for the High Performance Option (HPO) feature only.
CJ12	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS recoup.
CJ15	Real-Time Assembler	Not Applicable	New	Created for TPFCS.
CJ16	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS recoup.
CTKS	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS.
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 520 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 520. Changes to Commands for TPF Collection Support Enhancements

Command	New, Changed, or No Longer Supported?	Description of Change
ZBROW DISPLAY	Changed	Updated to add the new FA parameter.
ZOODB CHANGE	Changed	Updated to add new DS options.
ZOODB DEFINE	Changed	Updated to add new DS options.
ZRECP TO2	Changed	Updated to add the new TIMEOUT parameter.

Messages and System Errors

Table 521 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 521. Changes to Messages and System Errors for TPF Collection Support Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
020410	System Error	New
041006	System Error	New
BROW0701I	Online	New
BROW0702I	Online	New
BROW0751E	Online	New
BROW0752E	Online	New
CJ040003I	Online	New
CJ040004I	Online	New
CJ040052E	Online	New

Table 521. Changes to Messages and System Errors for TPF Collection Support Enhancements (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OODB0014I	Online	New
OODB0030I	Online	New
OODB0123E	Online	New
OODB0130E	Online	New
RECP0215I	Online	New
RECP0281E	Online	No Longer Supported
RECP0285E	Online	New
RECP0286E	Online	New
RECP0287E	Online	New
RECP0288E	Online	New
RECP0289E	Online	New
RECP0290E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 522 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 522. Changes to TPF Publications for TPF Collection Support Enhancements

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP08	Added information about the new TPFCS collection types.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU09	Added new C/C++ functions for TPFCS.
<i>TPF Concepts and Structures</i>	GTPCON06	Updated with information about the new TPFCS collection types.
<i>TPF Database Reference</i>	GTPDBR07	Updated with information about TPFCS and TPFCS recoup.
<i>TPF Library Guide</i>	GTPDOC09	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPFCS.

Table 522. Changes to TPF Publications for TPF Collection Support Enhancements (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG09	Updated with migration considerations for TPFCS.
<i>TPF Operations</i>	GTPOPR09	Updated with information about the commands that were added and changed for TPFCS.
<i>TPF System Macros</i>	GTPSYS09	Updated the GROUP macro with information for TPFCS.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To add TPFCS enhancements to your existing TPF 4.1 system, do the following:

1. Install program update tape (PUT) 9 and APAR PJ25805.
2. Run the system allocator program (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table. See Table 512 on page 528 and Table 519 on page 531 for more information about new segments.
3. Run the LIBI offline program for all changed library interface scripts listed in Table 510 on page 528.
4. Run CBLD for build scripts listed in Table 507 on page 527.
5. Install the following:
 - C/C language header files listed in Table 508 on page 527
 - Copy members listed in Table 513 on page 529
 - Macros listed in Table 514 on page 530, Table 515 on page 530, and Table 518 on page 531.
6. Reassemble or recompile the following:
 - DLM members listed in Table 512 on page 528
 - CSECTS listed in Table 513 on page 529
 - Programs listed in Table 518 on page 531
 - Segments listed in Table 519 on page 531.
7. Link-edit the build scripts (DLMS) listed in Table 512 on page 528.
8. It is recommended but not required that existing applications be updated to use the renamed APIs. All new applications should use the renamed APIs.
 - The following three collection types have been renamed:

- The dictionary collection has been renamed to key sorted set. As a result of that change, the following APIs have been renamed:
 - T02_createDictionary renamed to T02_createKeySortedSet
 - T02_createDictionaryTemp renamed to T02_createKeySortedSetTemp
 - T02_createDictionaryWithOptions renamed to T02_createKeySortedSetWithOptions.
 - The ordered collection has been renamed to sequence. As a result of that change, the following APIs have been renamed:
 - T02_asOrderedCollection renamed to T02_asSequenceCollection
 - T02_createOrder renamed to T02_createSequence
 - T02_createOrderTemp renamed to T02_createSequenceTemp
 - T02_createOrderWithOptions renamed to T02_createSequenceWithOptions.
 - The sorted collection has been renamed to sorted bag. As a result of that change, the following APIs have been renamed:
 - T02_createSort renamed to T02_createSortedBag
 - T02_createSortTemp renamed to T02_createSortedBagTemp
 - T02_createSortWithOptions renamed to T02_createSortedBagWithOptions.
9. Migrate your applications to be compatible with the new support:
 - The T02_getCollectionType function now returns the following:
 - KEYSORTEDSET for dictionary collections
 - SEQUENCE for ordered collections
 - KEYBAG for sorted collections.
 - Change any application that creates a recoup index associated with a BLOB to use the TO2_RECOUP_IGNORED value of the collectionType parameter of the T02_createRecoupIndex function.
 - Be aware that the T02_getDRprotect function now returns BOOL instead of long.
 - Ensure that all applications that code a T02_createEnv function pass compatible parameter types because the third and fourth parameters on the T02_createEnv function have changed from u_char * to char *.
 10. Load the updated object code to your TPF 4.1 system.
 11. Enter **ZRECP TO2 SETUP** specified before running recoup.
 12. Ensure that the TPF 4.1 system is in NORM state before running any application programs.
 13. Continue to set up your TPFCS database as described in *TPF Application Programming*.

Fallback and Coexistence

When using TPFCS consider the following fallback and coexistence information:

- If you need to fall back to a TPF 4.1 system that is at a PUT 8 level or earlier and does not have APAR PJ25414 applied, do the following:
 1. Enter **ZRECP TO2 SETUP BP** before falling back.
 2. Enter **ZRECP TO2 SETUP** after the fallback is completed.
- If you are running loosely coupled with one processor at PUT 8 level or earlier without APAR PJ25414 applied and you need to run recoup on that processor, do the following:

1. Enter **ZRECP TO2 SETUP BP** from a processor with APAR PJ25805 applied.
2. Enter **ZRECP TO2 SETUP** from the processor that does not have APAR PJ25414 applied.

TPF C Debugger for VisualAge Client (APAR PJ25632)

The following section discusses the migration considerations for TPF C Debugger for VisualAge Client.

Prerequisite APARs

See the APEDIT for APAR PJ25632 for information about prerequisite APARs.

Functional Overview

TPF C Debugger for VisualAge Client, which is part of VisualAge TPF for Windows NT, is a workstation development environment that provides you, the C and C++ programmer, with an effective means of increasing your programming productivity when developing applications for the TPF 4.1 system.

This remote development environment provides easy-to-use tools that enable you, the TPF developer, to improve quality and productivity by writing, debugging, and analyzing the performance of your applications in a team environment. The easy-to-use tools include:

- A graphical user interface (GUI) that was designed for ease of use
- A Live Parsing and Extensible (LPEX) editor that makes editing source code easier, whether it is written in C or C++ language
- A remote compile and assemble capability to do builds on the host system from your workstation
- A remote debugger that allows you to debug your TPF programs on the host system from your workstation
- Integration with IBM VisualAge TeamConnection for configuration management and version control
- Integration with IBM VisualAge for C++ to create workstation applications.

Development Environment User Interface

The GUI, which is a three-paned window, was designed for ease of use. The first pane contains a tree-based view and the second a contents view. The third pane is used to monitor any remote communications during the development cycle. Figure 6 on page 538 shows an example of this three-paned window.

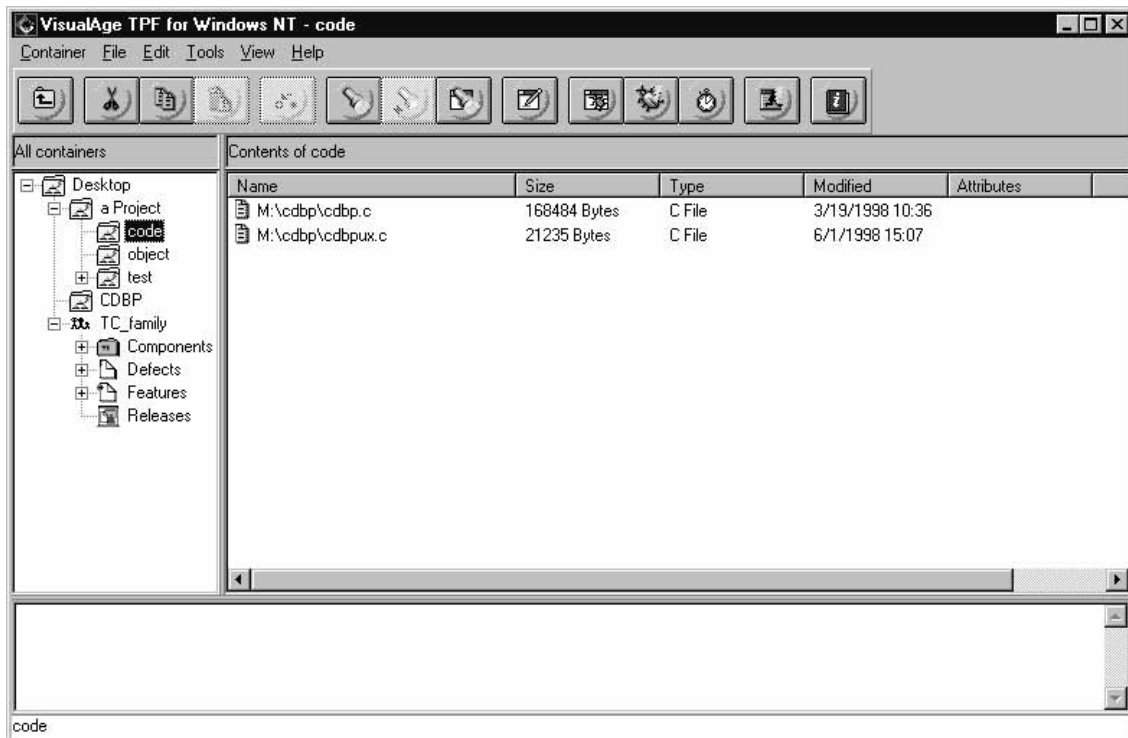


Figure 6. VisualAge for TPF Window

The user interface lets you easily interact with TeamConnection, remote and local tools, and state-of-the-art Hypertext Markup Language (HTML) online information.

Live Parsing and Extensible (LPEX) Editor

The LPEX editor is a 32-bit editor that is fast, simple to use, and easily customized. This editor provides all the general features expected of a workstation editor:

- Cut and paste
- Insert
- Delete
- Join
- Find.

The LPEX editor also provides extra features through language extensions supporting C and C++ languages. These language extensions format and display code structures, perform lexical parsing, and support contextual help information. The editor is integrated into the remote compiler and is extensible, which means current TPF macros are recognized by the editor and you can add to these macros or add your own.

Remote Compile and Assemble

The remote compile and assemble capability allows you to start an IBM OS/390 C/C++ Compiler Version 3 Release 4 (or higher) compile and assemble action from a Windows NT client just by selecting a source file. Depending on the file type (C or C++), the context menu will contain the appropriate remote compile or assemble choice. When you select that action, the compile and assemble command processes in IBM OpenEdition and the results of the compilation are displayed on your workstation. If there are any error messages, simply double-click on one of the messages and the editor is started and positioned at the appropriate place in your code with the error indicated.

Remote Debugger

The remote debugger is an interactive source-level debugger. A Windows NT client is connected through Transmission Control Protocol/Internet Protocol (TCP/IP) to a native TPF environment. TPF C Debugger for VisualAge Client allows you to debug C or C++ applications and displays application source files and the functions in those source files. You can step into, step return, step over, or stop processing at a specified line or condition. While controlling processing, you can monitor variables, registers, memory, call stacks, TPF control blocks, and other elements.

Figure 7 shows an example of the window you will use to begin debugging C or C++ applications.

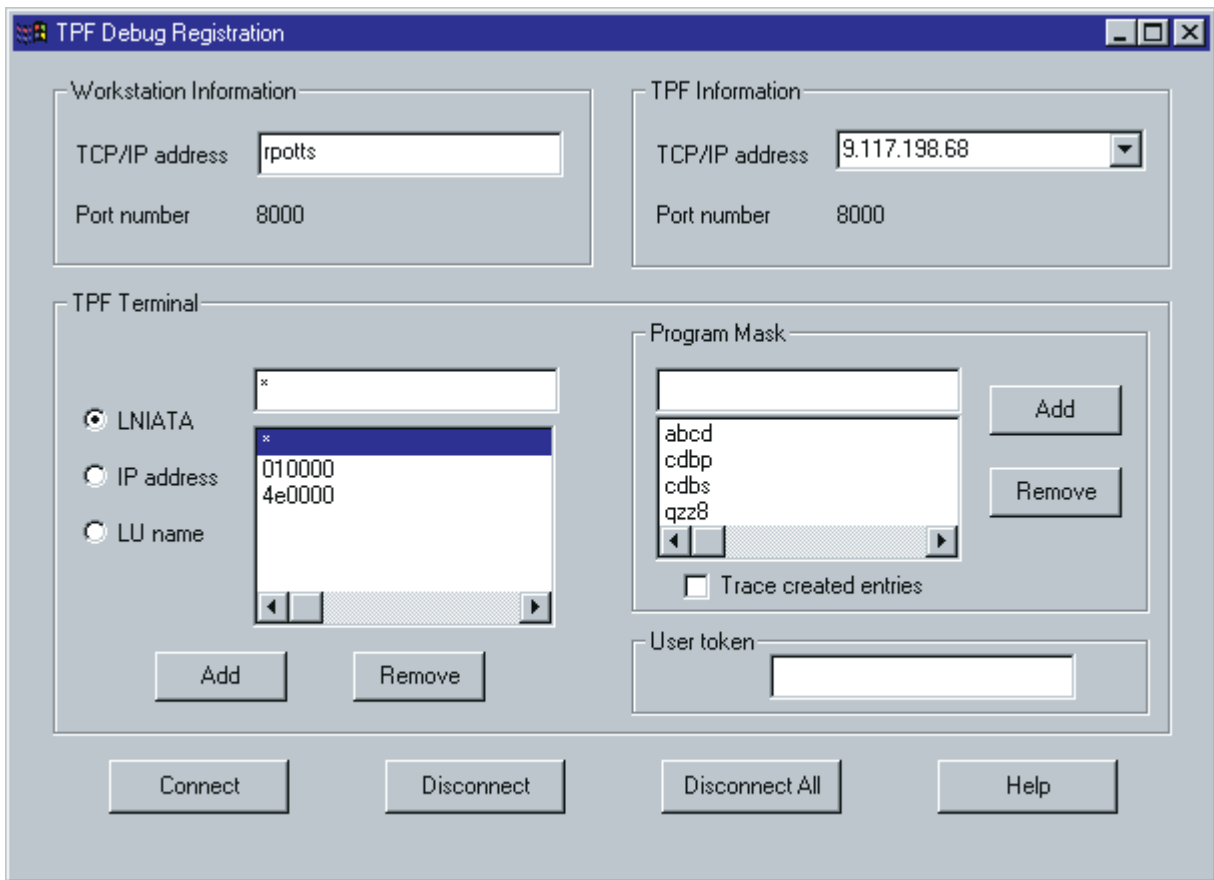


Figure 7. TPF Debug Registration Window

Configuration Management and Version Control

TeamConnection allows you to create applications in a true team programming environment. This application development tool helps you manage software configuration and version control as an integrated aspect of your development process. TeamConnection is flexible because you can tailor it to meet the varied requirements of specific teams and projects in the following areas:

- Configuration management
- Release management
- Version control
- Integrated build
- Problem tracking and change control

- Reporting.

TeamConnection manages which version of parts are contained in any level of application. Access to those parts is controlled. Actions performed on parts managed by TeamConnection generate automated notifications, ensuring that your team members are kept up-to-date. The reporting facility in TeamConnection is based on structured query language (SQL) so you can form queries and store them for later use. You can use the output from these queries as input to reporting tools.

TeamConnection supports concurrent development, provides utilities to assist with identification and reconciliation of conflicts, and provides support to move your applications from development to production. You can use TeamConnection to:

- Manage a development process
- Ensure that all mandated steps are performed
- Contribute to high-quality applications.

The TeamConnection build support provides automated and repeatable builds of individual managed parts, entire releases, or multiple releases. Once a build is set up, the TeamConnection build is both repeatable and reliable — same set of inputs always produces the same set of outputs.

Local Applications

Local C and C++ compilers are provided to assist in early syntax checking and logic verification before you deploy your application on the TPF 4.1 system. Compile your code on your workstation to create a C or C++ application or to help remove compile-time errors from the code that will be used on the TPF 4.1 system. TPF C Debugger for VisualAge Client provides access to the local tools you need to debug and analyze the application on your workstation.

Architecture

TPF C Debugger for VisualAge Client has six load modules:

CDBG CPLX

CDB2 CDB3

CEXP CPRS

The heart of TPF C Debugger for VisualAge Client resides in the CDBG load module, which is called through a special linkage defined by the C compiler. See “Operating Environment Requirements and Planning Information” on page 35 for more information about the IBM OS/390 family of compilers supported by the TPF 4.1 system. The special linkage consists of the execute instructions that are generated by the C compiler when the TEST option is specified. The other load modules provide support functions to TPF C Debugger for VisualAge Client. They are called using standard library linkages.

TPF C Debugger for VisualAge Client operates as an extension to the application; there is only one entry control block (ECB). All control structures used by TPF C Debugger for VisualAge Client are allocated from ECB MALLOC storage. When the TCP/IP session is established to the workstation where TPF C Debugger for VisualAge Client resides, the ECB is waiting on input/output (I/O) rather than being suspended by an outside force; TPF C Debugger for VisualAge Client runs in the same state and key as the application. There are a few exceptions where indicators need to be updated in ECB page 2 and certain restricted macros must be issued. Because of this structure, you may want to modify the system storage definitions or

you may see a slight change in the behavior of your application. For example, you may see an ISO-C stack overflow dump. You will need to increase the storage limit for both the ECB MALLOC storage area as well as the ISO-C stack.

See “Performance or Tuning Changes” on page 550 for more information about the storage definitions you need to change.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF C Debugger for VisualAge Client you must establish the required operating environment. The following section describes hardware and software requirements specific to the VisualAge TPF debug server.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Workstations: TPF C Debugger for VisualAge Client requires a TCP/IP workstation and an Intel-based Pentium workstation. See *VisualAge TPF Online Help*, which is provided with VisualAge TPF for Windows NT, and the VisualAge TPF for Windows NT library for more information about workstation requirements such as how much random access memory (RAM) is needed and the size of the hard drive.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

General Communication: To use TPF C Debugger for VisualAge Client you must have the following:

- VisualAge TPF for Windows NT installed on your workstation. See the VisualAge TPF for Windows NT library for more information about installing VisualAge TPF for Windows NT.
- TCP/IP enabled for the TPF 4.1 system. See the following for more information about TCP/IP support:
 - “Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)” on page 221
 - “Transmission Control Protocol/Internet Protocol (TCP/IP) Full-Duplex Socket Support (APAR PJ23180)” on page 259
 - “Transmission Control Protocol/Internet Protocol (TCP/IP) Resource Management (APAR PJ24525)” on page 333
 - “Transmission Control Protocol/Internet Protocol (TCP/IP) Application Tools (APAR PJ25375)” on page 440
 - “TCP/IP Native Stack Support (APAR PJ26683)” on page 626.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 523 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 523. Changes to Build Scripts for TPF C Debugger for VisualAge Client

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CDBPBS	DLM	New	Created for TPF C Debugger for VisualAge Client.
CDBSBS	DLM	New	Created for TPF C Debugger for VisualAge Client.
CDB0BS	DLM	New	Created for TPF C Debugger for VisualAge Client.
CISOBS	DLM	Changed	Updated for TPF C Debugger for VisualAge Client.
CTALBS	DLM	Changed	Updated for TPF C Debugger for VisualAge Client.

Dynamic Load Module (DLM) Stubs: Table 524 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 524. Changes to Dynamic Load Module (DLM) Stubs for TPF C Debugger for VisualAge Client

DLM Stub	New, Changed, or No Longer Supported?
CEEBETBL	Changed
CEEBLLST	New
CEESTART	Changed

General Use C/C++ Language Header Files: Table 525 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 525. Changes to General Use C/C++ Language Header Files for TPF C Debugger for VisualAge Client

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cdbg.h	New	No
c\$eb0eb.h	Changed	No
c\$idsicd.h	Changed	No
c\$idslst.h	Changed	No
c\$idsprg.h	Changed	No
c\$isc1nt.h	Changed	No
c\$pn1.h	New	No
c\$proc.h	Changed	No
c\$prog.h	New	No
c\$term.h	New	No
c\$test.h	New	No

Table 525. Changes to General Use C/C++ Language Header Files for TPF C Debugger for VisualAge Client (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$ecb3.h	Changed	No
nldtif.h	Changed	Yes
tpfapi.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 526 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 526. Changes to Library Interface Scripts for TPF C Debugger for VisualAge Client

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	Updated for TPF C Debugger for VisualAge Client.
CTALXV	Changed	Updated for TPF C Debugger for VisualAge Client.

Library Members (Object Files): Table 527 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 527. Changes to Library Members (Object Files) for TPF C Debugger for VisualAge Client

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CCRETC	CTAL	Changed	Assembler	Updated for TPF C Debugger for VisualAge Client.
CCRETL	CTAL	Changed	Assembler	Updated for TPF C Debugger for VisualAge Client.
CCREXC	CTAL	Changed	Assembler	Updated for TPF C Debugger for VisualAge Client.
CCTEST	CISO	New	Object-Only	Created for TPF C Debugger for VisualAge Client.
CDBINT	CISO	New	Object-Only	Created for TPF C Debugger for VisualAge Client.
CGTHBA	COMX	Changed	Object-Only	Updated for TPF C Debugger for VisualAge Client.
CGTHBN	COMX	Changed	Object-Only	Updated for TPF C Debugger for VisualAge Client.
CHDLDE	CISO	Changed	Object-Only	Updated for TPF C Debugger for VisualAge Client.
CHDLDI	CISO	Changed	Object-Only	Updated for TPF C Debugger for VisualAge Client.
CKEYRC	CTAL	Changed	Assembler	Updated for TPF C Debugger for VisualAge Client.
CLMINT	CISO	Changed	Assembler	Updated for TPF C Debugger for VisualAge Client.
CREDBG	CTAL	New	Object-Only	Created for TPF C Debugger for VisualAge Client.

Table 527. Changes to Library Members (Object Files) for TPF C Debugger for VisualAge Client (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CSSDLL	CISO	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
CTRINT	CISO	Changed	Object-Only	Updated for TPF C Debugger for VisualAge Client.
CXXFUN	CISO	Changed	Object-Only	Updated for TPF C Debugger for VisualAge Client.
C511	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C512	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C513	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C514	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C515	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C516	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C517	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C518	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C519	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C520	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C524	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C525	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C528	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C529	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C530	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C531	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C532	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C533	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C534	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C536	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C537	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C539	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.
C542	COMX	Changed	C Language	Updated for TPF C Debugger for VisualAge Client.

Table 527. Changes to Library Members (Object Files) for TPF C Debugger for VisualAge Client (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
EDCCPRDB	CISO	New	Object-Only	Created for TPF C Debugger for VisualAge Client.

Link-Edited Modules: Table 528 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 528. Changes to Link-Edited Modules for TPF C Debugger for VisualAge Client

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CDBG	New	Created for TPF C Debugger for VisualAge Client.
CDB2	New	Created for TPF C Debugger for VisualAge Client.
CDB3	New	Created for TPF C Debugger for VisualAge Client.
CEXP	New	Created for TPF C Debugger for VisualAge Client.
CPLX	New	Created for TPF C Debugger for VisualAge Client.
CPRS	New	Created for TPF C Debugger for VisualAge Client.

Members (Object Files): Table 529 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 529. Changes to Members (Object Files) for TPF C Debugger for VisualAge Client

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CDBP	CDBP	New	C Language	Created for TPF C Debugger for VisualAge Client.
CDBPUX	CDBP	New	C Language	Created for TPF C Debugger for VisualAge Client.
CDBS	CDBS	New	C Language	Created for TPF C Debugger for VisualAge Client.
CDBTBT	CDB0	New	C Language	Created for TPF C Debugger for VisualAge Client.
CDBUXT	CDB0	New	C Language	Created for TPF C Debugger for VisualAge Client.

Object Code Only (OCO) Stubs: Table 530 summarizes changes to stubs that are object code only (OCO) only. This information is presented in alphabetic order by the name of the OCO stub.

Table 530. Changes to OCO Stubs for TPF C Debugger for VisualAge Client

Object Code Only (OCO) Stub	New, Changed, or No Longer Supported?
CEETEST	New
DIMADDR	New

Table 530. Changes to OCO Stubs for TPF C Debugger for VisualAge Client (continued)

Object Code Only (OCO) Stub	New, Changed, or No Longer Supported?
EDCV003	New
ZGETST	New
ZFREEST	New

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 531 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 531. Changes to Copy Members for TPF C Debugger for VisualAge Client

Copy Member	Type	CSECT Where Copy Member Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Changed	Updated for TPF C Debugger for VisualAge Client.
CCED	Control Program	CCENBK	Changed	Updated for TPF C Debugger for VisualAge Client.
CCEF	Control Program	CCENBK	Changed	Updated for TPF C Debugger for VisualAge Client.
CCE4	Control Program	CCIISC	Changed	Updated for TPF C Debugger for VisualAge Client.
CHSZ	Control Program	CCNUCL	Changed	Updated for TPF C Debugger for VisualAge Client.
CICR	Control Program	CCNUCL	Changed	Updated for TPF C Debugger for VisualAge Client.
CIS0	Control Program	CCISOC	Changed	Updated for TPF C Debugger for VisualAge Client.
CIS1	Control Program	CCISOC	Changed	Updated for TPF C Debugger for VisualAge Client.
CIS2	Control Program	CCISOC	Changed	Updated for TPF C Debugger for VisualAge Client.
CLWP	Control Program	CCLAW3	Changed	Updated for TPF C Debugger for VisualAge Client.
CPSE	Control Program	CCCPSE	Changed	Updated for TPF C Debugger for VisualAge Client.
CTME	Control Program	CCNUCL	Changed	Updated for TPF C Debugger for VisualAge Client.
CTMS	Control Program	CCNUCL	Changed	Updated for TPF C Debugger for VisualAge Client.
CTR9	Control Program	CCISOC	Changed	Updated for TPF C Debugger for VisualAge Client.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 532 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 532. Changes to Data Macros for TPF C Debugger for VisualAge Client

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSCID	Changed	No
IDSDSA	Changed	No
IDSICD	Changed	No
IDSLST	Changed	No
IDSPRG	Changed	No
IDSXFC	Changed	Yes
IPROC	Changed	No
IPROG	New	No
ITERM	New	No

General Macros: Table 533 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 533. Changes to General Macros for TPF C Debugger for VisualAge Client

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
KEYRC	Changed	No
TMSEC	Changed	No
TMSPC	Changed	No

Selected Equate Macros: Table 534 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 534. Changes to Selected Equate Macros for TPF C Debugger for VisualAge Client

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IEQCE2	Changed	No
IEQCE3	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 535 on page 548 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 535. Changes to SIP Skeleton and Internal Macros for TPF C Debugger for VisualAge Client

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 536 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 536. Changes to SIP Stage II Macros for TPF C Debugger for VisualAge Client

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 537 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 537. Changes to System Macros for TPF C Debugger for VisualAge Client

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$CKMAC	Changed	No
ENATC	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 538 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 538. Changes to Segments for TPF C Debugger for VisualAge Client

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CBLD	Offline C Language	CBLD	Changed	Updated for TPF C Debugger for VisualAge Client.
CDB1	Assembler	Not Applicable	New	Created for TPF C Debugger for VisualAge Client.
COA4	Real-Time Assembler	Not Applicable	Changed	Updated for TPF C Debugger for VisualAge Client.
CSTDLL	Real-Time Assembler	Not Applicable	Changed	Updated for TPF C Debugger for VisualAge Client.
CSTRTD	Real-Time Assembler	Not Applicable	Changed	Updated for TPF C Debugger for VisualAge Client.
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Updated for TPF C Debugger for VisualAge Client.

Table 538. Changes to Segments for TPF C Debugger for VisualAge Client (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for TPF C Debugger for VisualAge Client.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 539. Changes to ECB User Exits for TPF C Debugger for VisualAge Client

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Debug Registration	CDBP	CDBPUX	New	Created for TPF C Debugger for VisualAge Client.
Trace by Terminal	CDB0	CDBUXT	New	Created for TPF C Debugger for VisualAge Client.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 540 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 540. Changes to Commands for TPF C Debugger for VisualAge Client

Command	New, Changed, or No Longer Supported?	Description of Change
ZDEBUG	New	Added to start and clear the VisualAge TPF debug server.

Messages and System Errors

Table 541 on page 550 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on

the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 541. Changes to Messages and System Errors for TPF C Debugger for VisualAge Client

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
097400	System Error	New
097401	System Error	New
CDBP0001E	Online	New
CDBP0002E	Online	New
CDBP0003E	Online	New
CDBS0001I	Online	New
CDBS0002I	Online	New
CDBS0003I	Online	New
CDBS0004I	Online	New
CDBS0005E	Online	New
CDBS0006E	Online	New
CDBS0009I	Online	New

Performance or Tuning Changes

Before using TPF C Debugger for VisualAge Client you may need to modify:

- The size of the system heap
- The size of the entry control block (ECB) heap
- The allocation of frames and shutdown levels.

Size of the System Heap

The system heap is used to bring file resident dynamic load modules (DLMs) into memory. All the TPF C Debugger for VisualAge Client modules are defined as file resident and are very large; the largest is approximately 5 MB. The default size of the system heap is 10 MB. If the system heap is not increased by at least 15 MB, you may see messages displayed on the console stating that a DLM or dynamic link library (DLL) cannot be brought into memory. To increase the size of the system heap, enter the ZCTKA ALTER command as follows:

ZCTKA ALTER A SSPS-25

See *TPF Operations* for more information about the ZCTKA ALTER command.

Size of the ECB Heap

TPF C Debugger for VisualAge Client uses the ECB heap to hold symbol information about the program you are debugging. Depending on the size of your program and how many structures and variables it contains, the amount of storage allocated can be quite large. The default size of the ECB heap is 1 MB, which you should increase to at least 10 MB. To do so, enter the ZCTKA ALTER command as follows:

ZCTKA ALTER EMPS-10 MMHS-2560

See *TPF Operations* for more information about the ZCTKA ALTER command.

Allocation of Frames and Shutdown Levels

You may need to increase the number frames allocated on your test system because of the additional frames being used by each ECB. In addition, you may want to review the shutdown level for frames usage.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 542 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 542. Changes to TPF Publications for TPF C Debugger for VisualAge Client

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU09	Updated with information about the new and changed C functions for TPF C Debugger for VisualAge Client.
<i>TPF General Macros</i>	GTPGEN09	Updated with information about the new and changed general macros for TPF C Debugger for VisualAge Client.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF C Debugger for VisualAge Client.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMIG09	Updated with migration considerations for TPF C Debugger for VisualAge Client.
<i>TPF Operations</i>	GTPOPR09	Updated with information about the command that was added for TPF C Debugger for VisualAge Client.
<i>TPF System Macros</i>	GTPSYS09	Updated with information about the new and changed system macros for TPF C Debugger for VisualAge Client.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TPF C Debugger for VisualAge Client on your TPF 4.1 system.

To Install TPF C Debugger for VisualAge Client on Your TPF 4.1 System

1. Update the library system with the contents of program update tape (PUT) 9.
2. Install VisualAge TPF for Windows NT on a workstation.

Note: You cannot use TPF C Debugger for VisualAge Client without first installing VisualAge TPF for Windows NT.

3. Compile your applications with the IBM OS/390 C/C++ Compiler Version 3 Release 4 using the TEST ALL and GONUMBER options.

Additional Information:

- See the VisualAge TPF for Windows NT library for more information about installing VisualAge TPF for Windows NT.
- See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.

Program Update Tape 10 (PUT 10)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 10 (PUT 10).

SPE	Where to Go For More Information
Mapping of Airline Traffic over Internet Protocol (MATIP)	"Mapping of Airline Traffic over Internet Protocol (MATIP) (APAR PJ26161)" on page 554
TPF Collection Support Enhancements	"TPF Collection Support Enhancements (APAR PJ26143)" on page 566
16-Way Tightly Coupled Multiprocessor	"16-Way Tightly Coupled Multiprocessor (APAR PJ26146)" on page 574
C++ Class Library Support	"C++ Class Library Support (APARs PJ26187 and PJ26173)" on page 587
Open Systems Infrastructure	"Open Systems Infrastructure (APAR PJ26188)" on page 595
VSAM Database	"Virtual Storage Access Method (VSAM) Database Support (APAR PJ26150)" on page 606
TPF MQSeries Local Queue Manager Support Enhancements	"TPF MQSeries Local Queue Manager Support Enhancements (APAR PJ26156)" on page 614

As a result of APAR PJ25951 the device driver for output messages for file system support has changed from `/dev/tpf.msg` to the `/dev/null` special file. See "File System Support (APAR PJ25089)" on page 370 for more information about file system support. To change the default for the current working directory, `stdin`, `stdout`, and `stderr`, use `setenv` to change the values. For example, to change `stdout` and `stderr` to send output to `EBROUT` you should code the following:

```
setenv("TPF_STDOUT_PATHNAME", "/dev/tpf.msg", 1);
setdnv("TPF_STDERR_PATHNAME", "/dev/tpf.msg", 1);
```

TPF 4.1 PUT 10 is compiled with the IBM OS/390 C/C++ Version 2 Release 4 compiler. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Mapping of Airline Traffic over Internet Protocol (MATIP) (APAR PJ26161)

The following section discusses the migration considerations for Mapping of Airline Traffic over Internet Protocol (MATIP).

Prerequisite APARs

See the APEDIT for APAR PJ26161 for information about prerequisite APARs.

Functional Overview

MATIP support allows the TPF 4.1 system to receive and transmit airline reservation, ticketing, and messaging traffic over a Transmission Control Protocol/Internet Protocol (TCP/IP) network. MATIP support provides the following benefits:

- Lower cost TCP/IP networks can replace airline-specific networks.
- Fewer communications sessions to manage.
- Current airline terminals and applications do not need to be replaced.

MATIP support can coexist with current network configurations. Minimum changes to applications are needed for MATIP support; the current system architecture is maintained for the internal routing of messages between the network and the application.

Architecture

MATIP support is provided for the communication of two main types of airline traffic: transactional and messaging.

Transactional traffic (known as Type A) can be described as real-time query and response. Type A is high priority but limited protection; if a message is lost in the network, you resend the query. Transactional traffic can be broken down into either Type-A conversational (host-to-terminal) or Type-A host-to-host (one airline host system to another).

Messaging traffic (known as Type B) is more highly protected but less immediate. The different protection protocols used to secure Type-B messages are transparent to MATIP support and are provided by you.

When MATIP support is enabled, logical sessions are established over Transmission Control Protocol (TCP) connections that link the TPF 4.1 system to the remote end. One MATIP session will correspond to one TCP connection or one TCP/IP socket. These sessions can handle only one traffic type at a time; a Type-A host-to-host message cannot be sent on the same session that was originally established for sending a Type-B message. Once session characteristics are established, each data message that flows over that session is assumed to have the same characteristics.

Type-A transactional traffic can be concentrated on one MATIP session. For example, the TPF 4.1 system can have one Type-A conversational MATIP session with a remote MATIP concentrator. The concentrator can have several agent set control units (ASCUs) attached to it, and each ASCU can have several different terminals attached to it. All data received by the TPF 4.1 system from this network cluster will be processed on the same MATIP session; any data going to one of the terminals will be sent over the same MATIP session. This is known as *multiplexing*.

the sessions. In the same way, Type-A host-to-host sessions can be multiplexed when they are defined as Societe Internationale de Telecommunications Aeronautiques (SITA) host-to-host sessions, allowing for several airline flows to be sent on one MATIP session. Host-to-host sessions defined as traditional International Air Transport Association (IATA) host-to-host sessions cannot be multiplexed.

The TPF 4.1 system with MATIP support uses a line number, interchange address, and terminal address (LNIATA) for internal routing of messages. When a destination terminal or host is migrated to use MATIP support, you update the corresponding terminal address table (WGTA) entry to indicate that the destination is now a MATIP device. All future messages for this LNIATA will now be handled by the MATIP layer, and the previous communications protocols will be bypassed. You do not have to modify the original application for this to happen. If your TPF 4.1 system does not use LNIATAs for message routing, seven new user exits are provided so you can customize MATIP support to route messages to their destination.

The IP Bridge, unique to the TPF 4.1 system, is provided with MATIP support. The IP Bridge allows you to send non-airline-specific traffic over a TCP/IP network. TCP/IP messages received on a user-defined port number are converted into application message format (AM0SG), assigned an origin LNIATA, and passed to the system message router for routing to the application. Applications can use the ROUTC macro to send messages from the TPF 4.1 system. The TPF 4.1 system intercepts outbound messages and bypasses other communication protocols after the LNIATA has been defined as an IP Bridge device. The message is removed from its AM0SG format and is sent over the previously established TCP connection.

For more information about MATIP, see the Societe Internationale de Telecommunications Aeronautiques (SITA) Web site at: <http://www.sita.int>

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 543 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 543. Changes to Build Scripts for Mapping of Airline Traffic over Internet Protocol (MATIP)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMAPBS	DLM	New	Build script for the ZMATP functional message.
CMATBS	DLL	New	Build script for the MATIP primary DLL.
CMIABS	DLM	New	Build script for MATIP Type-A inbound.
CMIBBS	DLM	New	Build script for MATIP Type-B inbound.
CMICBS	DLM	New	Build script for MATIP outbound interface to the session manager.

Table 543. Changes to Build Scripts for Mapping of Airline Traffic over Internet Protocol (MATIP) (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMIRBS	DLM	New	Build script for MATIP cycle down.
CMITBS	DLM	New	Build script for MATIP cycle up.
CMOABS	DLM	New	Build script for MATIP Type-A outbound.
CMOBBS	DLM	New	Build script for MATIP Type-B outbound.
CRIIBS	DLM	New	Build script for IP Bridge inbound.
CRIOBS	DLM	New	Build script for IP Bridge outbound.
CTALBS	DLM	Changed	Build script for the CTAL ISO-C library.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 544 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 544. Changes to General Use C/C++ Language Header Files for Mapping of Airline Traffic over Internet Protocol (MATIP)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	Changed	No
c\$iscfdt.h	Changed	No
c\$itrdbl.h	Changed	No
c\$rc0pl.h	Changed	No
c\$trmeq.h	Changed	No
tpfapi.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 545 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 545. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Mapping of Airline Traffic over Internet Protocol (MATIP)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$matp.h	New	Yes
i\$mscb.h	New	Yes
i\$tcpc.h	Changed	No

Library Interface Scripts: Table 546 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 546. Changes to Library Interface Scripts for Mapping of Airline Traffic over Internet Protocol (MATIP)

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Added linkage for the lwgtc and rwgtc internal library functions.

Library Members (Object Files): Table 547 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 547. Changes to Library Members (Object Files) for Mapping of Airline Traffic over Internet Protocol(MATIP)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CLWGTC	CTAL	New	Real-Time Assembler	Processes the lwgtc internal library function.
CRWGTC	CTAL	New	Real-Time Assembler	Processes the rwgtc internal library function.
C513	COMX	Changed	C Language	Updated the serialization of cclose function calls.
C515	COMX	Changed	C Language	Updated the serialization of cclose function calls.
C524	COMX	Changed	C Language	Updated the serialization of cclose function calls.
C525	COMX	Changed	C Language	Updated the serialization of cclose function calls.
C533	COMX	Changed	C Language	Updated the serialization of cclose function calls.
C534	COMX	Changed	C Language	Updated the serialization of cclose function calls.
C539	COMX	Changed	C Language	Updated the serialization of cclose function calls.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 548 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 548. Changes to Members (Object Files) for Mapping of Airline Traffic over Internet Protocol(MATIP)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLTR	DLM	Changed	C Language	Updated to return to segment CLC0 during system restart.
CMACMD	DLL	New	C Language	Processes MATIP control packets.
CMADAT	DLL	New	C Language	Processes MATIP data packets.
CMAF	DLM	New	C Language	ZMATP command processor.
CMARTN	DLL	New	C Language	Processes common routines used by MATIP and IP Bridge.
CMATAB	DLL	New	C Language	Manages the MATIP session control block area.
CMIA	DLM	New	C Language	Receives inbound MATIP Type-A data packets.
CMIB	DLM	New	C Language	Receives inbound MATIP Type-B data packets.
CMIC	DLM	New	C Language	Outbound interface to the MATIP session manager.

Table 548. Changes to Members (Object Files) for Mapping of Airline Traffic over Internet Protocol (MATIP) (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CMIR	DLM	New	C Language	MATIP cycle-down processor.
CMIT	DLM	New	C Language	MATIP cycle-up processor.
CMOA	DLM	New	C Language	Processes outbound MATIP Type-A data packets.
CMOB	DLM	New	C Language	Processes outbound MATIP Type-B data packets.
CRII	DLM	New	C Language	Processes inbound IP Bridge data packets.
CRIO	DLM	New	C Language	Processes outbound IP Bridge data packets.
UMATAL	DLL	New	C Language	MATIP assign line number, interchange address, and terminal address (LNIATA) user exit.
UMATAS	DLL	New	C Language	MATIP agent set control unit (ASCU) list user exit.
UMATFI	DLL	New	C Language	MATIP flow ID user exit.
UMATRO	DLL	New	C Language	MATIP router user exit.
UMATSE	DLL	New	C Language	MATIP security user exit.
UMATSS	DLL	New	C Language	MATIP session start user exit.
UMATTR	DLL	New	C Language	MATIP translation user exit.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 549 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 549. Changes to Copy Members for Mapping of Airline Traffic over Internet Protocol (MATIP)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CLBV	Assembler	CCLAW1	Not Applicable	Changed	Leave the CLAW polling switch on.
CLB3	Assembler	CCLAW1	Not Applicable	Changed	Turn the CLAW polling switch off.
CLXA	Assembler	CCCCP1	Not Applicable	Changed	Updated processing of the ROUTC macro.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 550 summarizes changes to the communication macros. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 550. Changes to Communication Macros and Statements for Mapping of Airline Traffic over Internet Protocol (MATIP)

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 551 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 551. Changes to Data Macros for Mapping of Airline Traffic over Internet Protocol (MATIP)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
DLTEC	Changed	Yes
ISCFDT	Changed	No
RC0PL	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 552 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 552. Changes to Selected Equate Macros for Mapping of Airline Traffic over Internet Protocol (MATIP)

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
TRMEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 553 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 553. Changes to SIP Skeleton and Internal Macros for Mapping of Airline Traffic over Internet Protocol (MATIP)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 554 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 554. Changes to SIP Stage II Macros for Mapping of Airline Traffic over Internet Protocol (MATIP)

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 555 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 555. Changes to Segments for Mapping of Airline Traffic over Internet Protocol (MATIP)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLC0	Real-Time Assembler	Not Applicable	Changed	Updated to process the TCT dump label.
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated to include the MAXASCU and MAXMATIP parameters for the ZNKEY command.
CTKR	Real-Time Assembler	Not Applicable	Changed	Updated to call the MATIP cycle-down processor.
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated to call the MATIP cycle-up processor.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added an entry for the ZMATP command.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 556. Changes to ECB User Exits for Mapping of Airline Traffic over Internet Protocol (MATIP)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
MATIP Agent Set Control Unit (ASCU) User Exit	CMACMD	UMATAS	New	Defines a list of ASCUs.
MATIP Assign LNIATA User Exit	CMADAT, CMOA, CR11	UMATAL	New	Assigns an LNIATA to a data message.
MATIP Flow ID User Exit	CMADAT	UMATFI	New	Allows SITA host-to-host communication to allocate message charges to the appropriate host airlines.
MATIP Router User Exit	CMADAT	UMATRO	New	Allows messages to be routed to the appropriate application when a terminal address table (WGTA) entry is not used to route the messages.
MATIP Security User Exit	CMACMD	UMATSE	New	Accepts or rejects the MATIP Session Open requests.
MATIP Session Start User Exit	CMACMD	UMATSS	New	Defines the characteristics of a MATIP session that will be opened with a remote MATIP server.
MATIP Translation User Exit	CMADAT, CMOA, CMOB	UMATTR	New	Translates message text according to user requirements.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 557 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 557. Changes to Commands for Mapping of Airline Traffic over Internet Protocol (MATIP)

Command	New, Changed, or No Longer Supported?	Description of Change
ZMATP	New	Displays or modifies MATIP values.
ZNKEY	Changed	Added the MAXASCU and MAXMATIP parameters.

Messages and System Errors

Table 558 on page 562 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 558. Changes to Messages and System Errors for Mapping of Airline Traffic over Internet Protocol (MATIP)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MATP0001I	Online	New
MATP0002I	Online	New
MATP0003E	Online	New
MATP0004E	Online	New
MATP0005E	Online	New
MATP0006I	Online	New
MATP0007I	Online	New
MATP0008I	Online	New
MATP0009E	Online	New
MATP0010I	Online	New
MATP0011E	Online	New
MATP0012I	Online	New
MATP0013E	Online	New
MATP0014E	Online	New
MATP0015E	Online	New
MATP0016E	Online	New
MATP0055E	Online	New
MATP0064E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

MATIP support supplies a new core memory table, the MATIP Session Control Block (MSCB) area. You can define the size of the MSCB by using the ZNKEY command with the following parameters specified:

- MAXASCU represents the total number of MATIP agent set control units (ASCUs) that can be defined to the TPF 4.1 system at one time. Each ASCU that is defined requires 20 bytes of storage.
- MAXMATIP represents the total number of MATIP sessions (Type-A Conversational, Type- A Host-to-Host, and Type B) that will be active at one time. Each session that is defined requires 64 bytes of storage.

See *TPF Operations* for more information about the ZNKEY command.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 559 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 559. Changes to TPF Publications for Mapping of Airline Traffic over Internet Protocol(MATIP)

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF09	Updated the SNAKEY macro with the MAXASCU and MAXMATIP parameters.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for MATIP.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG200	Updated with migration considerations for MATIP.
<i>TPF Operations</i>	GTPOPR0A	Updated with information about the commands that were added and changed for MATIP.
<i>TPF Program Development Support Reference</i>	GTPPDR0A	Updated with information about the TCT main storage dump label that was added for MATIP.
<i>TPF System Installation Support Reference</i>	GTPINR0A	Updated with information about the user exits that were added for MATIP.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

There are two phases you must go through before you use MATIP support:

- Analyzing
- Installing.

Analyzing MATIP Support

To determine if you will be able to install MATIP support in your TPF 4.1 system, do the following:

1. Analyze your current available LNIATAs to determine which ones will be used for MATIP support and IP Bridge, and to create a list of these LNIATAs according to the following types:
 - Type-A conversational

- Type-A host-to-host
 - Type B
 - IP Bridge.
2. Analyze your current applications that now send data across a non-IP network, and which will be used to send data across an IP network through MATIP or the IP Bridge. Your applications will fall into one of the following categories:
 - Applications that use LNIATAs

Application programs that will be used to send data across an IP network issue a ROUTC macro with the LNIATA of the remote terminal or system in the destination field (RCPLDES3) of the routing control parameter list (RCPL). The LNIATA used in the RCPL is classified as a MATIP or IP Bridge device by the ZMATP command when the TPF 4.1 system is started.
 - Applications that do not use LNIATAs

Applications that do not use LNIATAs to send Type-A host-to-host or Type-B message traffic have the ability to set destination field RCPLDES of the RCPL to an IP address. This address initially is set when starting a Type-A host-to-host session or a Type-B session and a message is sent across the session. The application enters the CMOA MATIP program for Type-A host-to-host traffic or the CMOB program for Type-B traffic. If MATIP is able to connect to the desired remote session, it returns the socket number created to the application after the session is started and the data is sent. The application passes that socket number to RCPLDES on ensuing enters to the CMOA or CMOB programs when additional data is sent across the session.
 3. After analyzing your applications, make any changes necessary to enable them to run with MATIP support.

Installing MATIP Support

To install MATIP support in your TPF 4.1 system, do the following:

1. Install program update tape (PUT) 10.
2. Code the UMATAL, UMATAS, UMATSE, and UMATSS user exits (and the UMATFI, UMATRO, and UMATTR user exits if necessary) listed in “ECB User Exits” on page 560. Update the application programs associated with the user exits (if necessary).
3. Define the MAXASCU and MAXMATIP parameters on the SNAKEY macro in CTK2.
4. Compile or reassemble all DLL and DLM members as necessary.
5. Run the system allocator to include all the new segments added by MATIP support.
6. Reassemble the CLC0, CSK0, CTKR, CTKT, CVAB, CZXR, ICDF, IPLB, and STPP segments.
7. Reassemble the CCCC1, CCCTIN, and CCLAW1 CSECTS.
8. Link the CTAL ISO-C library to pick up the lwgtc and rwgtc internal library functions.
9. Run the CBLD program to create the link-edit decks to the DLLs and DLMs.
10. Link the DLLs and DLMs.
11. Link the control program (CP) and PPCP to pick up STPP changes.
12. Load the following to your TPF 4.1 system:
 - Updated CP, CTK2, ICDF, IPLB, and CZXR segments
 - New and updated DLMs and DLLs

- New and updated assembler segments
 - Updated applications.
13. Perform an initial program load (IPL) of the TPF 4.1 system.
 14. Cycle to CRAS state or above.
 15. Enter the ZMATP command with the DEFINE or ALTER parameter specified to define the necessary LNIATAs as MATIP or IP Bridge devices. When you issue the ZMATP command, refer to the list of LNIATAs that you created in 1 on page 563.
 16. Define the Internet daemon (INETD) listeners for MATIP and IP Bridge support by entering the following commands:
 - **ZINET ADD S-MATIPA MODEL-AOR AORL-4 PGM-CMIA PROT-TCP PORT-350 STATE-CRAS**
 - **ZINET ADD S-MATIPB MODEL-AOR AORL-4 PGM-CMIB PROT-TCP PORT-351 STATE-CRAS**
 - **ZINET ADD S-IPBRIDGE MODEL-AOR PGM-CRII PROT-TCP PORT-userport**
- See *TPF Operations* for more information about the ZINET ADD command.
17. Enter the ZNKEY command to verify that the MAXASCU and MAXMATIP parameters are defined.

See *TPF Operations* for more information about the ZNKEY command.
 18. Do the following to activate MATIP support:
 - If the TPF 4.1 system is in CRAS state or above, enter the ZMATP command with the START parameter specified. See *TPF Operations* for more information about the ZMATP command.
 - If the TPF 4.1 system is in 1052 state, cycle the TPF 4.1 system to CRAS state or above.

Note: MATIP support does not need to be started to use the IP Bridge.

TPF Collection Support Enhancements (APAR PJ26143)

The following section discusses the migration considerations for TPF collection support (TPFCS) enhancements.

Prerequisite APARs

See the APEDIT for APAR PJ26143 for information about prerequisite APARs.

Functional Overview

TPFCS has been enhanced in the following ways:

- Key path support has been added, which enables you to search and access data in a single collection by using the value of a specified data field.
- New application programming interfaces (APIs) for adding, using, removing, and displaying as many as 16 alternate key paths for persistent keyed collections and persistent sorted collections:
 - T02_addKeyPath
 - T02_getCurrentKey, T02_getCurrentKeyWithBuffer
 - T02_getKeyPathAttributes
 - T02_getPathInfoFor
 - T02_removeKeyPath
 - T02_setKeyPath
 - T02_validateKeyPath.

See the *TPF C/C++ Language Support User's Guide* for more information about these APIs.

- The capability to display the path information for either a key or an RRN by using the ZBROW PATH command. You can also display the record number and displacement in the record for a specific index or relative byte address (RBA). See *TPF Operations* for more information about the ZBROW PATH command.
- The capability to display the contents of a directory entry for a specific relative record number (RRN) by using the ZBROW DISPLAY command or the T02_getDirectoryForRRN function.
- A new API, T02_isTemp has been added to determine if a collection is temporary or persistent.
- Support for reuse of released long-term pool records to prevent applications from flushing through pool records too quickly.
- The maximum number of bytes that can be managed for a binary large object (BLOB) has been increased from 32 KB to 4 MB for the following APIs:
 - T02_add
 - T02_atRBA, T02_atRBAWithBuffer
 - T02_atRBAPut
 - T02_removeRBA.

See the *TPF C/C++ Language Support User's Guide* for more information about these APIs.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 560 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 560. Changes to General Use C/C++ Language Header Files for TPF Collection Support Enhancements

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	No
c\$to2.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 561 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 561. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF Collection Support Enhancements

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$to2m.h	Changed	No

Library Interface Scripts: Table 562 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 562. Changes to Library Interface Scripts for TPF Collection Support Enhancements

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CJ00XV	Changed	Added new library functions for TPFCS.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 563 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 563. Changes to Members (Object Files) for TPF Collection Support Enhancements

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CJ04	CJ04	Changed	Assembler	Updated for the TPFCS restart scheduler exit.
CJ109	CJ10	Changed	C Language	Updated the ZBROW report table handler.
CJ110	CJ10	Changed	C Language	Updated to add the RRN parameter to the ZBROW DISPLAY command.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 564 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 564. Changes to CINFC Tags for TPF Collection Support Enhancements

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMTO2P	06	New

Copy Members

Table 565 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 565. Changes to Copy Members for TPF Collection Support Enhancements

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CJ001	Real-Time Assembler	CJ003	CJ00	Changed	Updated for TPFCS library C function support routines.
CJ002	Real-Time Assembler	CJ000, CJ003, CJ004, CJ005, CJ006	CJ00	Changed	Updated for TPFCS common macro definitions.
CJ015	Real-Time Assembler	CJ005	CJ00	Changed	Updated for TPFCS system services class.
CJ020	Real-Time Assembler	CJ000	CJ00	Changed	Updated for base class definitions.
CJ021	Real-Time Assembler	CJ006	CJ00	Changed	Updated for TPFCS directory entry support.
CJ022	Real-Time Assembler	CJ005	CJ00	Changed	Updated for TPFCS database support objects.
CJ025	Real-Time Assembler	CJ006	CJ00	Changed	Updated for TPFCS collection class definitions.

Table 565. Changes to Copy Members for TPF Collection Support Enhancements (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CJ026	Real-Time Assembler	CJ006	CJ00	Changed	Updated for TPFCS cursor class definitions.
CJ030	Real-Time Assembler	CJ004	CJ00	Changed	Updated for TPFCS structure class definitions.
CJ036	Real-Time Assembler	CJ004	CJ00	Changed	Updated for TPFCS index structure support.
CJ037	Real-Time Assembler	CJ004	CJ00	Changed	Updated for TPFCS flat structure support.
CJ038	Real-Time Assembler	CJ004	CJ00	Changed	Updated for TPFCS hash structure support.
CJ039	Real-Time Assembler	CJ004	CJ00	Changed	Updated for TPFCS list structure support.
CJ101	Real-Time Assembler	CJ100	CJ10	Changed	Updated for the ZBROW commands.
CJ102	Real-Time Assembler	CJ100	CJ10	Changed	Updated for the ZBROW commands.
CJ103	Real-Time Assembler	CJ100	CJ10	Changed	Updated for the ZBROW commands.
CJ104	Real-Time Assembler	CJ100	CJ10	Changed	Updated for the ZBROW commands.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 566 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 566. Changes to Data Macros for TPF Collection Support Enhancements

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ITO2	Changed	No

General Macros: Table 567 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 567. Changes to General Macros for for TPF Collection Support Enhancements

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): There are no changes.

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 568 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 568. Changes to Segments for TPF Collection Support Enhancements

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CTKR	Real-Time Assembler	Not Applicable	Changed	Updated for TPFCS cycle down.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 569 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 569. Changes to Commands for TPF Collection Support Enhancements

Command	New, Changed, or No Longer Supported?	Description of Change
ZBROW COLLECTION	Changed	Updated to add the new KEYPATH parameter.
ZBROW DISPLAY	Changed	Updated to add the new RRN parameter.
ZBROW KEYPATH	New	Added for adding, displaying, or removing key paths.

Table 569. Changes to Commands for TPF Collection Support Enhancements (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZBROW PATH	New	Added for displaying path information for a collection structure.

Messages and System Errors

Table 570 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 570. Changes to Messages and System Errors for TPF Collection Support Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
02040B	System Error	New
BROW0098E	Online	New
BROW0475E	Online	New
BROW0703I	Online	New
BROW0710I	Online	New
BROW0753E	Online	New
BROW0754E	Online	New
BROW0801I	Online	New
BROW0802I	Online	New
BROW0803I	Online	New
BROW0804I	Online	New
BROW0810I	Online	New
BROW0850E	Online	New
BROW0851E	Online	New
BROW0852E	Online	New
BROW0853E	Online	New
BROW0901I	Online	New
BROW0902I	Online	New
BROW0903I	Online	New
BROW0904I	Online	New
BROW0910I	Online	New
BROW0951E	Online	New
BROW0952E	Online	New
CJ040005I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 571 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 571. Changes to TPF Publications for TPF Collection Support Enhancements

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP09	Added information about key path support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0A	Added new C/C++ functions for TPFCS.
<i>TPF Concepts and Structures</i>	GTPCON07	Updated with information about the new TPFCS enhancements.
<i>TPF Database Reference</i>	GTPDBR08	Updated with information about the new TPFCS key path support.
<i>TPF Library Guide</i>	GTPDOC0A	Added definitions for new terminology to the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPFCS.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG200	Updated with migration considerations for TPFCS.
<i>TPF Operations</i>	GTPOPR0A	Updated with information about the commands that were added and changed for TPFCS.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To add TPFCS enhancements to your existing TPF 4.1 system, do the following:

1. Install program update tape (PUT) 10.
2. Run the LIBI offline program for all changed library interface scripts listed in Table 562 on page 567.
3. Run the CBLD program for the build scripts listed in Table 563 on page 568, Table 565 on page 568, and Table 566 on page 569.
4. Verify the following are installed:
 - Header files listed in Table 560 on page 567
 - Copy members listed in Table 565 on page 568
 - Macros listed in Table 566 on page 569 and Table 567 on page 569.
5. Reassemble or recompile the following:
 - DLM members listed in Table 563 on page 568
 - CSECTS listed in Table 565 on page 568
 - Segments listed in Table 568 on page 570.
6. Link-edit the DLM/DLLs listed in Table 563 on page 568 and Table 565 on page 568.
7. Load the updated object code to your TPF 4.1 system.
8. Ensure that the TPF 4.1 system is in NORM state before running any application programs.

Fallback and Coexistence

TPFCS enhancements can coexist with previous versions of TPFCS as long as the alternate key paths are not used until you have migrated all processors to the current level of TPFCS because previous versions cannot maintain the new key path support.

After installing the current level of TPFCS on all processors, applications can add and use alternate key paths on both existing and new collections. If you need to fall back to the prior level of TPFCS, those collections are still usable. However, once you migrate to the current level of TPFCS again, any key paths that were previously created must be removed and added again in order for key paths to be usable.

16-Way Tightly Coupled Multiprocessor (APAR PJ26146)

The following section discusses the migration considerations for the 16-way tightly coupled multiprocessor.

Prerequisite APARs

See the APEDIT for APAR PJ26146 for information about prerequisite APARs.

Functional Overview

The following function has been added by 16-way tightly coupled multiprocessor:

- To fully exploit the capacity of existing 10-way processors and future processors with more central processing units (CPUs), the TPF 4.1 system has been modified to accommodate processors with as many as 16 CPUs or I-streams. The current restriction of 8 I-streams has been removed.
- The file address compute program (FACE) table generator (FCTBG) has been modified to reduce the size of the FACE table and conserve space.
- Additional #GLOBL ordinals have been defined and chained to the existing super global storage allocator (GOA).
- The global load programs have been modified to use the additional #GLOBL ordinals.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with 16-way tightly coupled multiprocessor, you must establish the required operating environment. The following section describes hardware and software requirements specific to 16-way tightly coupled multiprocessor.

"Operating Environment Requirements and Planning Information" on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Central Processing Complexes (CPCs):

Requests for Price Quotations (RPQs) and Product Features for Central Processing Complexes (CPCs)::

Important Note

The time-of-day (TOD) clock synchronization RPQ uses a synchronization selection address that is tied to the CPU address. TOD clock synchronization will **not** support more than 8 I-streams. The sysplex timer (STR) **must** be used with 16-way tightly coupled multiprocessor to support TOD clock synchronization in a loosely coupled complex.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 572 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 572. Changes to Build Scripts for 16-Way Tightly Coupled Multiprocessor

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CRDWBS	DLM	Changed	Build script for TPFAR ZSTTD ISO-C DLM CRDW.
CZXKBS	DLM	Changed	Build script for the ZDECD command DLM.

Dynamic Load Module (DLM) Stubs: Table 573 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 573. Changes to Dynamic Load Module (DLM) Stubs for 16-Way Tightly Coupled Multiprocessor

DLM Stub	New, Changed, or No Longer Supported?
CZXM	Changed

General Use C/C++ Language Header Files: Table 574 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 574. Changes to General Use C/C++ Language Header Files for 16-Way Tightly Coupled Multiprocessor

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ifc2.h	Changed	Yes (FTBD01 and FTBD09)
c\$ms0ut.h	Changed	Yes (CRDW and CZXK)

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: Table 575 on page 576 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 575. Changes to Link-Edited Modules for 16-Way Tightly Coupled Multiprocessor

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CPS0	Changed	Updated CP load module.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 576 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 576. Changes to Copy Members for 16-Way Tightly Coupled Multiprocessor

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CEDI	Control Program	CCNUCL	Not Applicable	Changed	Updated WTOPC message writer.
CFAC	Control Program	CCDBAF	Not Applicable	Changed	Updated CP version of FACE and FACS.
CPSE	Control Program	CCCPSE	Not Applicable	Changed	Updated system error detection code.
CPSM	Control Program	CCCPSE	Not Applicable	Changed	Updated monitor call service.
CT38	Control Program	CCCTIN	Not Applicable	Changed	Updated working storage initializer.
CT40	Control Program	CCCTIN	Not Applicable	Changed	Updated working storage initializer.
CT81	Control Program	CCCTIN	Not Applicable	Changed	Updated machine check support initialization.
CTIN	Control Program	CCCTIN	Not Applicable	Changed	Updated CP initializer control segment.
IB07	Control Program	IPLB	Not Applicable	Changed	Updated the face table generator main program to define the I-stream value.
RTCU	Control Program	CCDBAF	Not Applicable	Changed	Updated CP version of FACE and FACS.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 577 on page 577 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 577. Changes to Data Macros for 16-Way Tightly Coupled Multiprocessor

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDFET	Changed	No
IFC2SC	Changed	Yes (CCDBAF and CZXM)

General Macros: There are no changes.

Selected Equate Macros: Table 578 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 578. Changes to Selected Equate Macros for 16-Way Tightly Coupled Multiprocessor

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
TPFGLB	Changed	Yes
SYGLB	No Changes – Copies in TPFGLB	Yes

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 579 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 579. Changes to SIP Skeleton and Internal Macros for 16-Way Tightly Coupled Multiprocessor

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKJPCO	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 580 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 582 for a description of other system generation changes you must make.

Table 580. Changes to SIP Stage I Macros and Statements for 16-Way Tightly Coupled Multiprocessor

SIP Stage I Macro	New, Changed, or No Longer Supported?
#GLOBL	Changed
RAMFIL	Changed

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 581 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 581. Changes to System Macros for 16-Way Tightly Coupled Multiprocessor

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$ADPC	Changed	No; publication updates only.
\$CRISC	Changed	No; publication updates only.
DLTEC	Changed	No; comments only.

System Macros (IBM Use Only): Table 582 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro.

Table 582. Changes to System Macros (IBM Use Only) for 16-Way Tightly Coupled Multiprocessor

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes

Segments

Table 583 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 583. Changes to Segments for 16-Way Tightly Coupled Multiprocessor

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BAM1	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor to indicate a range of 1–16 I-streams.
BDB5	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor to indicate a range of 1–16 I-streams.
BDBA	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor to indicate a range of 1–16 I-streams.
BDBF	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor database reorganization.
BDBN	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor.
BRPT	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor.
CDE1	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor.
CDE3	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor.
CFD1	Real-Time Assembler	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZDADD command.
CIPZ	Real-Time Assembler	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZDREC and ZAREC commands.

Table 583. Changes to Segments for 16-Way Tightly Coupled Multiprocessor (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CIQY	Real-Time Assembler	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZRPGM command.
CPSI	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor for SNAPC dump processing.
CQAD	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor time-of-day (TOD) SYNC check.
CQAU	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor TOD clock messages.
CRDW	C Language	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZSTTD command.
CRDX	C Language	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZSTTD command.
CVAN	Real-Time Assembler	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZDCOR and ZACOR commands.
CVAX	Real-Time Assembler	Not Applicable	Changed	Updated for ZACOR command processing.
CVOO	Real-Time Assembler	Not Applicable	Changed	Updated for 16-way tightly coupled multiprocessor.
CYBD	Real-Time Assembler	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZIFIL command.
CZ XK	C Language	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZDECD command.
CZXM	Real-Time Assembler	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZDECD commands.
CZXR	Real-Time Assembler	Not Applicable	Changed	Updated a parameter to handle 2-character input for the ZDDCA and ZADCA commands.
FTBD01	Offline C Language	FCTBG	Changed	Updated for 16-way tightly coupled multiprocessor FACE table generator (FCTBG).
FTBD09	Offline C Language	FCTBG	Changed	Updated for 16-way tightly coupled multiprocessor FACE table generator.
FTGN00	Offline C Language	FCTBG	Changed	Updated the FACE table generator main program to define the I-stream value.
GOGO	Real-Time Assembler	Not Applicable	Changed	Updated face table generator main program to define the I-stream value.
ICDF	Real-Time Assembler	Not Applicable	Not Changed	Although this segment was not changed, the CFMCC macro was changed so the ICDF segment must be assembled.
JRA0	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRA1	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRA2	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.

Table 583. Changes to Segments for 16-Way Tightly Coupled Multiprocessor (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
JRA3	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRA4	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRA5	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRA6	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRF1	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRF4	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRF5	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRF6	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRM1	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRM2	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRM4	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRM5	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRP1	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRP3	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRS1	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
JRS3	Offline PL/I	DATAREAD	Changed	Support for 16-way tightly coupled multiprocessor data reduction reports.
STPP	Offline Assembler	PPCP	Not Changed	Although this segment was not changed, the CFMCC macro was changed so the STPP segment must be assembled.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 584 on page 581 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 584. Changes to Commands for 16-Way Tightly Coupled Multiprocessor

Command	New, Changed, or No Longer Supported?	Description of Change
ZACOR	Changed	Updated a parameter to handle 2-character input.
ZADCA	Changed	Updated a parameter to handle 2-character input.
ZAREC	Changed	Updated a parameter to handle 2-character input.
ZDADD	Changed	Updated a parameter to handle 2-character input.
ZDBRO INIT	Changed	Updated a parameter to handle 2-character input.
ZDCOR	Changed	Updated a parameter to handle 2-character input.
ZDDCA	Changed	Updated a parameter to handle 2-character input.
ZDECD	Changed	Updated a parameter to handle 2-character input.
ZDREC	Changed	Updated a parameter to handle 2-character input.
ZIFIL	Changed	Updated a parameter to handle 2-character input.
ZRPGM	Changed	Updated a parameter to handle 2-character input.
ZSTTD	Changed	Updated a parameter to handle 2-character input.

Messages and System Errors

Table 585 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 585. Changes to Messages and System Errors for 16-Way Tightly Coupled Multiprocessor

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000000000	Online	No Longer Supported
CLKS0058E	Online	Changed
CLKS0059E	Online	Changed
CLKS0068E	Online	Changed
CPSE0015I	Online	Changed
CPSE0050E	Online	Changed
CPSE0051T	Online	Changed
CPSE0052E	Online	Changed
CPSE0053T	Online	Changed
CPSE0055T	Online	Changed
CRDW0004I	Online	Changed
CSMP0097I	Online	Changed
DBRI0087I	Online	Changed

Table 585. Changes to Messages and System Errors for 16-Way Tightly Coupled Multiprocessor (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DBR00096E	Online	Changed
DDCA0008I	Online	Changed
FECB0006I	Online	Changed
FECB0007I	Online	Changed
GOGO0005E	Online	Changed
IPLB00D2I	Online	Changed
RECP0000I	Online	Changed
RPGM0015E	Online	Changed
RPGM0017I	Online	Changed
RPGM0033I	Online	Changed
SNAP0001I	Online	Changed
STAT0011I	Online	Changed

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 586 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 586. Changes to TPF Publications for 16-Way Tightly Coupled Multiprocessor

Publication Title	Softcopy File Name	Description of Change
<i>TPF Concepts and Structures</i>	GTPCON07	Updated with 16-way tightly coupled multiprocessor information.
<i>TPF Database Reference</i>	GTPDBR08	Updated with 16-way tightly coupled multiprocessor information.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for 16-way tightly coupled multiprocessor.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG200	Updated with migration considerations for 16-way tightly coupled multiprocessor.
<i>TPF Operations</i>	GTPOPR0A	Updated with information about the commands that were added and changed for 16-way tightly coupled multiprocessor.

Table 586. Changes to TPF Publications for 16-Way Tightly Coupled Multiprocessor (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF System Installation Support Reference</i>	GTPINR0A	Updated with 16-way tightly coupled multiprocessor information.
<i>TPF System Generation</i>	GTPSYG0A	Updated with 16-way tightly coupled multiprocessor information.
<i>TPF System Macros</i>	GTPSYS0A	Updated with 16-way tightly coupled multiprocessor information.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR09	Updated with 16-way tightly coupled multiprocessor information.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to add 16-way tightly coupled multiprocessor to your existing TPF 4.1 system.

1. Install program update tape (PUT) 10.
2. Run CBLD for the build scripts listed in Table 572 on page 575.
3. Install the following:
 - Header files listed in Table 574 on page 575
 - Copy members listed in Table 576 on page 576
 - Macros listed in Table 577 on page 577.
4. Reassemble or recompile the following:
 - All CPS0 CSECTS to ensure displacements within CAPT that are affected by &SAISTRM are consistent throughout the CP.
 - CSECTS listed in Table 576 on page 576
 - Segments listed in Table 583 on page 578.
5. Continue with the next set of required steps to prepare the TPF 4.1 system for more than 16 I-streams:
 - a. Add a SIP definition for an additional super GOA ordinal. See *TPF System Generation* for more information about adding a SIP definition.
 The existing super GOA (#GLOBL ordinal 0) can accommodate a processor complex with as many as 8 loosely coupled processors times 10 I-streams each. The super GOA is a 1055-byte record, and each entry is 12 bytes long. There is one entry for each I-stream on each loosely coupled processor. If more entries are needed to define additional I-streams or

processors, additional super GOA records are needed. A second ordinal will handle as many as 8 loosely coupled processors by 16 I-streams.

To add a second super GOA, the SIP Stage I deck must include another RAMFIL statement for #GLOBL, which defines the additional ordinals using the PRIOR parameter.

- b. Build and load the new FACE table. A new FACE table is needed primarily because of the table format changes to conserve space, but also to include any new #GLOBL records.

Notes:

- 1) In addition to recompiling all changed FACE table generator segments (FCTBG), the DASD table (DASDTB) must be regenerated and FCTBG relinked. DASDTB must be regenerated to pick up the new maximum number of I-streams defined in TPFGLB. To regenerate DASDTB, see the JCL in the compiling the FACE table generator information in *TPF System Generation*.
 - 2) Failure to load a new format FACE table with 16-way tightly coupled multiprocessor will result in database corruption.
- c. Create or load the new PILOT tape for global load.
The STC input deck that defines the global allocator records must be modified to include super GOA definitions for additional I-streams. If more than 86 entries are defined, you will need a second super GOA. Using the definitions for #GLOBL 0 as a skeleton, define the second SUPER GOA for the ordinal created in step 5a on page 583. The ENTIT entries will start again from 1 for the new record.
 - d. Reassemble or load the new system interprocessor global table (SIGT).
 - e. Reassemble or load the following programs that were **not** modified by 16-way tightly coupled multiprocessor, but use tables or values that were modified:
 - GOG1
 - GLBL
 - CNPS
 - CONN.
 - f. Reassemble or load the following segments (or any user-defined code) that were **not** modified by 16-way tightly coupled multiprocessor, but use the modified &SAISTRM value.

Notes:

- 1) &SAISTRM is defined in TPFGLB, which is copied by SYGLB in some cases.
- 2) Reassemble any segments, programs, or user-defined code that use any of the following macros or segments.

• **SIP assembly:**

- SIGT
- SKDASD
 - FTBD05
 - FTBD07
 - FTVA01.

• **CSECTS (copy segments that use &SAISTRM):**

ACPL CCCLHR

CCCPSF	CCCSAS
CCDCOL	CCIISC
CCLANG	CCMCDC
CCMCKH	CCSNA0
CCSTOR	CCTHDS
CCVFAC	

- **E-type (the following call a macro that uses &SAISTRM, arranged by macro):**

- DC0DC
 - JCS0.
- GL0BP:
 - RLCH.
- SI1GT:

CGLOBA	CNPR
CNPS	CNPU
C179	
- SYNCC:

BAM2	BCAI
BKB0	BKPA
BKP4	BKP5
BRCP	BRPA
BRPE	BRPI
BRPX	BRSH
BRYO	CSAI
CJ12	CJ13
CJ16	CJ17
CNPU	
- MS0UT, c\$ms0ut.h (also callers of GDATX, GCALX, GCLKX):

BDBY	BSSU
BSSW	BSSX
CBQ0	CDTC
CDTD	CEBM
CGLOBM	CHSZ
CL11	CNAF
CONN	CS0M
CS0P	CS06
CVCT	GLBL
GOG1	GOG3
JCD4	JCD6

– DLTEC:

CTK0 CTKS

- g. Assemble **all** CSECTS and link-edit CPS0 (see Table 575 on page 576).
 - h. Check the commands listed in Table 584 on page 581 for changes that were made to allow a 2-character decimal I-stream number.
 - i. Check the online messages listed in Table 585 on page 581 for changes that were made to allow a 2-character decimal I-stream number.
6. Perform an initial program load (IPL). The migration is completed.

Note: Because the logical record length (LRECL) of STEMPIS and STEMPID varies according to the number of I-streams specified in JPC0, the JCL must be changed when you actually increase the number of I-streams. See *TPF Operations* for an updated sample of JCL for 16 I-streams.

C++ Class Library Support (APARs PJ26187 and PJ26173)

The following section discusses the migration considerations for C++ class library support.

Prerequisite APARs

See the APEDIT for APAR PJ26187 and APAR PJ26173 for information about prerequisite APARs.

Functional Overview

C++ class libraries provide you, the programmer, with more powerful tools for the development and maintenance of object-oriented programs. Built on the solid foundation of the C language, the C++ language adds support for object-oriented programs and many other features without sacrificing any of the power, elegance, or flexibility of the C language. C++ class library support provides specific class libraries that you can use and extends the power of the C++ language, which enables you to take advantage of more powerful C++ features and standards.

Although the TPF 4.1 system does **not** provide all the C++ class libraries that are available, it does provide the input/output (I/O) stream class libraries, which provide facilities for handling many varieties of I/O such as `cin`, `cout`, `clog`, and `cerr`. See *OS/390 C/C++ IBM Open Class Library Reference* for more information about these I/O stream class libraries.

Note: The input/output (I/O) stream class library support provided by the TPF 4.1 system does not provide for a multi-threaded environment. However, you can use the `fcntl` function to control the level of access to files.

In addition, the TPF 4.1 system provides support for the STLport standard template library, which is available from Silicon Graphics, Inc. as a product called STLport Standard Template Library Version 3.01. This library, which is part of the ANSI/ISO C++ standard, contains generic container classes and algorithms that are designed to work together to provide you with a wide range of functions. The *container classes* are used as templates to define objects, while the *algorithms* are used to manage data in the containers. For example, the vector class can be used to represent vectors and the reverse algorithm can be used to reverse elements in vectors. The reverse algorithm can also be used to reverse elements in a list or in a C array. Therefore, generic C algorithms can be used to manage different containers. By providing a set of containers and algorithms to manage the containers, the STLport standard template library becomes a powerful tool for data representation and code development.

The TPF 4.1 system supports STLport Standard Template Library Version 3.01 compiled with IBM OS/390 C/C++ Version 2 Release 4. STLport Standard Template Library Version 3.01 is **not** shipped with the TPF 4.1 system. Rather, STLport Standard Template Library Version 3.01, which supports the IBM OS/390 environment, is available as freeware from the World Wide Web (WWW). You can port STLport Standard Template Library Version 3.01 to the TPF 4.1 system. See "Migration Scenarios" on page 592 for more information.

C++ class library support is a follow-on to C++ support (APAR PJ25084), which provides support for:

- TPF application programs written in the C++ language

- Dynamic link library (DLL), which is a collection of one or more functions or variables gathered in a load module that can be processed or referenced dynamically while the application program is running rather than statically when the application program is built.
- User-defined C++ class libraries.

See “C++ Support (APAR PJ25084)” on page 358 for more information about C++ support (APAR PJ25084).

Benefits of Using C++ Class Libraries

I/O stream class libraries and the STLport standard template library provide the flexibility, productivity, and quality needed to gain a market advantage because C++ class libraries:

- Enable you to build and maintain custom applications that are portable and interoperable in a heterogeneous, multiple vendor environment
- Help you to respond quickly to changing business needs
- Enhance code reuse, which lowers your overall cost of computing, improves programmer quality and productivity, and reduces development time
- Increase the quality of your application code by building programs from existing and tested components
- Reduce your maintenance costs.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with C++ class library support, you must establish the required operating environment. The following section describes hardware and software requirements specific to C++ class library support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no changes.

Software (Programming Requirements)

The following section contains information about software requirements.

If you want to take advantage of the power behind the STLport standard template library, you must port STLport Standard Template Library Version 3.01 from the WWW. See “Migration Scenarios” on page 592 for more information about porting STLport Standard Template Library Version 3.01.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the

TPF C/C++ Language Support User's Guide and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 587 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 587. Changes to Build Scripts for C++ Class Library Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CPP1BS	DLL	Changed	Added comments to state that the members are object code only (OCO).
CPP2BS	DLL	New	Build script containing the C++ I/O stream class library function. CPP2 is a DLL and does not need a library interface script. Program update tape (PUT)10 contains the CPP240 DLL, which has been built for you already. You do not need to use the CPP2BS build script to build the DLL.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 588 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 588. Changes to General Use C/C++ Language Header Files for C++ Class Library Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
fstream.h	New	No
generic.h	New	No
iomanip.h	New	No
iostream.h	New	No
irtllock.h	New	No
stdiostream.h	New	No
stream.h	New	No
strstream.h	New	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 589 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 589. Changes to Library Members (Object Files) for C++ Class Library Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CSSDLL	CISO	Changed	C Language	Add the CPP2 name to the subsystem-shared DLL validation routine.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): There are no changes.

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 590 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 590. Changes to SIP Stage II Macros for C++ Class Library Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

There are no changes.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 591 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 591. Changes to TPF Publications for C++ Class Library Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP09	Updated with information about TPF restrictions using C++ class library support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG200	Updated with migration considerations for C++ class library support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

This section provides migration scenario information for the I/O stream class libraries and the STLport standard template library.

I/O Stream Class Libraries

Use the following procedure to install I/O stream class libraries in your TPF 4.1 system:

1. Make sure C++ support (APAR PJ25084) is installed in your TPF 4.1 system. See “C++ Support (APAR PJ25084)” on page 358 for more information.
2. Install program update tape (PUT) 10 in your TPF 4.1 system. Make sure you include APAR PJ26188 for open systems infrastructure. See “Open Systems Infrastructure (APAR PJ26188)” on page 595 for more information about open systems infrastructure (APAR PJ26188).

Porting STLport Standard Template Library Version 3.01 from the WWW to the TPF 4.1 System

Use the following sets of procedures, in the order they are presented, to port STLport Standard Template Library Version 3.01 from the WWW to your TPF 4.1 system and then test it using the STLport test suite program:

- Obtain STLport Standard Template Library Version 3.01 and the STLport test suite program
- Make setup modifications for the TPF 4.1 system if you want to test using the STLport test suite program
- Make modifications to the expected results file for the TPF 4.1 system if you want to test using the STLport test suite program.

Before you begin, do the following:

- See the TPF Web page for information about linking to the STLport Standard Template Library Web page where you will find modules in an STLport test suite program to use when testing STLport Standard Template Library Version 3.01.
- Be aware that the TPF 4.1 system supports STLport Standard Template Library Version 3.01 compiled with only the IBM OS/390 C/C++ Version 2 Release 4 compiler.

Obtaining STLport Standard Template Library Version 3.01 and the STLport Test Suite Program: Use the following procedure to obtain STLport Standard Template Library Version 3.01 and the modules in the STLport test suite program from the WWW:

1. In the TPF Web page, click **STLPort Standard Template Library** to go to the IBM OS/390 C/C++ Standard Template Web page. You will find links on this Web page that enable you to download STLport Standard Template Library Version 3.01, the modules in the STLport test suite program, and the `ibm390.mak` file.
2. Load the STLport standard template library from STLport Standard Template Library Version 3.01 into a hierarchical file system (HFS), which allows file names greater than 8 characters.

If you want to use the STLport test suite program to test the STLport standard template library, continue with “Making Setup Modifications for the TPF 4.1 System” on page 593 and “Making Modifications to the Expected Results File for the TPF 4.1 System” on page 594 to modify the expected results file.

If you do not want to test the STLport standard template library, there is no further action for you to take.

Making Setup Modifications for the TPF 4.1 System: You can use either the TPF C Debugger for VisualAge Client or the `ibm390.mak` file to compile the modules in the STLport test suite program. The `ibm390.mak` file uses the IBM OS/390 UNIX System Services in the IBM OS/390 environment as well as the Compile ANSI C/MVS Source Code and Create an Executable File command with CXX specified to compile the modules in the STLport test suite program. See *OS/390 UNIX System Services Command Reference* for more information about this command.

1. Make sure you have completed the procedure "Obtaining STLport Standard Template Library Version 3.01 and the STLport Test Suite Program" on page 592.
2. Edit the `ibm390.mak` file to change the `STL_INCL=/stl` line to include the HFS directory where you placed the STLport C++ header files. For example:

```
STL_INCL=/u/stlport
```

If you want to include additional libraries, separate each library by a blank and place -l (dash-capital l) in front of the second library, the third library, and so on. For example:

```
STL_INCL=/u/stlport -l/u/lib2 -l/u/lib3
```

3. Set the environment variables in your IBM OS/390 system to reference the correct data sets for compile, prelink, and link. For example:
`_CXX_INCDIRS, _CXX_PSYSEX, _CXX_PSYSLIB`
4. Set the following environment variables in your IBM OS/390 system:
 - `export _CXX_CXXSUFFIX="cpp"` to select the C++ compiler
 - `export _CXX_CCMODE=1` to allow the parameters in the `ibm390.mak` file to be placed in any order
 - `export _CXX_STEPS=-1` to run the prelinker and linker rather than the binder. The TPF 4.1 system requires the prelinker and linker.
5. Uncomment the following line in the `stlcomp.h` header file to prevent a return code of 12 when compiling the `uniqcpy1.cpp` module in the STLport test suite program:
Change: `///define _STL_NONTEMPL_BASE_MATCH_BUG 1
To: #define _STL_NONTEMPL_BASE_MATCH_BUG 1`
6. Compile the modules in the STLport test suite program.
7. Transfer the HFS files to an IBM OS/390 partitioned data set (PDS).
8. Use the E-type loader to load the load module to the TPF 4.1 system. When you run the STLport test suite, the `istmit1.cpp` module issues a `cin` C++ function to obtain input.
9. Use the TPF file system C functions to prime the input/output (I/O) buffer to contain the data for the `cin` C++ function. If you do not prime the I/O buffer, a CTL-4 system error occurs in the TPF 4.1 system when the `cin` C++ function tries to obtain input, but there is none available.

Notes:

- a. See the *TPF C/C++ Language Support User's Guide* for more information about file system C functions that you can use to prime the I/O buffer.
- b. See the `echo` statement in the `istmit1.out:istmit1.cpp` section of the `ibm390.mak` file for the input data that should be primed.

10. Run the STLport test suite in your TPF 4.1 system. You can start the STLport load module by running a program that issues the system C function to dispatch the modules in the STLport test suite program in the TPF 4.1 system. For example:

```
system("STL1");
```
11. Continue with "Making Modifications to the Expected Results File for the TPF 4.1 System" to modify the expected results file.

Making Modifications to the Expected Results File for the TPF 4.1 System:

The STLport test suite program issues cout C++ functions to print results from the test cases. The STLport standard template library provides the `stl_test.ibm390.exp` expected-results file. You can use this file to compare your actual results.

The results file expects the output lines to be in the order in which the cout C++ functions were issued. However, because these output messages are not chained together, the TPF 4.1 system may not print the messages in the order in which the cout C++ functions were issued. To avoid this sequencing problem, use the file system functions to direct the output to a file on the TPF file system. See "File System Support (APAR PJ25089)" on page 370 for more information about file system support and the *TPF C/C++ Language Support User's Guide* for more information about file system C functions.

You must edit and modify the actual results file before doing the comparison because of TPF-unique messages.

1. Make sure you have completed the procedures "Obtaining STLport Standard Template Library Version 3.01 and the STLport Test Suite Program" on page 592 and "Making Setup Modifications for the TPF 4.1 System" on page 593.
2. Place your actual TPF results into a file and edit that file as follows:
 - a. Remove all TPF messages such as the CSMP0097I header messages.
 - b. Remove the space on any blank line. The TPF 4.1 system prints a space for back-to-back new-line escape sequences (`\n\n`).
 - c. Remove any plus sign (+) line control that the TPF 4.1 system adds at the end of each message.
 - d. The TPF 4.1 system replaces any plus sign (+) and greater-than sign (>) in a message with a period (.). Replace these periods with the correct character. For example, replace all dash/period (-.) combinations with dash/greater-than (->) combinations in the actual results file.

You are now ready to compare the actual results file with the expected results file.

Open Systems Infrastructure (APAR PJ26188)

The following section discusses the migration considerations for open systems infrastructure.

Prerequisite APARs

See the APEDIT for APAR PJ26188 for information about prerequisite APARs.

Functional Overview

Porting applications would not be practical if the time required to port outweighs a complete rewrite of the applications. From a management point of view, application porting is advantageous, especially across platforms. The benefits of porting code include stable, highly efficient, reliable, well-documented, mature, and scalable applications. By abstracting system services and encapsulating them into a common set of application programming interfaces (APIs), it is not necessary for application programmers to be aware of system peculiarities and, therefore, they can concentrate on providing business solutions.

Open systems infrastructure eases the porting of applications written for other systems to run in the TPF 4.1 system by providing:

- Shared memory using the X/Open interface to allow sharing of data among processes
- Pipes using a Portable Operating System Interface for Computer Environments (POSIX) interface for interprocess communications
- Enhanced signal support so that:
 - A signal handler remains installed after a signal is raised.
 - A process can choose to block certain signals.
 - The TPF 4.1 system automatically blocks a signal when that signal is being handled.
- Enhancements to support password and group files so that these files are actual files in the file system rather than static C headers.

Architecture

The primary objective of open systems infrastructure is to provide a platform-independent layer based on the TPF combined POSIX and X/Open interfaces to ease porting as well as encourage development of new applications for the TPF 4.1 system.

The following information describes the changes that were made to the TPF 4.1 system to make this possible.

Shared Memory

Shared memory is based on the X/Open interface and uses TPF 4.1 system heap storage as the underlying memory resource. Shared memory is allocated as units called shared memory segments.

There is a maximum of 70 shared memory segments allowed in the TPF 4.1 system at any time to minimize the loss of memory when shared memory is not returned by a process that exits.

The usage of shared memory segments and the number of TPF 4.1 system heap frames used by shared memory are recorded by data collection and reported by data reduction.

Pipes

A pipe is a POSIX implementation of a first-in-first-out (FIFO) system buffer that is accessed through a file descriptor. A pipe is read from and written to by using the file system read and write interfaces respectively.

A pipe buffer consists of two 4-KB system heap frames for a total of 8 KB.

If a signal interrupt is received during a blocked read or write operation for a pipe, control is returned to the user application.

Signals

Open systems infrastructure provides:

- Functions to manage and query signals and signal masks
- Macros that manage and query signal sets.

Password and Group Files

If password and group files are not found when accessed initially, they are created automatically with default characteristics. You can customize them using file system commands implemented through the ZFILE command.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 592 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 592. Changes to Build Scripts for Open Systems Infrastructure

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CBOTBS	DLM	Changed	Changed the initialization of the file system.
CHSMBS	DLM	New	Build script for the shared memory support.
CISOBS	DLM	Changed	Added new signal functions.
COMXBS	DLM	Changed	Added the password and group files.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 593 on page 597 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 593. Changes to General Use C/C++ Language Header Files for Open Systems Infrastructure

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cbuf.h	New	Not Applicable
c\$proc.h	Changed	Yes
c\$spif.h	Changed	No
grp.h	Changed	No
limits.h	Changed	No
netdb.h	Changed	No
pwd.h	Changed	No
signal.h	Changed	No
sys/ipc.h	New	Not Applicable
sys/modes.h	Changed	No
sys/shm.h	New	Not Applicable
sys/types.h	Changed	No
unistd.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 594 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 594. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Open Systems Infrastructure

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$dgrp.h	No Longer Supported	No
c\$dpwd.h	No Longer Supported	No
c\$pwgr.h	No Longer Supported	No
i\$cp1.h	New	Not Applicable
i\$dd1.h	New	Not Applicable
i\$dd2.h	New	Not Applicable
i\$dgrp.h	New	Not Applicable
i\$dpwd.h	New	Not Applicable
i\$fsdd.h	Changed	Yes
i\$fslk.h	Changed	Yes
i\$fsqu.h	Changed	Yes
i\$glue.h	Changed	Yes
i\$opfd.h	Changed	Yes
i\$pgdf.h	New	Not Applicable
i\$pwgr.h	New	Not Applicable
i\$shm.h	New	Not Applicable

Library Interface Scripts: Table 595 on page 598 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 595. Changes to Library Interface Scripts for Open Systems Infrastructure

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	Changed	Added the functions for shared memory, pipes, and signals.

Library Members (Object Files): Table 596 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 596. Changes to Library Members (Object Files) for Open Systems Infrastructure

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CDDPIP	COMX	New	C Language	Added the pipe device driver.
CDDTBL	COMX	Changed	C Language	Changed the device driver table.
CFORKC	COMX	Changed	C Language	Changed the <code>tpf_fork</code> function implementation.
CFS005	COMX	Changed	C Language	Changed the <code>c1ose</code> function implementation.
CFS008	COMX	Changed	C Language	Changed the <code>dup</code> function implementation.
CFS009	COMX	Changed	C Language	Changed the <code>dup2</code> function implementation.
CFS010	COMX	Changed	C Language	Changed the <code>fchmod</code> function implementation.
CFS011	COMX	Changed	C Language	Changed the <code>fchown</code> function implementation.
CFS012	COMX	Changed	C Language	Changed the <code>fcntl</code> function implementation.
CFS013	COMX	Changed	C Language	Changed the <code>fstat</code> function implementation.
CFS014	COMX	Changed	C Language	Changed the <code>fsync</code> function implementation.
CFS015	COMX	Changed	C Language	Changed the <code>ftruncate</code> function implementation.
CFS018	COMX	Changed	C Language	Changed the <code>lseek</code> function implementation.
CFS021	COMX	Changed	C Language	Changed the <code>mknod</code> function implementation.
CFS022	COMX	Changed	C Language	Changed the <code>open</code> function implementation.
CFS024	COMX	Changed	C Language	Changed the <code>read</code> function implementation.
CFS032	COMX	Changed	C Language	Changed the <code>symlink</code> function implementation.
CFS033	COMX	Changed	C Language	Changed the <code>tmpfile</code> function implementation.
CFS035	COMX	Changed	C Language	Changed the <code>umask</code> function implementation.
CFS037	COMX	Changed	C Language	Changed the <code>utime</code> function implementation.
CFS038	COMX	Changed	C Language	Changed the <code>write</code> function implementation.
CFS102	COMX	Changed	C Language	Changed an internal function.

Table 596. Changes to Library Members (Object Files) for Open Systems Infrastructure (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS107	COMX	Changed	C Language	Changed an internal function.
CFS110	COMX	Changed	C Language	Changed an internal function.
CFS115	COMX	Changed	C Language	Changed an internal function.
CFS116	COMX	Changed	C Language	Changed an internal function.
CFS130	COMX	Changed	C Language	Changed an internal function.
CFS139	COMX	Changed	C Language	Changed an internal function.
CFS149	COMX	Changed	C Language	Changed an internal function.
CFS154	COMX	Changed	C Language	Changed an internal function.
CFS504	COMX	Changed	C Language	Changed a device driver.
CFS554	COMX	Changed	C Language	Changed a device driver.
CFS604	COMX	Changed	C Language	Changed a device driver.
CFTOK	COMX	New	Object Code Only	Added the ftok function.
CGRPIP	COMX	New	Assembler	Added the get and release pipe storage routine.
CGTHBA	COMX	Changed	Object Code Only	Changed the gethostbyaddr function.
CGTHBN	COMX	Changed	Object Code Only	Changed the gethostbyname function.
CPIPE	COMX	New	C Language	Added the pipe function.
CPWGR0	COMX	Changed	C Language	Changed the APIs for password and group files.
CPWGR1	COMX	New	C Language	Moved the APIs for group files from CPWGR0 to CPWGR1.
CSAWNC	COMX	New	Assembler	Added an internal function.
CSHCTL	COMX	New	C Language	Added the shmctl function.
CSHDET	COMX	New	C Language	Added the shmdt function.
CSHGET	COMX	New	C Language	Added the shmget function.
CSHMAT	COMX	New	C Language	Added the shmat function.
CSIGAC	COMX	New	C Language	Added the sigaction function.
CSIGAL	COMX	Changed	C Language	Changed the alarm function.
CSIGDP	CISO	Changed	C Language	Added SIGPIPE signal support.
CSIGKL	COMX	Changed	C Language	Changed the kill function.
CSIGPA	COMX	New	C Language	Added the pause function.
CSIGPM	COMX	New	C Language	Added the sigprocmask function.
CSIGPN	COMX	New	C Language	Added the sigpending function.
CSIGPS	COMX	Changed	C Language	Added SIGPIPE signal support and changed the tpf_process_signals function.
CSIGR	CISO	Changed	C Language	Added SIGPIPE signal support and changed the raise function.
CSIGSL	COMX	Changed	C Language	Changed the sleep function.
CSIGSP	COMX	New	C Language	Added the sigsuspend function.
CSIGWP	COMX	Changed	C Language	Changed the waitpid function.
CWTOPC	CTAL	Changed	Assembler	Changed the wtopc function implementation.
CXXFUN	CISO	Changed	Object Code Only	Added the shared memory functions.
C1FDOP	CISO	Changed	Object Code Only	Changed the fdopen function implementation.

Table 596. Changes to Library Members (Object Files) for Open Systems Infrastructure (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C1OHFS	CISO	Changed	Object Code Only	Changed the FILE open macro processing.
C1P124	CISO	Changed	Object Code Only	Changed the FILE macro processing.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 597 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 597. Changes to Members (Object Files) for Open Systems Infrastructure

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CCCITA	CMQS	Changed	Object Code Only	Changed the gethostbyname function.
CFIN	CFIN	Changed	C Language	Added shared memory table initialization.
CHSM	CHSM	New	C Language	Added the exitc function cleanup routine.
CLTQ	CLTN	Changed	Object Code Only	Changed the gethostbyaddr function.
CLTT	CLTN	Changed	Object Code Only	Changed the gethostbyaddr and gethostbyname functions.
CSIGLS	CFI1	New	C Language	Added a table that contains the signal values.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 598 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 598. Changes to CINFC Tags for Open Systems Infrastructure

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMSHMM	379	New

Copy Members

Table 599 on page 601 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 599. Changes to Copy Members for Open Systems Infrastructure

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Not Applicable	Changed	Changed the exitc function cleanup routine and added SIGPIPE signal support.
CCE4	Control Program	CCIISC	Not Applicable	Changed	Added SIGPIPE signal support.
CHSZ	Control Program	CCNUCL	Not Applicable	Changed	Added SIGPIPE signal support and the routine to clear fields in the c\$iproc.h header.
CICR	Control Program	CCNUCL	Not Applicable	Changed	Added an emergency unlock routine.
CIEF	Control Program	CCCIEF	Not Applicable	Changed	Added the SANQC and SAWNC macro routines.
CPSL	Control Program	CCCPSE	Not Applicable	Changed	Added the routine to dump shared memory segments.
CT40	Control Program	CCCTIN	Not Applicable	Changed	Added SIGPIPE signal support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 600 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 600. Changes to Data Macros for Open Systems Infrastructure

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSEVN	Changed	No
IDSHM	New	Not Applicable
IOPFD	Changed	Yes
IPROC	Changed	Yes

General Macros: There are no changes.

Selected Equate Macros: Table 601 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 601. Changes to Selected Equate Macros for Open Systems Infrastructure

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	Yes
DLTEC	Changed	Yes

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 602 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 602. Changes to SIP Skeleton and Internal Macros for Open Systems Infrastructure

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes. See “System Initialization Program (SIP) and System Generation Changes” on page 604 for a description of other system generation changes you must make.

System Initialization Program (SIP) Stage II Macros: Table 603 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 603. Changes to SIP Stage II Macros for Open Systems Infrastructure

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 604 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 604. Changes to System Macros for Open Systems Infrastructure

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IBMSVC	Changed	Yes
SANQC	New	Not Applicable
SAWNC	New	Not Applicable

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

Table 605 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 605. Changes to Messages and System Errors for Open Systems Infrastructure

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007778	System Error	New
007779	System Error	New
007780	System Error	New
007781	System Error	New
007783	System Error	New
007785	System Error	New
CFIN0008E	Online	New

Performance or Tuning Changes

The system summary report produced by data reduction includes shared memory usage. See *TPF System Performance and Measurement Reference* for more information about the system summary report.

Storage Considerations and Changes

Shared memory and pipes cause an increase in the use of system heap storage. Use the **ZCTKA DISPLAY** and the **ZCTKA ALTER** commands to display and change the size of system heap storage, respectively. See *TPF Operations* for more information about these functional messages.

The number of bytes of shared memory used by your applications can be estimated by adding up the sizes of shared memory specified by the `shmget` function calls. A pipe buffer consists of 2 system heap frames; multiply the number of pipe buffers used by your applications by 2 to estimate the number system heap frames needed for pipe buffers. See the `CORREQ` macro in *TPF System Generation* for more information about calculating the number of frames required for your TPF system.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 606 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 606. Changes to TPF Publications for Open Systems Infrastructure

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP09	Updated with information about pipe support and POSIX-compliant APIs for process control added by open systems infrastructure.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0A	Updated with information about C functions that were added and changed by open systems infrastructure.
<i>TPF General Macros</i>	GTPGEN0A	Updated with information about general macros that were changed by open systems infrastructure.
<i>TPF Library Guide</i>	GTPDOC0A	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for open systems infrastructure.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG200	Updated with migration considerations for open systems infrastructure.
<i>TPF Program Development Support Reference</i>	GTPPDR0A	Updated with information about the dump label that was added by open systems infrastructure.
<i>TPF System Macros</i>	GTPSYS0A	Updated with information about the system macros that were added by open systems infrastructure.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR09	Updated with information about the new information in data collection and reduction reports that was added by open systems infrastructure.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW06	Updated with information about functions that were changed by open systems infrastructure.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The interfaces to the `gethostbyaddr` and `gethostbyname` functions are changed to correspond to the Berkeley Software Distribution (BSD) version of the UNIX standards to ease porting efforts. As a result of this change, callers of these functions require some minor modifications:

- For the `gethostbyaddr` function, the Internet Protocol (IP) address must now be specified as a network address in network byte order rather than as an IP address in dotted decimal notation.

- For both the `gethostbyaddr` and `gethostbyname` functions, the list in the structure returned by these functions is now a list of network addresses in network byte order rather than a list of IP addresses in dotted decimal notation.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about the `gethostbyaddr` and `gethostbyname` functions.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before You Begin

- Ensure that your TPF 4.1 system is at program update tape (PUT) 9. See “Program Update Tape 9 (PUT 9)” on page 449 for more information about PUT 9. In addition, ensure that the file system is enabled. See “File System Support (APAR PJ25089)” on page 370 for more information about enabling the file system.
- If you are using IBM Extended Operations Console Facility/2 (EOCF/2), install APAR IC21067.

Use the following procedure to install open systems infrastructure on your existing TPF 4.1 system.

1. Install program update tape (PUT) 10 on your TPF 4.1 system.
2. Perform an initial program load (IPL) and cycle the TPF 4.1 system to NORM state.
3. Enter **ZINET STOP** to stop the Internet daemon. See *TPF Operations* for information about the ZINET STOP command.
4. Enter **ZFILE Is -I** to create your password and group files. See *TPF Operations* for information about the ZFILE Is command.

Note: System errors 007783 and 007785 will occur to indicate that the password and group files, respectively, have been created. See *Messages (System Error and Offline)* for information about these system errors.

Enter **ZFILE Is -I /etc** to verify that the `/etc/passwd` password file and the `/etc/group` group file were created.

Update your password and group files with any modifications needed for your environment.

5. Enter **ZINET START** to start the Internet daemon. See *TPF Operations* for information about the ZINET START command.

Virtual Storage Access Method (VSAM) Database Support (APAR PJ26150)

The following section discusses the migration considerations for VSAM database support.

Prerequisite APARs

See the APEDIT for APAR PJ26150 for information about prerequisite APARs.

Functional Overview

VSAM database support for the TPF 4.1 system permits you to access a VSAM database from an IBM multiple virtual storage (MVS) environment in read-only format using TPF general data set (GDS) support. The most important benefit this offers is the ability for TPF applications to access VSAM data sets. Additionally, VSAM database support provides fast storage by retaining index records in virtual file access (VFA) and providing a mechanism for duplicate GDS volume access by mirroring a VSAM data set cluster. Application access is provided through a VSAM application programming interface (API) model that is similar to what is provided to applications in an MVS environment.

To retrieve a VSAM record in the TPF 4.1 system, the protocol for an entry control block (ECB) is as follows:

1. Use the VGENC macro to create an access method control block (ACB) that describes the name of the data set.
2. Use the VGENC macro to create a request parameter list (RPL) that describes the type of processing options, the location of the key that will be used to locate a record, the data level to use for input/output (I/O), and pointers to data attributes.
3. Open the data set to assign either the prime or mirror VSAM cluster to the ECB.
4. Use the VGETC macro to read the record. (This causes VSAM database support to issue the GDSNC and FINWC macros.)
5. Use the VCHKC macro to wait for VGETC macro processing to be completed.
6. Use the VENDC macro to end the request and free the RPL.
7. Use the VCLSC macro to free the ACB and its associated RPLs and end the dialog.

Architecture

VSAM database support for the TPF 4.1 system recognizes only the VSAM key-sequenced data set (KSDS) structure. A KSDS is a type of VSAM data set in which logical records of varying length are stored in ascending sequence by a field called a key. A KSDS has the following two data set components:

- Data
- Index.

Together, the data and index data sets comprise a VSAM cluster.

The TPF 4.1 system provides several levels of referencing for data sets. By convention, applications refer to a VSAM database by using an application data definition (DD) name, while the TPF 4.1 system uses a system DD name. The TPF 4.1 system can also refer to a single disk by its cluster data set name and volume sequence number.

Each KSDS cluster is then defined by two unique TPF DD names:

- One DD name identifies the data space
- The other DD name identifies the index space.

For this reason, there are two unique data set names. For a mirrored cluster, four unique DD names (and therefore four unique data set names) exist. A cluster group refers to the group of VSAM clusters that comprise a prime and mirror set. See *TPF Application Programming* for more information about how DD names are created and used.

Applications access VSAM data by using TPF macros such as VGENC and QGDSQ. See *TPF General Macros* and *TPF System Macros* for more information about these macros.

VSAM database space is managed by an intersystem communications function (ICF) catalog entry that is set in the MVS system when the VSAM cluster is created. The catalog entry contains the physical characteristics of the cluster such as: the name of the data set, the number of volumes, the control interval size, and so on. In addition, the catalog entry contains the logical layout of the data and the type of organization. The TPF 4.1 system requires a subset of the catalog information to navigate the VSAM database. As such, the TPF 4.1 system expects this information to be provided in the data set name that is mounted to the TPF 4.1 system. This is done in the MVS environment through the IDCAMS REPRO function, which renames the cluster data set components when preparing the cluster for use by the TPF 4.1 system. See *DFSMS/MVS Version 1 Release 2 Access Method Services for VSAM Catalogs* for more information about the IDCAMS REPRO function.

Note: A COBOL utility is available, on request, that demonstrates how to derive the catalog information that is needed by the TPF 4.1 system as part of the data set name.

The MVS system then actually manages the VSAM database space, which includes performing tasks such as allocating data sets on DASD, multivolume control, populating disks with data, and index maintenance. This means that each VSAM volume is connected to both the MVS and TPF 4.1 systems. However, TPF applications cannot access a VSAM data set while it is being populated with data on the MVS system.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with VSAM database support, you must establish the required operating environment. The following section describes hardware and software requirements specific to VSAM database support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

VSAM database support requires MVS/DFP Version 3 Release 3 or higher releases or MVS/ESA Version 4.2 or higher releases.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 607 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 607. Changes to General Use C/C++ Language Header Files for VSAM Database Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$eb0eb.h	Changed	Yes
i\$ecb3.h	Changed	Yes

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 608 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 608. Changes to Copy Members for VSAM Database Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Not Applicable	Changed	Updated to clear VSAM-related fields in the ECB exit processing.

Table 608. Changes to Copy Members for VSAM Database Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CEFJ	Control Program	CCFADC	Not Applicable	Changed	Updated to turn on the GDS attribute in the record ID attribute table (RIAT) for a GDS VSAM request.
CEFK	Control Program	CCFADC	Not Applicable	Changed	Updated to permit the LOC parameter option of the GDSCC macro to be issued from any I-stream.
CEFL	Control Program	CCFADC	Not Applicable	Changed	Updated so that the format flag is not set in the last byte of a 4-KB record read for VSAM ECBs.
CVF3	Control Program	CCVFAC	Not Applicable	Changed	Updated to permit virtual file access (VFA) caching of VSAM index records.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 609 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 609. Changes to Data Macros for VSAM Database Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
EB0EB	Changed	Yes
IDSDSB	Changed	Yes
IDSFLV	Changed	Yes
IEQCE2	Changed	Yes
IEQCE3	Changed	Yes
IXREC	New	Yes
VSACB	New	Yes
VSCNT	New	Yes
VSRPL	New	Yes

General Macros: Table 610 on page 610 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 610. Changes to General Macros for VSAM Database Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
VCHKC	New	Yes
VCLSC	New	Yes
VENDC	New	Yes
VGENC	New	Yes
VGETC	New	Yes
VOPNC	New	Yes
VPNTC	New	Yes
VSHOC	New	Yes

Selected Equate Macros: Table 611 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 611. Changes to Selected Equate Macros for VSAM Database Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
RITEQ	Changed	Yes
VSERR	New	Yes
VSMAC	New	Yes

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 612 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 612. Changes to SIP Skeleton and Internal Macros for VSAM Database Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 613 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 613. Changes to SIP Stage II Macros for VSAM Database Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 614 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 614. Changes to System Macros for VSAM Database Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
FLVFC	Changed	Yes
QGDSQ	New	Yes

System Macros (IBM Use Only): Table 615 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 615. Changes to System Macros (IBM Use Only) for VSAM Database Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
VACBC	New	Yes
VRPLC	New	Yes
VSETC	New	Yes

Segments

Table 616 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 616. Changes to Segments for VSAM Database Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVGE	Real-Time Assembler	Not Applicable	Changed	Updated to flush all VFA records associated with a VSAM data set when removing the data set.
CVG5	Real-Time Assembler	Not Applicable	New	Added VSAM database macro service routines.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

There are no changes.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 617 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 617. Changes to TPF Publications for VSAM Database Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP09	Updated with an overview of VSAM database support, including information about accessing data in VSAM data sets, disk mirroring, data set naming conventions, and compatibility considerations.
<i>TPF Database Reference</i>	GTPDBR08	Updated with information about VFA record selection for GDS records with VSAM database support.
<i>TPF General Macros</i>	GTPGEN0A	Updated with information about general macros that were added for VSAM database support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG200	Updated with migration considerations for VSAM database support.
<i>TPF System Macros</i>	GTPSYS0A	Updated with information about system macros that were added and changed for VSAM database support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

VSAM database support adds the following information to pages 2 and 3 of the ECB:

- VSAM context pointer
- VSAM macro parameter area.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To add VSAM database support to your TPF 4.1 system, do the following:

1. Install program update tape (PUT) 10.
2. Run the system allocator program (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated IBM program allocation table (IPAT) and system allocator (SAL) table.
3. Reassemble any existing VSAM database applications against the new macros.
4. Load the new object code to your TPF 4.1 system.
5. Run the MVS REPRO offline procedure to prepare the VSAM cluster for mounting to the TPF 4.1 system. See *DFSMS/MVS Version 1 Release 2 Access Method Services for VSAM Catalogs* for more information about the REPRO function.
6. Enter the ZDSMG MT command to mount the VSAM cluster data sets to the TPF 4.1 system. See *TPF Operations* for more information about the ZDSMG MT command.
7. Run your VSAM applications.

TPF MQSeries Local Queue Manager Support Enhancements (APAR PJ26156)

The following section discusses the migration considerations for TPF MQSeries local queue manager support enhancements. See the following for more information about TPF MQSeries support:

- “Message Queue Interface (MQI) Client (APAR PJ22434)” on page 268
- “TPF MQSeries Local Queue Manager Support (APAR PJ25780)” on page 483
- The TPF Web page.

Prerequisite APARs

See the APEDIT for APAR PJ26156 for information about prerequisite APARs.

Functional Overview

The following enhancements are provided to improve the usability of TPF MQSeries local queue manager support and to provide functions that make the support more consistent with other MQSeries platforms.

- The TPF 4.1 system now provides the ability to define an alias queue. When an application opens an alias queue, the TPF local queue manager will resolve the alias queue name to either a local queue or a local definition of a remote queue.
- TPF MQSeries trace was enhanced and now includes a function trace. Function trace provides the ability to trace the entry to, and return or exit from, any function in the MQSeries system.
- The following new MQSeries application programming interface (API) functions are available:
 - MQINQ
 - MQSET.
- You can now disable and enable TPF MQSeries receiver channels.

Architecture

The following describes how the TPF MQSeries local queue manager support enhancements are implemented in the TPF 4.1 system.

Alias Queues

A local or remote queue can be defined with an alias by using the ZMQSC DEF QA command. This allows applications to issue a request to open the queue without having to know the true name of the queue. When the application specifies the alias queue name on the MQOPEN function call, TPF MQSeries local queue manager support substitutes the real queue name.

You can change an alias queue definition with the ZMQSC ALT QA command. The ZMQSC DISPLAY and ZMQSC DEL commands were also updated to support alias queues.

Function Trace

In addition to the communications trace (previously referred to as channel trace) that was provided with TPF MQSeries local queue manager support, you can now use a function trace to aid with debugging. You can set function tracing for:

- One or more queues
- One or more channels
- A combination of queues and channels

- All functions in the MQSeries system
- ZMQSC commands.

Both communications and function tracing are controlled with the ZMQSC TRACE command. You can direct the output to an RTL tape, the console (recommended for test systems only), both tape and console, or neither tape nor console. The trace data is also attached to the entry control block (ECB) and will be included in any system error dumps that are issued.

MQSeries Application Programming Interface (API) Functions

The set of supported TPF MQSeries local queue manager functions was expanded to include the MQINQ and MQSET functions. The MQINQ function allows you to get attribute information about the queue or queue manager. The MQSET function allows you to set certain attribute information for a queue. These functions are based on the standard MQSeries architecture.

Disabling Receiver Channels

TPF MQSeries now provides protection against remote systems or applications with errors. You can use the ZMQSC STOP functional message to disable a TPF MQSeries receiver channel and prevent the remote system from connecting to the TPF MQSeries queue manager. You can use the ZMQSC START command to enable the receiver channel again so that it can be started by the remote system after any problems have been corrected.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF MQSeries local queue manager support enhancements, you must establish the required operating environment. The following section describes hardware and software requirements specific to TPF MQSeries local queue manager support enhancements.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no changes.

Software (Programming Requirements)

The following section contains information about software requirements.

You must use the IBM OS/390 C/C++ Version 2 Release 4 compiler or later version or release to compile the TPF MQSeries programs. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 618 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 618. Changes to Build Scripts for TPF MQSeries Local Queue Manager Support Enhancements

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMQSBS	DLL	Changed	Included new member CMQFTR for TPF MQSeries function trace.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 619 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 619. Changes to General Use C/C++ Language Header Files for TPF MQSeries Local Queue Manager Support Enhancements

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
cmqc.h	Changed	Yes

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 620 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 620. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF MQSeries Local Queue Manager Support Enhancements

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
amqrrha.h	Changed	Yes
amqscrw.h	Changed	Yes
c\$mq.s.h	Changed	Yes
c\$mqtr.h	Changed	Yes

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 621 on page 617 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 621. Changes to Members (Object Files) for TPF MQSeries Local Queue Manager Support Enhancements

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CCCITA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CCCMXA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CCLIBA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CMQAPI	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQCOL	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQERR	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CMQFTR	CMQS	New	C++ Language	Created for TPF MQSeries local queue manager support enhancements.
CMQGBL	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQHSH	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQL	CMQL	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CMQMCA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CMQMGC	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQMGR	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQMTR	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CMQNPM	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQNPS	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CMQQUE	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CMQR	CMQR	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CMQUTL	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CQRFPT	CMQI	Changed	C Language	Updated for TPF MQSeries local queue manager support enhancements.
CQRREQ	CMQI	Changed	C Language	Updated for TPF MQSeries local queue manager support enhancements.
CRCMSA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRCRSA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRCSIA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRMCLA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRMCVA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.

Table 621. Changes to Members (Object Files) for TPF MQSeries Local Queue Manager Support Enhancements (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CRMCA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRMRA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRMSAA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRMSSA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CRMTRA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CUIE	CUIE	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CUIF	CUIF	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CUIQ	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUIS	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUIT	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUIV	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUIW	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUIX	CUIX	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CUSCCA	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CUSCCD	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CUSCPF	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUSCQL	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUSCQM	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUSCQR	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUSCRW	CUSC	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CUSCUL	CMQS	Changed	C++ Language	Updated for TPF MQSeries local queue manager support enhancements.
CXCSMW	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.
CXCSSW	CMQS	Changed	Object Code Only	Updated for TPF MQSeries local queue manager support enhancements.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: Table 622 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 622. Changes to Selected Equate Macros for TPF MQSeries Local Queue Manager Support Enhancements

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IEQCE2	Changed	Yes

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 623 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 623. Changes to SIP Skeleton and Internal Macros for TPF MQSeries Local Queue Manager Support Enhancements

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 624 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 624. Changes to Segments for TPF MQSeries Local Queue Manager Support Enhancements

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CMQMPP	Offline	CMQMPP	Changed	Updated to support TPF MQSeries function trace.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 625 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 625. Changes to Commands for TPF MQSeries Local Queue Manager Support Enhancements

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQSC ALT QA	New	Changes a TPF MQSeries alias queue definition.
ZMQSC ALT QL	Changed	Updated to allow the PUT and GET parameters for transmission queues.
ZMQSC ALT QR	Changed	Added the PUT parameter.
ZMQSC DEF QA	New	Defines a TPF MQSeries alias queue.
ZMQSC DEF QL	Changed	Updated to allow the PUT and GET parameters for transmission queues.
ZMQSC DEF QR	Changed	Added the PUT parameter.
ZMQSC DEL	Changed	Added the QA parameter.
ZMQSC DISPLAY	Changed	Added the QA parameter.
ZMQSC START	Changed	Updated to allow you to enable receiver channels that were previously disabled by the ZMQSC STOP command.
ZMQSC STOP	Changed	Updated to allow you to disable receiver channels.
ZMQSC SWQ	Changed	Updated to allow chained requests.
ZMQSC TRACE	Changed	Updated for the enhanced TPF MQSeries trace.

Messages and System Errors

Table 626 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 626. Changes to Messages and System Errors for TPF MQSeries Local Queue Manager Support Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0008I	Online	New
MQSC0011I	Online	No Longer Supported
MQSC0012E	Online	New
MQSC0013E	Online	New
MQSC0014I	Online	New
MQSC0021E	Online	No Longer Supported
MQSC0022E	Online	No Longer Supported
MQSC0028I	Online	New
MQSC0029I	Online	New
MQSC0030I	Online	New
MQSC0031I	Online	New
MQSC0032I	Online	New
MQSC0033I	Online	New
MQSC0034E	Online	New
MQSC0035E	Online	New
MQSC0036W	Online	New
MQSC0046W	Online	New
MQSC0047I	Online	New
MQSC0048I	Online	New
MQSC0049I	Online	New
MQSC0051E	Online	New
MQSC0052I	Online	Changed
MQSC0053E	Online	New
MQSC0056I	Online	New
MQSC0073E	Online	New
MQSC0075E	Online	No Longer Supported
MQSC0076E	Online	No Longer Supported
MQSC0078E	Online	Changed
MQSC0079E	Online	Changed
MQSC0085I	Online	New
MQSC0114E	Online	No Longer Supported

Table 626. Changes to Messages and System Errors for TPF MQSeries Local Queue Manager Support Enhancements (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0119E	Online	No Longer Supported
MQSC0122E	Online	No Longer Supported
MQSC0133E	Online	New
MQSC0134E	Online	New
MQSC0150I	Online	New
MQSC0158I	Online	No Longer Supported
MQSC0160I	Online	No Longer Supported
MQSC0161I	Online	No Longer Supported
MQSC0162E	Online	Changed
MQSC0165E	Online	New
MQSC0166E	Online	New
MQSC0177I	Online	New
MQSC0204I	Online	New
MQSC0333E	Online	New
MQSC0334E	Online	New
MQSC0335I	Online	New
MQSC0336E	Online	New
MQSC0337I	Online	New
MQSC0338E	Online	New
MQSC0339E	Online	New
MQSC0340E	Online	New
MQSC0501E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 627 on page 623 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 627. Changes to TPF Publications for TPF MQSeries Local Queue Manager Support Enhancements

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0A	Updated with information about the C language functions that were added and changed for TPF MQSeries local queue manager support enhancements.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF MQSeries local queue manager support enhancements.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG200	Updated with migration considerations for TPF MQSeries local queue manager support enhancements.
<i>TPF Operations</i>	GTPOPR0A	Updated with information about the commands that were added and changed for TPF MQSeries local queue manager support enhancements.
<i>TPF Program Development Support Reference</i>	GTPPDV0A	Updated with information about the trace function that was enhanced for TPF MQSeries local queue manager support enhancements.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedures to install TPF MQSeries local queue manager support enhancements on your existing TPF 4.1 system.

1. Install program update tape (PUT) 10.
2. Use the IBM OS/390 C/C++ Version 2 Release 4 compiler or later version or release to compile all non-OCO programs in the following build scripts: CMQLBS, CMQRBS, CMQSBS, CUIEBS, CUIFBS, CUIKBS, CUIMBS, CUIRBS, CUIUBS, CUIXBS, CUSCBS. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.
3. Use the CMQSBS build script to link-edit the CMQS DLL, which produces the CMQS definition side-deck.
4. Use the CMQS definition side-deck to link-edit the following DLMs: CMQL, CMQR, CUIE, CUIF, CUIK, CUIM, CUIR, CUIU, CUIX, CUSC.
5. Link-edit the CMQMPP offline trace program by using the system initialization program (SIP) generated job control language (JCL). The CMQMPP program does not require prelinking because the program is compiled with the NORENT and NOLONGNAME options.
6. Compile the Message Queue Interface (MQI) client modules contained in the CMQI, CMQ1, CMQ2, and CMQ3 DLMs. Link-edit these DLMs. See "Message

Queue Interface (MQI) Client (APAR PJ22434)” on page 268 for more information about the MQI client modules.

7. Do the following for any MQI client application programs that currently call the MQINQ and MQSET functions:
 - a. Use the DLL option to recompile the application programs.
 - b. Modify the prelink step to import the CMQS definition side-deck for the application programs.
 - c. Link-edit the application programs.
8. Enter **ZMQSC STOP QMGR** to stop the TPF MQSeries queue manager.
9. Load the new versions of the MQSeries programs or activate a loadset that contains the MQSeries programs.
10. Enter **ZMQSC START QMGR** to restart the TPF MQSeries queue manager.

Additional Information: See *TPF Operations* for more information about the ZMQSC START and ZMQSC STOP commands.

Program Update Tape 11 (PUT 11)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 11 (PUT 11).

SPE	Where to Go For More Information
TCP/IP Native Stack Support	"TCP/IP Native Stack Support (APAR PJ26683)" on page 626
Coupling Facility Record Lock Support	"Coupling Facility (CF) Record Lock Support (APAR PJ26707)" on page 646
Remote Procedure Call	"Remote Procedure Call (APAR PJ26575)" on page 667
Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements	"Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements (APAR PJ26693)" on page 679
Tape Record Migration	"Tape Record Migration (APAR PJ26577)" on page 690
TPF Support for VisualAge Client	"TPF Support for VisualAge Client (APARs PJ26600, PJ26581, and PJ26666)" on page 700

TPF 4.1 PUT 11 is compiled with the IBM OS/390 C/C++ Version 2 Release 6 compiler; you must use this level of the compiler if you change segments that are linked to object code that is shipped by IBM. The IBM OS/390 C/C++ Version 2 Release 6 compiler is not required to install PUT 11 because C load modules are link-edited and shipped in partitioned data set (PDS) ACP.LINK.OCO40.

Before loading APAR PJ26686 for multiple module copy support, alter keypoint 6 in each subsystem by adding 20 to the CJ6TOT field. Otherwise, you would have to load a new keypoint 6, which would require you to shut down your processor complex. Once you have altered keypoint 6, load the multiple module copy support code onto all processors in your processor complex before using multiple module copy support.

See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

TCP/IP Native Stack Support (APAR PJ26683)

The following section discusses the migration considerations for TCP/IP native stack support.

Prerequisite APARs

See the APEDIT for APAR PJ26683 for information about prerequisite APARs.

Functional Overview

TCP/IP native stack support provides the following benefits to the TPF 4.1 system:

- Direct connectivity to Internet Protocol (IP) networks
- Improved network throughput
- Support for more socket options
- Support for a new TPF-unique socket application programming interface (API) function
- Support for a full function IP trace facility.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about TCP/IP native stack support.

Direct Connectivity

Before TCP/IP native stack support, the TPF 4.1 system was required to communicate through a TCP/IP offload device to connect to IP networks. The TPF 4.1 system used the Common Link Access to Workstation (CLAW) protocol to communicate with special software (the offload server) in the offload device, which would then use the TCP/IP stack in the offload device to communicate with the IP networks using standard IP protocols. With TCP/IP native stack support, the TCP/IP stack now resides in the TPF 4.1 system, allowing the TPF 4.1 system to directly connect to IP routers using standard IP protocols.

Improved Network Throughput

Before TCP/IP native stack support, when a TPF application issued a socket API function, the function call was sent to the TCP/IP offload device, processed there, and the TPF application had to wait for the call to be completed. For example, if a TPF application issued a send function call to send data on a socket, the following occurred:

1. The send function call was sent to the TCP/IP offload device by using the CLAW protocol.
2. The application entry control block (ECB) was suspended, waiting for send function processing to be completed.
3. The TCP/IP offload device received the send function call and passed it to the offload server software code.
4. The offload server code issued the send function call with the same parameters specified by the TPF application.
5. The TCP/IP stack in the offload device processed the send function call and passed the return code to the offload server code.
6. The offload server code sent the return code of the send function call back to the CLAW protocol.
7. The TCP/IP offload device sent the data from the send function call to the IP network.
8. The TPF 4.1 system received the send function return code information through the CLAW protocol.

9. The TPF application ECB was activated and the return code from the send function call was passed to the application.

With TCP/IP native stack support, all socket API function calls are processed locally, which improves performance. Now, if a TPF application issues a socket send function call, the following occurs:

1. The TCP/IP stack in the TPF 4.1 system processes the send function call and passes the return code back to the TPF application.
2. The TPF 4.1 system sends the data from the send function call to the IP network.

Socket Options

TCP/IP offload support provided support for a subset of the socket options. TCP/IP native stack support provides support for additional socket options that allow you to do the following:

- Set the send buffer size and receive buffer size for a given socket, so you can tune the flow control mechanisms of the network and limit the amount of main storage used by a TPF socket application.
- Set the receive low-water mark for TCP sockets, which causes the TPF 4.1 system code to put large messages received from the network back together before passing them to the application rather than forcing the application to issue multiple read function calls and rebuild the messages itself.
- Specify timeout values on all blocking function calls, including: read, recv, recvfrom, activate_on_receipt, send, sendto, write, writev, accept, and activate_on_accept. Before TCP/IP native stack support, the select function call was the only socket function that had a timeout capability.

Socket API Function

TCP/IP native stack support provides a new TPF-unique socket API function called `activate_on_accept`, which performs the same function as the standard `accept` function, but has the following advantages:

- The application ECB is not suspended in the TPF 4.1 system while waiting for remote clients to connect.
- There are no long-running server ECBs in the TPF 4.1 system, which allows E-type loader operations to be completed successfully.
- There is a parameter that allows you to balance the work across all I-streams.

IP Trace Facility

TCP/IP native stack support provides a full function IP trace facility that allows you to do the following:

- Select which IP packets to trace
- Set the amount of data from each IP packet to place in the IP trace table
- Display the main storage copy of the IP trace table, either as compact data or formatted data
- Write the IP trace data to real-time tape and postprocess the data offline.

Architecture

A TCP/IP stack contains the following components:

- Socket layer, which begins processing socket API functions issued by the application.
- TCP layer, which processes data for stream sockets.
- UDP layer, which processes data for datagram sockets.

- IP layer, which sends and receives IP packets. The Internet Control Message Protocol (ICMP) component is included in the IP layer.
- One or more link layers, which transfer packets to and from the network.

TCP/IP native stack support uses the IP over CDLC link layer, which allows the TPF 4.1 system to connect to the following IP routers:

- IBM 3745 Communications Controller
- IBM 3746 Model 900 (3746-900) or Model 950 (3746-950) Communications Controller.

Figure 8 shows the TCP/IP layers that reside in the TPF host and those that reside in the 3745 or 3746 IP router.

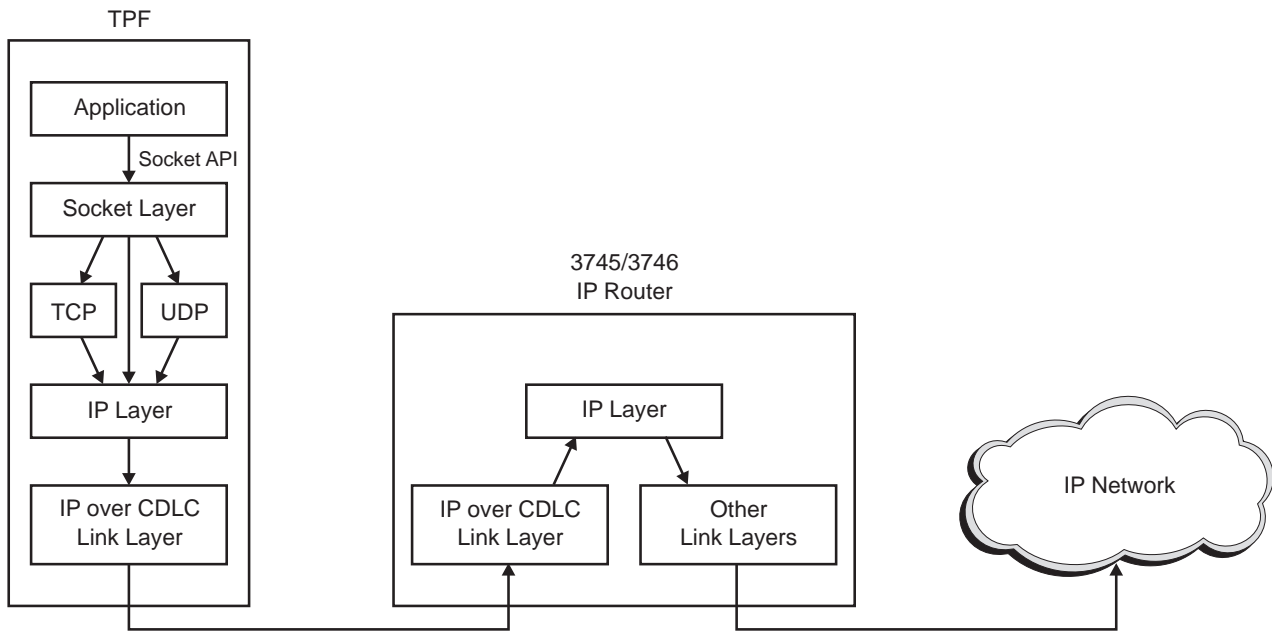


Figure 8. TCP/IP Layers

TCP/IP native stack support also includes a loopback interface referred to as *local sockets*. This enables a socket client application to communicate with a socket server application running in the same TPF 4.1 system without having any network connections.

Without TCP/IP native stack support, data sent by remote socket applications remains queued in the offload devices until the TPF socket application requests the data with a read function call. This can limit throughput, especially for sockets where large amounts of data are flowing. With TCP/IP native stack support, data sent by remote socket applications flows into the TPF 4.1 system and is queued there until the TPF socket application requests the data. In this model, data can be delivered to the TPF socket application as fast as the data is sent through the network.

In an IP network, a node can be either a host or a router. The TPF 4.1 system is an IP host; therefore, packets destined for TPF socket applications are the only packets sent by IP routers to the TPF 4.1 system.

The TPF 4.1 system can be connected to one or more IP networks. Each TPF host processor can have one or more local IP addresses defined. If a TPF processor is connected to multiple IP networks, a different local IP address is needed for each IP network. IP addresses must be unique per TPF host. Each TPF host in a loosely coupled complex must have different local IP addresses defined.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about TCP/IP native stack support.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TCP/IP native stack support, you must establish the required operating environment. The following section describes hardware and software requirements specific to TCP/IP native stack support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

TCP/IP native stack support supports the following communication control units:

- IBM 3745 Communications Controller, which is channel-attached to the TPF 4.1 system using a parallel channel adapter
- IBM 3746-900 or 3646-950 Communications Controller, which is channel-attached to the TPF 4.1 system using an IBM Enterprise Systems Connection (ESCON) channel adapter.

Software (Programming Requirements)

The TPF 4.1 system can connect to the following devices:

- IBM 3745 Communications Controller with IBM NCP Version 7 Release 2 or later release
- IBM 3746-900 or 3746-950 Communications Controller with the IP feature installed.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 628 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 628. Changes to Build Scripts for TCP/IP Native Stack Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
COMXBS	DLM	Changed	Updated to support the <code>activate_on_accept</code> function.
CSF4BS	DLM	New	Build script for the ZIPTR command.

Table 628. Changes to Build Scripts for TCP/IP Native Stack Support (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
UACCBS	DLM	New	Build script for the TCP/IP native stack support accept connection user exit (UACC).
USOKBS	DLM	New	Build script for the select TCP/IP support user exit (USOK).

Dynamic Load Module (DLM) Stubs: Table 629 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 629. Changes to Dynamic Load Module (DLM) Stubs for TCP/IP Native Stack Support

DLM Stub	New, Changed, or No Longer Supported?
UACC	New
USOK	New

General Use C/C++ Language Header Files: Table 630 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 630. Changes to General Use C/C++ Language Header Files for TCP/IP Native Stack Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	Changed	No
c\$eb0eb.h	Changed	No
c\$syseq.h	Changed	No
socket.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 631 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 631. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TCP/IP Native Stack Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$iphd.h	New	Yes
i\$netd.h	Changed	No
i\$pwbl.h	New	Yes

Library Interface Scripts: Table 632 on page 631 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 632. Changes to Library Interface Scripts for TCP/IP Native Stack Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	Changed	Added the activate_on_accept function.

Library Members (Object Files): Table 633 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 633. Changes to Library Members (Object Files) for TCP/IP Native Stack Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C511	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C512	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C513	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C514	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C515	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C516	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C517	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C518	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C519	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C520	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C524	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C525	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C528	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C529	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C530	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C531	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C532	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C533	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C534	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C536	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support. Also, updated for APAR PJ26730.

Table 633. Changes to Library Members (Object Files) for TCP/IP Native Stack Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C537	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support.
C538	COMX	Changed	C Language	Added socket checks for TCP/IP native stack support. Also, updated for APAR PJ26730.
CAOACC	COMX	New	C Language	Added the activate_on_accept function for TCP/IP native stack support.

Link-Edited Modules: Table 634 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 634. Changes to Link-Edited Modules for TCP/IP Native Stack Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CPS0	Changed	Added the new CCTCP1, CCTCP2, and CCTCP3 CSECTs.

Members (Object Files): Table 635 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 635. Changes to Members (Object Files) for TCP/IP Native Stack Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CINET1	CLTV	Changed	C Language	Added checks for no TCP/IP support.
CINET3	CLTW	Changed	C Language	Added checks for no TCP/IP support.
CINET5	CLTV, CLTY, CMAT, CMQS	Changed	C Language	Added checks for no TCP/IP support.
CINET6	CTFT	Changed	C Language	Added checks for no TCP/IP support.
CLTN	CLTN	Changed	C Language	Updated for ZDTCP command changes for the NETSTAT parameter.
CLTR	CLTR	Changed	C Language	CLTR allocates the NETSTAT table if either or both offload support or native stack is genned. Also, updated for APAR PJ26730.
CLTS	CLTN	Changed	C Language	Updated for ZDTCP command changes for the NETSTAT parameter.
CSF4	CSF4	New	C Language	The format display for the ZIPTR command.

Object Code Only (OCO) Stubs: Table 636 on page 633 summarizes changes to stubs that are object code only (OCO) only. This information is presented in alphabetic order by the name of the OCO stub.

Table 636. Changes to OCO Stubs for TCP/IP Native Stack Support

Object Code Only (OCO) Stub	New, Changed, or No Longer Supported?
CTSA	New
CTSB	New
CTSI	New
CTSJ	New
CTS0	New
CTS1	New
CTS2	New
CTS3	New
CTS4	New
CTS5	New
CTS6	New
CTS7	New
CTS8	New
CTS9	New

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 637 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 637. Changes to Copy Members for TCP/IP Native Stack Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCPU	Control Program	CCNUCL	Not Applicable	Changed	Added the TCP/IP native stack support polling switch.
CIEF	Control Program	CCCIEF	Not Applicable	Changed	Updated for changes to the POSTC macro address space.
CHSZ	Control Program	CCNUCL	Not Applicable	Changed	Updated to clear the CE2TCPIP field when the entry control block (ECB) is created.
CLHL	Control Program	CCCLHR	Not Applicable	Changed	Updated to run Internet Protocol (IP) scan and polling.
CMFL	Control Program	CCMCDC	Not Applicable	Not Applicable	This copy member was not updated, but changes were made to the IBMSVC macro, which this copy member calls. The CCMCDC CSECT must be reassembled.
CPSE	Control Program	CCCPSE	Not Applicable	Changed	Updated for TCP/IP native stack support dump formatting.
CTI1	Control Program	CCTCP2	Not Applicable	New	IP Opzero processor.
CTI2	Control Program	CCTCP2	Not Applicable	New	TCP Opzero processor.
CTI3	Control Program	CCTCP2	Not Applicable	New	UDP Opzero processor.
CTI4	Control Program	CCTCP2	Not Applicable	New	RAW Opzero processor.
CTME	Control Program	CCNUCL	Not Applicable	Changed	Updated to set the TCP/IP native stack support polling switch.

Table 637. Changes to Copy Members for TCP/IP Native Stack Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CTSM	Control Program	CCTCP3	Not Applicable	New	TCP/IP native stack support block management routines.
CTSS	Control Program	CCTCP3	Not Applicable	New	IP scan routines.
CTTA	Control Program	CCTCP1	Not Applicable	New	IP channel data link control (CDLC) sense interrupt routine.
CTTO	Control Program	CCTCP1	Not Applicable	New	IPSDC macro handler.
CTT1	Control Program	CCTCP1	Not Applicable	New	IP CDLC polling routine.
CTT3	Control Program	CCTCP1	Not Applicable	New	IP CDLC read interrupt routine.
CTT5	Control Program	CCTCP1	Not Applicable	New	IP CDLC interrupt routine.
CTT6	Control Program	CCTCP1	Not Applicable	New	TCP/IP native stack support trace processor.
CTT8	Control Program	CCTCP1	Not Applicable	New	IP CDLC write interrupt routine.
CTX0	Control Program	CCTCP1	Not Applicable	New	IP CDLC build/issue exchange identification (XID) commands.
CTX1	Control Program	CCTCP1	Not Applicable	New	IP CDLC XID interrupt routine.
CTX2	Control Program	CCTCP1	Not Applicable	New	IP CDLC process XID information routine.
CT15	Control Program	CCCTIN	Not Applicable	Changed	Updated to allocate storage for TCP/IP native stack support tables.

Fixed File Records

Table 638 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 638. Changes to Fixed File Records for TCP/IP Native Stack Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMMP4	Changed	Updated with ordinal 1 for the Internet Protocol (IP) configuration record.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 639 summarizes changes to the communication macros. This information is presented in alphabetic order by the name of the communication macro or statement.

Table 639. Changes to Communication Macros and Statements for TCP/IP Native Stack Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 640 on page 635 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 640. Changes to Data Macros for TCP/IP Native Stack Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
DCTSWC	Changed	No
IPCCW	New	Not Applicable
IPMTE	New	Not Applicable
IPWBL	New	Not Applicable
ISOCK	New	Not Applicable
ISTAK	New	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: Table 641 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 641. Changes to Selected Equate Macros for TCP/IP Native Stack Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CVTEQ	Changed	No
CZ1SE	Changed	No
IEQCE2	Changed	No
SNAEQ	Changed	No
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 642 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 642. Changes to SIP Skeleton and Internal Macros for TCP/IP Native Stack Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 643 on page 636 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 643 for a description of other system generation changes you must make.

Table 643. Changes to SIP Stage I Macros and Statements for TCP/IP Native Stack Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 644 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 644. Changes to SIP Stage II Macros for TCP/IP Native Stack Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 645 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 645. Changes to System Macros for TCP/IP Native Stack Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IBMSVC	Changed	Yes
IDATB	Changed	Yes

System Macros (IBM Use Only): Table 646 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 646. Changes to System Macros (IBM Use Only) for TCP/IP Native Stack Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
DLTEC	Changed	Yes
IPSDC	New	Not Applicable

Segments

Table 647 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 647. Changes to Segments for TCP/IP Native Stack Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCTCP1	CSECT	Not Applicable	New	Build output messages and input/output (I/O) handling for TCP/IP native stack support.
CCTCP2	CSECT	Not Applicable	New	Opzero processor for TCP/IP native stack support.
CCTCP3	CSECT	Not Applicable	New	Internet Protocol (IP) scan and resource management for TCP/IP native stack support.

Table 647. Changes to Segments for TCP/IP Native Stack Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLC0	Real-Time Assembler	Not Applicable	Changed	Updated to no longer allocate the NETSTAT table.
CPLKMP	CSECT	CPS0	Changed	Added CCTCP1, CCTCP2, and CCTCP3 to the linkmap.
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated with new ZNKEY command parameters.
CTF0	Real-Time Assembler	Not Applicable	New	ZIPTR command processor.
CTF1	Real-Time Assembler	Not Applicable	New	ZTTCP command parser.
CTF2	Real-Time Assembler	Not Applicable	New	ZTTCP command processor for the DEFINE, CHANGE, and DELETE parameters.
CTF3	Real-Time Assembler	Not Applicable	New	ZTTCP command processor for the TRACE parameter.
CTF4	Real-Time Assembler	Not Applicable	New	ZTTCP command processor for the ACTIVATE and INACTIVATE parameters.
CTF5	Real-Time Assembler	Not Applicable	New	ZTTCP command processor for the DISPLAY parameter.
CTKR	Real-Time Assembler	Not Applicable	Changed	Updated to call TCP/IP native stack support cycle-down code.
CTKS	Real-Time Assembler	Not Applicable	Changed	Updated to call TCP/IP native stack support restart.
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated to start the TCP/IP native stack support socket sweeper during cycle-up.
CTSA	Real-Time Assembler	Not Applicable	New	activate_on_receipt function processor.
CTSB	Real-Time Assembler	Not Applicable	New	activate_on_accept function processor.
CTSC	Real-Time Assembler	Not Applicable	New	activate_on_receipt function processor. Also, updated for APAR PJ26730.
CTSG	Real-Time Assembler	Not Applicable	New	activate_on_accept function processor. Also, updated for APAR PJ26730.
CTSI	Real-Time Assembler	Not Applicable	New	ioctl1 function processor.
CTSJ	Real-Time Assembler	Not Applicable	New	getsockname, getpeername, gethostid, and gethostname function processor.
CTSK	Real-Time Assembler	Not Applicable	New	TCP/IP native stack support cycle-down.
CTSN	Real-Time Assembler	Not Applicable	New	Added for changes to the NETSTAT parameter of the ZDTCP command.
CTSQ	Real-Time Assembler	Not Applicable	New	Added TCP/IP support for common (offload and native stack) restart.
CTSR	Real-Time Assembler	Not Applicable	New	TCP/IP native stack support restart processing.
CTSU	Real-Time Assembler	Not Applicable	New	read and recvfrom function processing.
CTSW	Real-Time Assembler	Not Applicable	New	TCP/IP native stack support socket sweeper.
CTS0	Real-Time Assembler	Not Applicable	New	socket function processor.

Table 647. Changes to Segments for TCP/IP Native Stack Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CTS1	Real-Time Assembler	Not Applicable	New	bind function processor.
CTS2	Real-Time Assembler	Not Applicable	New	connect function processor.
CTS3	Real-Time Assembler	Not Applicable	New	listen function processor.
CTS4	Real-Time Assembler	Not Applicable	New	accept function processor.
CTS5	Real-Time Assembler	Not Applicable	New	getsockopt and setsockopt function processor.
CTS6	Real-Time Assembler	Not Applicable	New	close and shutdown function processor.
CTS7	Real-Time Assembler	Not Applicable	New	read, recv, and recvfrom function processor.
CTS8	Real-Time Assembler	Not Applicable	New	send, sendto, and write function processor.
CTS9	Real-Time Assembler	Not Applicable	New	select function processor.
CTX3	Real-Time Assembler	Not Applicable	New	TCP/IP native stack support exchange identification (XID) link messages. Also, updated for APAR PJ26730.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated to add the ZIPTR and ZTTCP commands.
IPTPRT	Offline C Language	IPTPRT	New	IP trace facility for TCP/IP native stack support.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 648 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 648. Changes to SYSEQ Tags for TCP/IP Native Stack Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#IPCFG	X'01'	New

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 649. Changes to ECB User Exits for TCP/IP Native Stack Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
TCP/IP Native Stack Support Accept Connection	C511	UACC	New	Verifies a remote client connection request.
Select TCP/IP Support	C536	USOK	New	Allows you to select TCP/IP native stack support or TCP/IP offload support.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 650 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 650. Changes to Commands for TCP/IP Native Stack Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZDTCP	Changed	Changed the display for the NETSTAT parameter.
ZIPTR	New	Displays the Internet Protocol (IP) trace table.
ZNKEY	Changed	Added new parameters for TCP/IP native stack support.
ZTTCP ACTIVATE	New	Activates IP routers.
ZTTCP CHANGE	New	Changes local IP address association.
ZTTCP DEFINE	New	Defines an IP router or local IP address.
ZTTCP DELETE	New	Deletes an IP router or local IP address.
ZTTCP DISPLAY	New	Displays IP routers, local IP addresses, or resources used by TCP/IP native stack support.
ZTTCP INACTIVATE	New	Deactivates IP routers.
ZTTCP TRACE	New	Starts or stops the IP trace facility.

Messages and System Errors

Table 651 on page 640 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 651. Changes to Messages and System Errors for TCP/IP Native Stack Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007801	System Error	New
007802	System Error	New
007804	System Error	New
007805	System Error	New
007806	System Error	New
007807	System Error	New
CTSR0001I	Online	New
CTSR0002I	Online	New
DTCP0041E	Online	No Longer Supported
DTCP0043E	Online	New
DTCP0045E	Online	New
INET0075E	Online	New
IPTR0001I	Online	New
IPTR0002I	Online	New
IPTR0005I	Online	New
IPTR0007E	Online	New
IPTR0008E	Online	New
IPTR0009I	Online	New
IPTR0010E	Online	New
IPTS0000I	Offline	New
IPTS0001E	Offline	New
IPTS0002E	Offline	New
IPTS0003E	Offline	New
IPTS0004E	Offline	New
IPTS0005E	Offline	New
IPTS0006E	Offline	New
IPTS0007E	Offline	New
IPTS0008E	Offline	New
IPTS0009E	Offline	New
IPTS0010E	Offline	New
IPTS0011E	Offline	New
TTCP0001I	Online	New
TTCP0002I	Online	New
TTCP0003I	Online	New
TTCP0004I	Online	New
TTCP0005I	Online	New
TTCP0006I	Online	New
TTCP0007I	Online	New
TTCP0010I	Online	New
TTCP0011I	Online	New
TTCP0012I	Online	New
TTCP0013I	Online	New
TTCP0014I	Online	New
TTCP0015I	Online	New

Table 651. Changes to Messages and System Errors for TCP/IP Native Stack Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
TTCP0016I	Online	New
TTCP0017I	Online	New
TTCP0018I	Online	New
TTCP0019I	Online	New
TTCP0020I	Online	New
TTCP0021I	Online	New
TTCP0022I	Online	New
TTCP0030I	Online	New
TTCP0031I	Online	New
TTCP0032I	Online	New
TTCP0033I	Online	New
TTCP0040I	Online	New
TTCP0041I	Online	New
TTCP0042I	Online	New
TTCP0043I	Online	New
TTCP0045I	Online	New
TTCP0047I	Online	New
TTCP0090W	Online	New
TTCP0091W	Online	New
TTCP0100E	Online	New
TTCP0101E	Online	New
TTCP0102E	Online	New
TTCP0103E	Online	New
TTCP0104E	Online	New
TTCP0105E	Online	New
TTCP0106E	Online	New
TTCP0110E	Online	New
TTCP0111E	Online	New
TTCP0112E	Online	New
TTCP0113E	Online	New
TTCP0114E	Online	New
TTCP0115E	Online	New
TTCP0116E	Online	New
TTCP0117E	Online	New
TTCP0118E	Online	New
TTCP0120E	Online	New
TTCP0121E	Online	New
TTCP0122E	Online	New
TTCP0125E	Online	New
TTCP0126E	Online	New
TTCP0127E	Online	New
TTCP0128E	Online	New
TTCP0129E	Online	New

Table 651. Changes to Messages and System Errors for TCP/IP Native Stack Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
TTCP0130E	Online	New
TTCP0131E	Online	New
TTCP0201E	Online	New
TTCP0202E	Online	New
TTCP0203I	Online	New
TTCP0204E	Online	New
TTCP0205E	Online	New
TTCP0206E	Online	New
TTCP0207E	Online	New
TTCP0208W	Online	New
TTCP0209E	Online	New
TTCP0210E	Online	New
TTCP0211I	Online	New
TTCP0212E	Online	New
TTCP0213E	Online	New
TTCP0214E	Online	New
TTCP0215E	Online	New
TTCP0216E	Online	New
TTCP0217E	Online	New
TTCP0218E	Online	New
TTCP0219E	Online	New
TTCP0220E	Online	New
TTCP0221E	Online	New
TTCP0222E	Online	New

Performance or Tuning Changes

Use the ZTTCP DISPLAY command and the IP trace facility (the ZIPTR command or the offline IPTPRF facility) to monitor your TPF 4.1 system and the IP network. Some things to look for include:

- The maximum number of socket block entries used since the last IPL
- The maximum number of IP message table (IPMT) entries used since the last IPL
- The number of IP packets that are sent and received in the same channel program and the size of the read buffer
- The number IP fragments received and the maximum packet size.

Use the SNAKEY macro to define or change the number of socket block entries, IPMT entries, and read buffers. Use the ZTTCP DEFINE and ZTTCP CHANGE commands to define and change the maximum packet size.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about performance and tuning considerations for TCP/IP native stack support. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro. See *TPF Operations* for more information about the ZIPTR and the ZTTCP commands.

Storage Considerations and Changes

Use the SNAKEY macro to define the size of the main storage tables used by TCP/IP native stack support. See *TPF Transmission Control Protocol/Internet Protocol* for more information about how to determine the size of these tables.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 652 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 652. Changes to TPF Publications for TCP/IP Native Stack Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF0A	Updated with information about new SNAKEY macro parameters for TCP/IP native stack support.
<i>TPF Concepts and Structures</i>	GTPCON08	Updated with information about TCP/IP native stack support.
<i>TPF Library Guide</i>	GTPDOC0B	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TCP/IP native stack support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for TCP/IP native stack support.
<i>TPF Operations</i>	GTPOPR0B	Updated with information about the commands that were added and changed for TCP/IP native stack support.
<i>TPF Program Development Support Reference</i>	GTPPDR0B	Updated with information about new dump labels for TCP/IP native stack support.
<i>TPF System Generation</i>	GTPSYG0B	Updated with information about TCP/IP native stack support.
<i>TPF System Installation Support Reference</i>	GTPINR0B	Updated with information about new user exits for TCP/IP native stack support.
<i>TPF System Macros</i>	GTPSYS0B	Updated with information about new and changed system macros for TCP/IP native stack support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW07	Updated with information about TCP/IP native stack support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Existing TPF socket applications that are using TCP/IP offload support do not require changes to use TCP/IP native stack support. However, you may need to change the local IP address to which the TPF application binds. With TCP/IP offload support, the TPF application binds to the IP address of the offload device. With TCP/IP native stack support, the TPF application binds to the IP address of the TPF

host itself. If you have socket client applications or socket server applications in your TPF 4.1 system that bind to a specific IP address, you may need to change the IP address to which they bind.

TCP/IP native stack support provides support for additional socket options. Your socket applications must issue the `setsockopt` function call to enable the new options for that socket.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TCP/IP native stack support on your existing TPF 4.1 system:

1. Install program update tape (PUT) 11.
2. Define the following parameters on the SNAKEY macro in keypoint 2 (CTK2):
 - MAXSOCK
 - MAXIPCCW
 - IPRBUFFS
 - IPRBUFSZ
 - IPMTSIZE
 - SOCKSWP.
3. Code the select TCP/IP support user exit (USOK) and the TCP/IP native stack support accept connection user exit (UACC), if necessary.
4. Load the updated CTK2 to your TPF 4.1 system.
5. IPL the TPF 4.1 system and cycle to 1052 state.
6. Define the local IP addresses to the TPF 4.1 system by using the ZTTCP DEFINE command.
7. Define the IP routers to the TPF 4.1 system by using the ZTTCP DEFINE command.
8. Enter the ZTTCP TRACE command to do the following:
 - Activate the IP trace facility.
 - Select which resources to trace.
 - Set the amount of data to trace.
 - Set whether or not to write IP trace data to a real-time tape.
9. Activate the IP routers by using the ZTTCP ACTIVATE command.
10. Cycle the TPF 4.1 system to NORM state.
11. Activate your socket applications.

Additional Information:

- See *TPF Transmission Control Protocol/Internet Protocol* for more information about the following:

- Determining the appropriate values for the SNAKEY macro parameters
- Defining local IP addresses and IP routers
- Using the IP trace facility
- Activating IP routers
- Activating socket applications.
- See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.
- See *TPF Operations* for more information about the ZTTCP commands.

Fallback Scenarios

To disable TCP/IP native stack support, do **one** of the following:

- Do the following:
 1. Set the following SNAKEY macro parameters to 0 in keypoint record 2 (CTK2):
 - MAXSOCK
 - MAXIPCCW
 - IPMTSIZE.
 2. Reassemble CTK2 against the SNAKEY macro.
 3. Reload CTK2.
 4. IPL the TPF 4.1 system again.
- Load a new version of the select TCP/IP support user exit (USOK), specifying TCP/IP offload support. This allows you to leave TCP/IP native stack support defined in the TPF 4.1 system.

See *TPF System Installation Support Reference* for more information about USOK.

Coupling Facility (CF) Record Lock Support (APAR PJ26707)

The following section discusses the migration considerations for coupling facility record lock support (referred to as CF record lock support throughout this section).

Prerequisite APARs

See the APEDIT for APAR PJ26707 for information about prerequisite APARs.

Functional Overview

The limited lock facility (LLF) and the concurrency filter lock facility (CFLF), which are two external lock facilities (XLFs) supported by the TPF 4.1 system, were required to control access to data shared by two or more processors in a loosely coupled complex. CF record lock support now provides the option of using one or more CFs as XLFs. A CF is an IBM processor (sometimes referred to as a central processing complex (CPC)) used to centralize storage for all attached processors in a processor configuration by providing shared storage and shared storage management functions.

CF record lock support offers significant flexibility in using CFs as XLFs in your locking configuration. Your locking configuration may be dynamically modified by adding or deleting CFs. When a CF is added to or deleted from the locking configuration, the TPF 4.1 system automatically redistributes any locks to balance the locking workload across all available CFs. You can add up to 32 CFs to your locking configuration for a high degree of availability. The CFs in your locking configuration can be used in addition to or instead of LLF and CFLF. In addition, the CFs in your locking configuration can simultaneously be used for nonlocking workloads. Using CFs in a locking configuration can eliminate the need for LLF or CFLF, giving you greater flexibility when selecting and implementing new module control units (CUs).

All online modules in a loosely coupled complex must use an XLF for locking to control access to shared data. You may specify which online modules will use CFs for locking even if a specified module is connected to a CU with an LLF or CFLF. Modules may be migrated to use CFs for locking in one of the following manners:

- Individually
- In groups
- All online modules at once.

Note that the lock residency of any duplicate module is configured automatically to be identical to that of the corresponding prime module.

Architecture

CF record lock support uses the CF support provided on program update tape (PUT) 9 to implement an XLF. See “Coupling Facility (CF) Support (APAR PJ25781)” on page 450 for more information about the CF support provided on PUT 9.

In a loosely coupled complex, locks are used to control access to data shared by two or more processors. With CF record lock support, these locks can now be represented as entries in a CF list structure. A *CF list structure* is a named piece of storage on a CF that enables users to share information organized as entries on a set of lists or queues.

Operating Environment Requirements and Planning Information

See the *S/390 Processor Resource/Systems Manager Planning Guide* for information about CF planning and operating environment requirements.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 653 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 653. Changes to Build Scripts for CF Record Lock Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CFLABS	DLM	New	Created by CF record lock support.
CFLBBS	DLM	New	Created by CF record lock support.
CFLCBS	DLM	Changed	Updated by CF record lock support.
CFLEBS	DLM	New	Created by CF record lock support.
CFLGBS	DLM	New	Created by CF record lock support.
CFLKBS	DLM	New	Created by CF record lock support.
CFLNBS	DLM	Changed	Updated by CF record lock support for the ZMCFT CLEAR service routine.
CFL5BS	DLM	New	Created by CF record lock support.
CFL6BS	DLM	New	Created by CF record lock support.
CLM8BS	DLM	New	Created by CF record lock support.
CTALBS	DLM	Changed	Updated by CF record lock support for the ISO-C TPF application programming interface (API).

Dynamic Load Module (DLM) Stubs: Table 654 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 654. Changes to Dynamic Load Module (DLM) Stubs for CF Record Lock Support

DLM Stub	New, Changed, or No Longer Supported?
CFL5	New
CFL6	New
CFMA	New

General Use C/C++ Language Header Files: Table 655 on page 648 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 655. Changes to General Use C/C++ Language Header Files for CF Record Lock Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cfaa.h	Changed	No
c\$cfct.h	Changed	No
c\$cfdl.h	New	No
c\$cfef.h	Changed	No
c\$cfep.h	New	No
c\$cfel.h	New	No
c\$cfet.h	New	No
c\$cfel.h	New	No
c\$cfst.h	Changed	No
c\$cf2e.h	New	No
c\$cinfc.h	Changed	No
c\$cj6kp.h	Changed	No
c\$copy.h	New	No
c\$faapi.h	Changed	No
c\$fa0.h	Changed	No
c\$ic0ck.h	Changed	No
c\$ipli.h	New	No
c\$mfst.h	Changed	No
c\$miob.h	Changed	Yes
c\$pi1dt.h	Changed	No
c\$syseq.h	Changed	No
c\$sonf.h	Changed	No
reusable.h	Changed	No
sysapi.h	Changed	No
tpfapi.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 656 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 656. Changes to Library Interface Scripts for CF Record Lock Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Updated by CF record lock support for the ISO-C TPF application programming interface (API) library.

Library Members (Object Files): Table 657 on page 649 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 657. Changes to Library Members (Object Files) for CF Record Lock Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CLEMIC	CTAL	New	Assembler	Created by CF record lock support for the tpf_lemic function.
CSERRC	CTAL	Changed	Assembler	Updated by CF record lock support to add a SERRC macro catastrophic option.
CDLCKC	CTAL	New	Assembler	Created by CF record lock support for the tpf_d1ckc function.
CESFAC	CTAL	Changed	Assembler	Updated by CF record lock support to enhance the tpf_esfac function.

Link-Edited Modules: Table 658 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 658. Changes to Link-Edited Modules for CF Record Lock Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CPS0	Changed	Updated by CF record lock support to add the CCCFLC CSECT.

Members (Object Files): Table 659 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 659. Changes to Members (Object Files) for CF Record Lock Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFCNC	CFLZ	Changed	C Language	Updated by CF record lock support to provide additional validation on CF locking structures.
CFDSC	CFLY	Changed	C Language	Updated by CF record lock support.
CFFIND	CFLC	Changed	C Language	Updated by CF record lock support to provide support for CF locking fixed file records.
CFLA	CFLA	New	C Language	Created by CF record lock support.
CFLB	CFLB	New	C Language	Created by CF record lock support.
CFLD	CFLK	New	Assembler	Created by CF record lock support.
CFLDEL	CFLK	New	C Language	Created by CF record lock support.
CFLE	CFLE	New	C Language	Created by CF record lock support.
CFLIPA	CFLG	New	C Language	Created by CF record lock support.
CFLIPD	CFLG	New	C Language	Created by CF record lock support.
CFLIPM	CFLG	New	C Language	Created by CF record lock support.
CFLIP0	CFLG	New	C Language	Created by CF record lock support.
CFLK	CFLK	New	C Language	Created by CF record lock support.
CFLI	CFLK, CFLG	New	C Language	Created by CF record lock support.

Table 659. Changes to Members (Object Files) for CF Record Lock Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFLO	CFLK	New	C Language	Created by CF record lock support.
CFLW	CFLK	New	Assembler	Created by CF record lock support.
CFMADD	CFLN	Changed	C Language	Updated by CF record lock support
CFMCLE	CFLN	New	C Language	Created by CF record lock support.
CFMDEL	CFLN	Changed	C Language	Updated by CF record lock support to provide retry buffer support.
CFMENA	CFLN	Changed	C Language	Updated by CF record lock support to provide retry buffer support.
CFMFRE	CFLN	Changed	C Language	Updated by CF record lock support.
CFMPAR	CFLM	Changed	C Language	Updated by CF record lock support for the ZMCFT parser.
CFMRES	CFLN	Changed	C Language	Updated by CF record lock support for ZMCFT RESETLOCK processing.
CFMSGGS	CFLU	Changed	C Language	Updated by CF record lock support to add the messages for the ZMCFT CLEAR command.
CFRST1	CFLR	Changed	C Language	Updated by CF record lock support.
CFRST2	CFLS	Changed	C Language	Updated by CF record lock support to save the number #CFREC records in the CFCC copy member.
CFSBFD	CFLZ	Changed	C Language	Updated by CF record lock support to provide connections to CF locking structures in CF locking restart.
CFSBFL	CFLY, CFLZ	Changed	C Language	Updated by CF record lock support to provide connections to CF locking structures in CF locking restart.
CFSTBE	CFLP	Changed	C Language	Updated by CF record lock support to provide retry buffer support.
CFSTRF	CFLQ	Changed	C Language	Updated by CF record lock support to refresh the main storage copy of the CFST.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 660 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 660. Changes to CINFC Tags for CF Record Lock Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMCFL	370	New

Copy Members

Table 661 on page 651 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 661. Changes to Copy Members for CF Record Lock Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Not Applicable	Changed	Updated by CF record lock support for the control program (CP) table of contents.
CAPT	Control Program	CCNUCL	Not Applicable	Changed	Updated by CF record lock support to save the complex ID and complex name.
CCEB	Control Program	CCENBK	Not Applicable	Changed	Updated by CF record lock support.
CDC1	Control Program	CCDCOL	Not Applicable	Changed	Updated by CF record lock support for data collection.
CEDT	Control Program	CCCPSE	Not Applicable	Changed	Updated by CF record lock support.
CEFA	Control Program	CCTAPE	Not Applicable	Changed	Updated by CF record lock support.
CEFB	Control Program	CCTAPE	Not Applicable	Changed	Updated by CF record lock support.
CEFE	Control Program	CCTAPE	Not Applicable	Changed	Updated by CF record lock support.
CEFH	Control Program	CCSONA	Not Applicable	Changed	Updated by CF record lock support to allow the ZECBL command to work correctly when CF record lock support is being used in the CF locking configuration.
CEFI	Control Program	CCFADC	Not Applicable	Changed	Updated by CF record lock support.
CEFJ	Control Program	CCFADC	Not Applicable	Changed	Updated by CF record lock support.
CEFL	Control Program	CCFADC	Not Applicable	Changed	Updated by CF record lock support.
CEFM	Control Program	CCTAPE	Not Applicable	Changed	Updated by CF record lock support.
CEFR	Control Program	CCTAPE	Not Applicable	Changed	Updated by CF record lock support.
CEFS	Control Program	CCTAPE	Not Applicable	Changed	Updated by CF record lock support.
CEFT	Control Program	CCTAPE	Not Applicable	Changed	Updated by CF record lock support.
CFCC	Control Program	CCCFCC	Not Applicable	Changed	Updated by CF record lock support.
CFCE	Control Program	CCCFCC	Not Applicable	Changed	Updated by CF record lock support to add CF retry buffer support.
CFCM	Control Program	CCCFCC	Not Applicable	Changed	Updated by CF record lock support to add CF retry buffer support.
CFCP	Control Program	CCCFCC	Not Applicable	Changed	Updated by CF record lock support.
CFCR	Control Program	CCCFCC	Not Applicable	Changed	Updated by CF record lock support to add new CF routines.
CFCS	Control Program	CCCFCC	Not Applicable	Changed	Updated by CF record lock support to add new utility routines.
CFL1	Control Program	CCCFLC	Not Applicable	New	Created by CF record lock support.
CFL2	Control Program	CCCFLC	Not Applicable	New	Created by CF record lock support.
CFL3	Control Program	CCCFLC	Not Applicable	New	Created by CF record lock support.

Table 661. Changes to Copy Members for CF Record Lock Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CICR	Control Program	CCNUCL	Not Applicable	Changed	Updated by CF record lock support to add the new CMMCFL CINFCL tag.
CIDP	Control Program	CCCPSE	Not Applicable	Changed	Updated by CF record lock support to include IBM dump overrides.
CJIC	Control Program	CCSONS	Not Applicable	Changed	Updated by CF record lock support.
CJIE	Control Program	CCSONS	Not Applicable	Changed	Updated by CF record lock support.
CJIF	Control Program	CCSONS	Not Applicable	Changed	Updated by CF record lock support.
CJII	Control Program	CCSONS	Not Applicable	Changed	Updated by CF record lock support to set on the SSST and MFST flags for the concurrency filter lock facility (CFLF) devices that are using CF record lock support.
CJIL	Control Program	CCSONS	Not Applicable	Changed	Updated to follow locking paths for modules using CF record lock support.
CJIM	Control Program	CCSONS	Not Applicable	Changed	Updated to follow locking paths for modules using CF record lock support.
CJIR	Control Program	CCSONS	Not Applicable	Changed	Updated for CF record lock support.
CJIT	Control Program	CCSONS	Not Applicable	Changed	Updated for CF record lock support.
CJIU	Control Program	CCSONS	Not Applicable	Changed	Updated by CF record lock support to direct locking requests to a CF when required.
CJIV	Control Program	CCRCSC	Not Applicable	Changed	Updated by CF record lock support.
CJIX	Control Program	CCSONS	Not Applicable	Changed	Error routines were updated by CF record lock support to determine if locking is on the CF before taking action.
CJIY	Control Program	CCSONS	Not Applicable	Changed	Error routines were updated by CF record lock support to determine if locking is on the CF before taking action.
CLHL	Control Program	CCCLHR	Not Applicable	Changed	Updated by CF record lock support.
CL10	Control Program	CCTLOG	Not Applicable	Changed	Updated by CF record lock support.
CPSE	Control Program	CCCPSE	Not Applicable	Changed	Updated by CF record lock support to update the emergency unlock routine.
CPSF	Control Program	CCCPSF	Not Applicable	Changed	Updated by CF record lock support.
CPSL	Control Program	CCCPSE	Not Applicable	Changed	Updated by CF record lock support to dump new control blocks.
CSYN	Control Program	CCNUCL	Not Applicable	Changed	Updated by CF record lock support.
CTIN	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.

Table 661. Changes to Copy Members for CF Record Lock Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CT00	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.
CT01	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.
CT20	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.
CT38	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support to allocate the CF locking table (CFLT).
CT40	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.
CT41	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support to a routine for data collection.
CT50	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.
CT85	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.
CT99	Control Program	CCCTIN	Not Applicable	Changed	Updated by CF record lock support.
CVF3	Control Program	CCVFAC	Not Applicable	Changed	Updated by CF record lock support to provide lock table full support.
DBAC	Control Program	CCDBAF	Not Applicable	Changed	Updated by CF record lock support.
DBAD	Control Program	CCDBAF	Not Applicable	Changed	Updated by CF record lock support.
IBF2	Control Program	IPLB	Not Applicable	Changed	Updated by CF record lock support to allow the TPF 4.1 system to IPL as a loosely coupled processor if CF record lock support is in use for modules whose CUs do not have locking enabled.
IB03	Control Program	IPLB	Not Applicable	Changed	Updated by CF record lock support to allow the TPF 4.1 system to IPL as a loosely coupled processor if CF record lock support is in use for modules whose CUs do not have locking enabled.
IB06	Control Program	IPLB	Not Applicable	Changed	Updated by CF record lock support to allow the TPF 4.1 system to IPL as a loosely coupled processor if CF record lock support is in use for modules whose CUs do not have locking enabled.

Fixed File Records

Table 662 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 662. Changes to Fixed File Records for CF Record Lock Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#CF2LR	New	Created by CF record lock support.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 663 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 663. Changes to Data Macros for CF Record Lock Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
CJ6KP	Changed	Yes
DCTMFS	Changed	No
DCTMIO	Changed	No
DC0DC	Changed	Yes
DLTEC	Changed	Yes
ICFAA	Changed	No
ICFBB	New	No
ICFCT	Changed	No
ICFDL	New	No
ICFEQ	Changed	No
ICFLP	New	No
ICFLR	New	Yes
ICFLS	New	Yes
ICFLT	New	Yes
ICFLV	New	Yes
ICFMB	New	Yes
ICFRB	Changed	No
ICFSB	Changed	No
ICFST	Changed	No
ICFTT	Changed	No
IC0CK	Changed	Yes
IDSCFW	Changed	No
IDSSST	Changed	No
IFAPI	Changed	No
IIPLI	New	No
IMCPT	New	No
IMDDB	Changed	No
MRLNQ	Changed	Yes
MV0LKC	New	Yes
PI1DT	Changed	No
VF0AC	Changed	No

General Macros: Table 664 on page 655 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro.

See *TPF General Macros* for a complete description of all general macros.

Table 664. Changes to General Macros for CF Record Lock Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No

Selected Equate Macros: Table 665 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 665. Changes to Selected Equate Macros for PROJECT

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZOCP	Changed	No
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 666 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 666. Changes to SIP Skeleton and Internal Macros for CF Record Lock Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 667 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 664 for a description of other system generation changes you must make.

Table 667. Changes to SIP Stage I Macros and Statements for CF Record Lock Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed
SKCTK6	Changed

System Initialization Program (SIP) Stage II Macros: Table 668 on page 656 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 668. Changes to SIP Stage II Macros for CF Record Lock Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 669 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 669. Changes to System Macros for CF Record Lock Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFDISC	Changed	Yes
FCTL	Changed	Yes
IBMSVC	Changed	Yes
IDATB	Changed	Yes
LEMIC	New	No
SLNKC	Changed	No
\$GIOBC	Changed	Yes
\$ULKRC	Changed	Yes

System Macros (IBM Use Only): Table 670 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 670. Changes to System Macros (IBM Use Only) for CF Record Lock Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFRQC	Changed	Yes
\$GCFBC	Changed	No

Segments

Table 671 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 671. Changes to Segments for CF Record Lock Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCCFCC	CSECT	Not Applicable	Changed	Updated by CF record lock support.
CCCFLC	CSECT	Not Applicable	New	Created by CF record lock support.
CCRCSC	CSECT	Not Applicable	Changed	Updated by CF record lock support.
CCSONS	CSECT	Not Applicable	Changed	Updated by CF record lock support.
CCVFAC	CSECT	Not Applicable	Changed	Updated by CF record lock support.
CFL7	C Language	Not Applicable	New	Created by CF record lock support.
CFL8	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CFL9	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.

Table 671. Changes to Segments for CF Record Lock Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CFMA	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLMA	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to call the CLM6 segment to disconnect from CF locking structures if, during deactivation, CF record lock support is active in the CF locking configuration.
CLMB	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLMC	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLMD	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLME	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLMI	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLMK	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLML	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLMM	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLMN	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLMR	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLMZ	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLM0	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLM1	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLM2	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CLM6	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLM7	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLM8	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CLM9	Real-Time Assembler	Not Applicable	New	Created by CF record lock support.
CNPY	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support for the processor ID table (PIDT) and keypoint I (CTKI) initialization; to validate the processor status in a loosely coupled complex; to perform MPLF restart and CF locking restart; to handle CTKI manipulations for an IPL destruct.
CPAA	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.

Table 671. Changes to Segments for CF Record Lock Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CPAB	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CPAD	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CPLKMP	CSECT	Not Applicable	Changed	Updated by CF record lock support for the copy cards for the CP link map.
CTKS	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add CF locking restart.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support for new commands.
CYED	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYGN	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYMA	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPF	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPG	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPH	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPI	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPL	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPM	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPN	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
CYPU	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support.
FTVA03	Offline C Language	FCTBG	Changed	Updated by CF record lock support.
IB02	Offline Assembler	IPLB	Changed	Updated by CF record lock support.
IB03	Offline Assembler	IPLB	Changed	Updated by CF record lock support.
IB06	Offline Assembler	IPLB	Changed	Updated by CF record lock support.
JCD1	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data collection support.
JCD2	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data collection support.
JCD4	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data collection support.
JCD6	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data collection support.
JCS0	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data collection support.
JRA1	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data reduction support.
JRA2	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data reduction support.

Table 671. Changes to Segments for CF Record Lock Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
JRA3	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data reduction support.
JRS3	Real-Time Assembler	Not Applicable	Changed	Updated by CF record lock support to add data reduction support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 672 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 672. Changes to Commands for CF Record Lock Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZCFLK ADD	New	Created by CF record lock support to add a CF to the locking configuration for use as an external locking facility (XLF).
ZCFLK DELETE	New	Created by CF record lock support to remove a CF from the CF locking configuration.
ZCFLK DISPLAY	New	Created by CF record lock support to display information about the CF locking configuration.
ZCFLK INITIALIZE	New	Created by CF record lock support to initialize the CF locking configuration.
ZCFLK MIGRATE	New	Created by CF record lock support to change the lock residency of a module from a CFLF locking CU to a CF, or from a CF to a CFLF locking CU.
ZDLCK DISPLAY	New	Created by CF record lock support to display locks in a CF.
ZDMFS	Changed	Updated by CF record lock support to add CF locking as a type for lock status.
ZMCFT ADD	Changed	Updated by CF record lock support to add retry buffer support.
ZMCFT CLEAR	New	Created by CF record lock support to remove from a CF the CF structures that are not known to this processor configuration.
ZMCFT DELETE	Changed	Updated by CF record lock support to add retry buffer support.
ZMCFT ENABLE	Changed	Updated by CF record lock support to synchronize records in the CF structure block (CFSB) with CF contents.

Messages and System Errors

Table 673 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 673. Changes to Messages and System Errors for CF Record Lock Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000038	System Error	Changed
0000DA	System Error	New
0006AE	System Error	No Longer Supported
004600	System Error	New
004601	System Error	New
004602	System Error	New
004603	System Error	New
004604	System Error	New
004605	System Error	New
004606	System Error	New
004607	System Error	New
004608	System Error	New
004609	System Error	New
00460A	System Error	New
00460B	System Error	New
00460C	System Error	New
004610	System Error	New
004611	System Error	New
004612	System Error	New
004613	System Error	New
004614	System Error	New
004615	System Error	New
004616	System Error	New
004617	System Error	New
00461E	System Error	New
00461F	System Error	New
004620	System Error	New
004621	System Error	New
004622	System Error	New
004623	System Error	New
004624	System Error	New
004626	System Error	New

Table 673. Changes to Messages and System Errors for CF Record Lock Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
004627	System Error	New
004628	System Error	New
004629	System Error	New
00462A	System Error	New
00462B	System Error	New
00462C	System Error	New
00462D	System Error	New
00462E	System Error	New
00462F	System Error	New
004630	System Error	New
004632	System Error	New
004633	System Error	New
004634	System Error	New
004635	System Error	New
004637	System Error	New
004638	System Error	New
004640	System Error	New
004641	System Error	New
004642	System Error	New
004643	System Error	New
004644	System Error	New
004645	System Error	New
004646	System Error	New
004647	System Error	New
004648	System Error	New
004649	System Error	New
00464A	System Error	New
00464B	System Error	New
00464C	System Error	New
00464D	System Error	New
00464E	System Error	New
00464F	System Error	New
004650	System Error	New
00500A	System Error	Changed
CFCC0020E	Online	Changed
CFCC0021E	Online	Changed
CFCC0022E	Online	Changed
CFCE0006E	Online	New
CFCE0007E	Online	New
CFLK0001I	Online	New
CFLK0002I	Online	New
CFLK0003I	Online	New
CFLK0004I	Online	New

Table 673. Changes to Messages and System Errors for CF Record Lock Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CFLK0005E	Online	New
CFLK0006E	Online	New
CFLK0007I	Online	New
CFLK0009I	Online	New
CFLK0011I	Online	New
CFLK0012E	Online	New
CFLK0013E	Online	New
CFLK0014I	Online	New
CFLK0015I	Online	New
CFLK0016I	Online	New
CFLK0018E	Online	New
CFLK0019E	Online	New
CFLK0020E	Online	New
CFLK0021I	Online	New
CFLK0022E	Online	New
CFLK0023E	Online	New
CFLK0024E	Online	New
CFLK0025E	Online	New
CFLK0026E	Online	New
CFLK0027E	Online	New
CFLK0028I	Online	New
CFLK0029T	Online	New
CFLK0030E	Online	New
CFLK0031E	Online	New
CFLK0032E	Online	New
CFLK0033E	Online	New
CFLK0034E	Online	New
CFLK0035E	Online	New
CFLK0036E	Online	New
CFLK0037E	Online	New
CFLK0038E	Online	New
CFLK0039E	Online	New
CFLK0040E	Online	New
CFLK0041T	Online	New
CFLK0042T	Online	New
CFLK0043E	Online	New
CFLK0045E	Online	New
CFLK0200I	Online	New
CFLK0201E	Online	New
CFLK0202E	Online	New
CFLK0204I	Online	New
CFLK0205E	Online	New
CFLK0206E	Online	New

Table 673. Changes to Messages and System Errors for CF Record Lock Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CFLK0207E	Online	New
CFLK0208E	Online	New
CFLK0209W	Online	New
CFLK0211E	Online	New
CFLK0212E	Online	New
CFL00001W	Online	New
CFL00002W	Online	New
CFL00003W	Online	New
CFL20001W	Online	New
CLM00001E	Online	No Longer Supported
CLM00002E	Online	New
CLM60001W	Online	New
CLM60002W	Online	New
CLM60003W	Online	New
CLM60004W	Online	New
CLM60005W	Online	New
CLM80001E	Online	New
CLM80002E	Online	New
CLM80004E	Online	New
CLM80005E	Online	New
CLM80006E	Online	New
CLM80007E	Online	New
CLM80008E	Online	New
CLM80009I	Online	New
CPAA0013E	Online	New
CPSF0028W	Online	New
MCFT0005T	Online	Changed
MCFT0027E	Online	Changed
MCFT0035I	Online	New
MCFT0036E	Online	New
MCFT0038E	Online	New
MCFT0039E	Online	New
MCFT0040E	Online	New
MCPY0225E	Online	New
RHLD0025E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

Review the information about system work blocks (SWBs) in “Storage Considerations and Changes” on page 460.

System Initialization Program (SIP) and System Generation Changes

The FC2F record ID attribute table (RIAT) ID was added for CF record lock support. Be sure to rebuild a RIAT table with this new record ID. You must also code the #CF2LR record type in the SIP Stage I deck and run the file address to produce a new file address compute program (FACE) table.

See *TPF System Generation* for more information about RIAT IDs, the FCTBG, and SIP.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 674 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 674. Changes to TPF Publications for CF Record Lock Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0B	Updated to add the tpf_lemic function. Modifications were also made to the tpf_cfconc, serrc_op, serrc_op_ext, and serrc_op_slt functions.
<i>TPF Concepts and Structures</i>	GTPCON08	Updated to include information about CF record lock support.
<i>TPF Database Reference</i>	GTPDBR09	Updated to include information about CF record lock support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added and changed for CF record lock support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for CF record lock support.
<i>TPF Operations</i>	GTPOPR0B	Updated with information about the commands that were added and changed for CF record lock support.
<i>TPF Program Development Support Reference</i>	GTPPDR0B	Updated with new dump labels that were added for CF record lock support.
<i>TPF System Generation</i>	GTPSYG0B	Updated to include system generation information for CF record lock support.
<i>TPF System Macros</i>	GTPSYS0B	Updated with information about the new LEMIC macro. Updates were also made to the existing CFCONC and FCTLC macros.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR0A	Updated with changes for data collection and reduction reports.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Keep in mind the following before installing CF record lock support in your TPF 4.1 system:

- In a TPF 4.1 system that you are converting from DASD locking to CF record lock support, the module CUs are used as backup devices during any transition periods.
- If you intend to use selective migration, which includes the movement of locks between existing module CUs and CF record lock support, all module CUs must have the appropriate CFLF RPQs installed. See “Operating Environment Requirements and Planning Information” on page 35 for more information about RPQs.
- Ensure that all CFs used for CF record lock support are attached to each processor in the loosely coupled complex.
- Ensure that all CFs used for CF record lock support are at level 6 or higher.

Use the following procedure to install CF record lock support on your TPF 4.1 system.

1. Install program update tape (PUT) 11, which contains APAR PJ26707 for CF record lock support, on the TPF 4.1 system.
2. Install the following:
 - C/C++ language header files listed in Table 655 on page 648
 - Copy members listed in Table 661 on page 651
 - Macros found in “Macros” on page 654.
3. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table. See Table 671 on page 656 for more information about segments.
4. Update the record ID attribute table (RIAT) with the new FC2F record ID, as appropriate. See *TPF System Generation* for more information about the RIAT.
5. Update the SIP RAMFIL macro input statements to the FACE table generator (FCTBG) by specifying the #CF2LR fixed file record type with 32 ordinals defined. The #CF2LR fixed file record type has a RIAT ID of FC2F. See *TPF System Generation* for more information about the RAMFIL macro.
6. Run the FCTBG to create a new FACE table.
7. Assemble the SIP stage I deck to create a SIP stage II deck.
8. Run SIP stage II.
9. Run stubs and module build from VisualAge TPF for Windows NT for all library interface scripts listed in Table 656 on page 648.
10. Reassemble or recompile the following:
 - DLM members listed in Table 659 on page 649
 - CSECTs and segments listed in Table 661 on page 651.

11. Reassemble or recompile the following segments. These segments were not modified by CF record lock support but must be reassembled or recompiled because there were CF record lock support modifications made to macros used by these segments.

CLMF	CLMG
CLMH	CLM3
CPAA	CPAD
CSS2	CTKR
CVFS	CVF2
CVF4	CVF7
CVF9	CVFX
CYEM	CYEN
CYEP	CYPI
CYSA	CYSM
JCD0	JCD3
JCF0	JCM0
JCP0	

12. Link-edit the build scripts (DLMs) listed in Table 653 on page 647.
13. Link-edit the control program (CP).
14. Define a load deck for the auxiliary loader (TLDR) that includes the following:
 - Updated programs
 - Updated CP
 - Updated IPLB program
 - Updated IPAT
 - Updated FACE table.
15. Run TLDR.
16. Perform an initial program load (IPL) of the TPF 4.1 system.
17. Enter the ZCFLK INITIALIZE command to initialize the CF locking configuration.
18. Re-IPL all processors in the processor configuration. CF record lock support is now installed on your TPF 4.1 system.

Remote Procedure Call (APAR PJ26575)

The following section discusses the migration considerations for remote procedure call (RPC).

Prerequisite APARs

See the APEDIT for APAR PJ26575 for information about prerequisite APARs.

Functional Overview

The TPF 4.1 system is enabled to run remote procedure call (RPC) servers through a partial port of the Distributed Computing Environment (DCE) RPC run-time library. RPC allows applications on one workstation to call functions that reside on and are run by another workstation. The RPC run-time library allows you to develop RPC server applications that can be accessed using Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) Internet protocols. The RPC library application programming interfaces (APIs) establish required client/server connections by using socket APIs. Two new socket APIs, `sendmsg` and `recvmsg`, were added. See *TPF Transmission Control Protocol/Internet Protocol* for more information about socket APIs. You can use RPC to call various types of new and existing applications. RPC servers are started and ended by entering the ZINET commands. See *TPF Operations* for more information about the ZINET commands.

Client applications running on any IBM or non-IBM DCE platform are able to run remote procedure calls to a TPF server. All DCE services are available to client applications; however, the TPF 4.1 system supports only a subset of the DCE RPC services.

Elements of a traditional DCE RPC environment that can be used with the TPF implementation are:

- Server support only (no client support)
- Unauthenticated RPC only (no DCE security service or Kerberos provided)
- An offline process to load TPF server information into a directory server (no directory service APIs)
- Preassigned server port numbers (no dynamic server port assignment at run time).

DCE RPC is based on a thread model; therefore, server applications must be thread-safe. See *TPF Application Programming* for more information about RPC and threads.

Architecture

The DCE model of RPC is being implemented by the TPF 4.1 system, and only the RPC run-time library APIs for server applications are supported. Client API support is not provided. Other standard DCE environment services that are **not** implemented by the TPF 4.1 system are:

- DCE Directory (Name) Service
- DCE Security Service
- DCE Distributed Time Service
- DCE Distributed File Service.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 675 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 675. Changes to Build Scripts for RPC

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
COMXBS	LIB	Changed	Added the sendmsg and recvmsg APIs.
CPG2BS	DLM	New	Added ISO8859-1 to the IBM-1047 code page conversion.
CPG3BS	DLM	New	Added IBM-1047 to the ISO8859-1 code page conversion.
CRPCBS	DLL	New	Added the dynamic link libraries (DLLs) for RPC APIs.
CRP1BS	DLM	New	Added the dynamic load module (DLM) for RPC server activation.
CRP2BS	DLM	New	Added the dynamic load module (DLM) for RPC server activation.
CTHDBS	LIB	New	Added the threads library.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 676 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 676. Changes to General Use C/C++ Language Header Files for RPC

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$eb0eb.h	Changed	No
errno.h	Changed	No
rpc.h	New	Not Applicable
socket.h	Changed	No
sysdef.h	Changed	No
sysgtime.h	Changed	No
types.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 677 on page 669 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 677. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for RPC

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$iscfdt.h	Changed	No
c\$iscInt.h	Changed	No
c\$proc.h	Changed	No
c\$thgl.h	New	Not Applicable
i\$netd.h	Changed	No

Library Interface Scripts: Table 678 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 678. Changes to Library Interface Scripts for RPC

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	Changed	Added the sendmsg and recvmsg APIs.
CTHDXV	New	Added the thread APIs.

Library Members (Object Files): Table 679 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 679. Changes to Library Members (Object Files) for RPC

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	Description of Change
CBSTER	CISO	Changed	C Language	Added strings for new errno.h values.
CLMINT	CISO	Changed	Real-Time Assembler	Removed wxtrn for @@PT_BAS.
CSSDLL	CISO	Changed	C Language	Added the CRPC subsystem shared list.
C301	COMX	New	C Language	Added sendmsg support.
C302	COMX	New	C Language	Added recvmsg support.
C513	COMX	Changed	C Language	Added setsockopt support.
C520	COMX	Changed	C Language	Added setsockopt support.
C533	COMX	Changed	C Language	Added setsockopt support.
C539	COMX	Changed	C Language	Added setsockopt support.
C541	COMX	Changed	C Language	Added setsockopt support.

Link-Edited Modules: Table 680 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 680. Changes to Link-Edited Modules for RPC

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
COMX	Changed	Added sendmsg and recvmsg APIs.
CPG2	New	Added ISO8859-1 to the IBM-1047 code page conversion.
CPG3	New	Added IBM-1047 to the ISO8859-1 code page conversion.

Table 680. Changes to Link-Edited Modules for RPC (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CPGS	Changed	Added CPG2 and CPG3 DLMs to the code page table.
CRPC	New	Added RPC API dynamic link libraries (DLLs).
CRP1	New	Added support for the ZINET START command for the RPC server.
CRP2	New	Added support for reactivating the RPC server.
CTHD	New	Added the thread library.

Members (Object Files): Table 681 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 681. Changes to Members (Object Files) for RPC

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CINET1	CLTV	Changed	C Language	Added RPC model support to the ZINET ADD and ZINET ALTER commands.
CINET3	CLTW	Changed	C Language	Added RPC model support to INETD.
CINET5	CLTV, CLTY	Changed	C Language	Added RPC model support to INETD.
CINET6	CRPC, CTFT	Changed	C Language	Added RPC model support to INETD.
CPGS	CPGS	Changed	C Language	Added new code page conversion DLMs.
CRPCIN	CRP1	New	C Language	Added RPC server startup.
CRPCMS	CRP1, CRP2	New	C Language	Added RPC error routines.
CRPCRS	CRP2	New	C Language	Added RPC server restart.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 682 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 682. Changes to Copy Members for RPC

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Not Applicable	Changed	Updated thread termination.
CHSZ	Control Program	CCNUCL	Not Applicable	Changed	Updated CE2RPC field initialization.
CIEF	Control Program	CCCIEF	Not Applicable	Changed	Updated event processing for threads.

Table 682. Changes to Copy Members for RPC (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CLHH	Control Program	CCSTOR	Not Applicable	Changed	Updated the RALOC macro to support threads.
CLHP	Control Program	CCCLHR	Not Applicable	Changed	Updated data collection fields.
CLHV	Control Program	CCSTOR	Not Applicable	Changed	Updated page and segment tables.
CLWP	Control Program	CCLAW3	Not Applicable	Changed	Updated TCP/IP error processing.
CPSL	Control Program	CCCPSE	Not Applicable	Changed	Updated dump formatting for thread blocks.
CTH0	Control Program	CCTHDS	Not Applicable	Changed	Added thread support.
CTH2	Control Program	CCTHDS	Not Applicable	Changed	Added thread support.
CTH3	Control Program	CCTHDS	Not Applicable	Changed	Added thread support.
CTH4	Control Program	CCTHDS	Not Applicable	Changed	Added thread support.
CTR0	Control Program	CCISOC	Not Applicable	Changed	Updated C function trace thread support.
CT40	Control Program	CCCTIN	Not Applicable	Changed	Updated ITSDT block initialization.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 683 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 683. Changes to Data Macros for RPC

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?
CZ3CP	Changed	No
ICPTH	New	Not Applicable
IEQCE2	Changed	No
IPROC	Changed	No
ITHGL	Changed	Yes
ITSUT	New	Not Applicable
ITTCB	New	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: Table 684 on page 672 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 684. Changes to Selected Equate Macros for RPC

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 685 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 685. Changes to SIP Skeleton and Internal Macros for RPC

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed. Also, changed for PJ26806.

System Initialization Program (SIP) Stage I Macros and Statements: Table 686 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 676 for a description of other system generation changes you must make.

Table 686. Changes to SIP Stage I Macros and Statements for RPC

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 687 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If the IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 687. Changes to SIP Stage II Macros for RPC

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 688 on page 673 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro.

Table 688. Changes to System Macros (IBM Use Only) for RPC

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
TERMC	New	Not Applicable
CFMCC	Changed	Yes
CFMDC	Changed	Yes

Segments

Table 689 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 689. Changes to Segments for RPC

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLH0	Assembler	Not Applicable	Changed	Updated for ZCTKA command parsing.
CLH2	Assembler	Not Applicable	Changed	Added ZCTKA DISPLAY command updates.
CLH3	Assembler	Not Applicable	Changed	Added ZCTKA ALTER command updates.
CTHA	Assembler	Not Applicable	Changed	Included process deactivation processing.
CVOE	Assembler	Not Applicable	Changed	Added ZASER and ZDSER command processing.
CVOR	Assembler	Not Applicable	Changed	Added ZSTAT command processing.
CVOU	Assembler	Not Applicable	Changed	Added ZASER and ZDSER command parsing.
CVRA	Assembler	Not Applicable	Changed	Added ZASER and ZDSER command processing.
ICDF	Assembler	Not Applicable	Changed	Assemble for CFMCC and CFMDC changes.
JCD4	Assembler	Not Applicable	Changed	Added data collection and data reduction changes.
JCS0	Assembler	Not Applicable	Changed	Added data collection and data reduction changes.
JRA2	PL/I	Dataread	Changed	Added data collection and data reduction changes.
JRF4	PL/I	Dataread	Changed	Added data collection and data reduction changes.
JRS3	PL/I	Dataread	Changed	Added data collection and data reduction changes.
STPP	Assembler	PPCP	Changed	Assemble for CFMCC and CFMDC changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 690 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 690. Changes to Commands for RPC

Command	New, Changed, or No Longer Supported?	Description of Change
ZASER	Changed	Added the THEAPON and THEAPOFF parameters.
ZCTKA ALTER	Changed	Added support for the MTHD and TSTK parameters.
ZDSER	Changed	Added the THEAPON and THEAPOFF parameters.
ZINET ADD	Changed	Added MODEL-RPC support.
ZINET ALTER	Changed	Added MODEL-RPC support.

Messages and System Errors

Table 691 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 691. Changes to Messages and System Errors for RPC

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
008508	System Error	New
008509	System Error	New
00850B	System Error	New
00850C	System Error	New
00850D	System Error	New
00850E	System Error	New
00850F	System Error	New
008510	System Error	New
008531	System Error	New
008532	System Error	New
008533	System Error	New
CTKA0017I	Online	New
CTKA0018I	Online	New
CTKA0065E	Online	New
CTKA0066E	Online	New
CTKA0067E	Online	New
CTKA0068E	Online	New

Table 691. Changes to Messages and System Errors for RPC (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CT400008I	Online	New
CT400010I	Online	New
FKPA0012A	Online	New
RPCR0001A	Online	New
RPCR0002E	Online	New
RPCR0003I	Online	New
RPCR0004I	Online	New
RPCR0005E	Online	New
STAT0012I	Online	New

Performance or Tuning Changes

Three fields have been added to the System Summary Report. Two fields contain information on the number of threads and the third field contains information on the number of frames:

- To ensure that there are enough threads defined to the TPF 4.1 system for any application that uses threads, data is collected from the following fields:
 - The maximum number of threads for each process. The maximum number of threads active in any process at any time during an iteration of data collection.
 - The high-water mark number of threads active in a process. The maximum number of threads active in any process at any point in time during the current initial program load (IPL).

If a thread application (for example, RPC) is using a large number of threads compared to the number defined in keypoint A (CTKA), you can enter the ZCTKA ALTER command to change the maximum number of threads.

- The third field is the maximum number of frames on the frames pending list, which is collected to determine if additional 4-KB frames are needed. If the maximum number is greater than 10% of the frames in the TPF 4.1 system, a system shutdown can occur because it is low on available frames.

Frames that are released by threaded entry control blocks (ECBs) are placed on the frames pending list until it is safe to reuse them; for example, after a purge of the translation look-aside buffer (PTLB) is performed on all I-streams. If a large number of frames exist on the frames pending list, additional 4-KB frames should be generated in the TPF 4.1 system using the CORREQ macro. See *TPF System Generation* for more information about the CORREQ macro.

Storage Considerations and Changes

See “Performance or Tuning Changes” for information about frame usage.

RPC servers run in a threaded environment. You need to consider both the size of the ECB heap area and the maximum number of threads in a process. As each thread is created in a process, the heap area of the initial thread is shared with the new thread. The maximum number of threads in a process affects the size of the collective heap.

You can enter the ZCTKA command to modify heap storage values. The maximum size of the ECB heap is set by specifying the EMPS parameter. The maximum number of 4-KB frames that an ECB can acquire for heap storage is set by

specifying the MMHS parameter. Specifying these parameters affects all ECBs in the TPF 4.1 system. In a threaded environment, the value in the MMHS parameter may be too small to accommodate the collective heap. You can modify the CE2MPF field in the ECB to override the value in the MMHS parameter; this will allow for the number of 4-KB frames required by the collective heap.

When a thread issues a request for heap storage, frames are attached to the initial thread. For RPC, this is the ECB that issued the `rpc_server_listen` API. These frames are not released until the initial ECB exits. For RPC, this means that the server has been shut down.

Additionally, the required size of the 31-bit core resident program area (CRPA) must be increased about 3 MG.

System Initialization Program (SIP) and System Generation Changes

No modifications are needed for SIP parameters; however, the GENSIP macro was updated for internal use thread support.

Loading Process Changes

There are no changes.

Online System Load Changes

Whenever a loadset is activated, deactivated, or excluded by the E-type loader, all RPC servers in the subsystem are recycled to ensure that the correct version of all loaded functions is used by the RPC server.

Publication Changes

Table 692 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 692. Changes to TPF Publications for RPC

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0A	Updated with a new chapter for RPC.
<i>TPF Concepts and Structures</i>	GTPCON08	Updated with information on the RPC server and the RPC process model.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0B	Updated with information about the RPC APIs.
<i>TPF Library Guide</i>	GTPDOC0B	Updated with definitions for RPC terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for RPC.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for RPC.
<i>TPF Operations</i>	GTPOPR0B	Updated with information about the commands that were added and changed for RPC.
<i>TPF Program Development Support Reference</i>	GTPPDR0B	Updated with information about dump labels for RPC.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR0A	Updated with information about entries to the System Summary Report for RPC.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW07	Updated with information about <code>sendmsg</code> and <code>recvmsg</code> socket APIs.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The following is a list of supported RPC run-time library APIs:

rpc_binding_copy	rpc_binding_free
rpc_binding_inq_object	rpc_binding_to_string_binding
rpc_binding_vector_free	rpc_if_id_vector_free
rpc_if_inq_id	rpc_mgmt_inq_if_ids
rpc_mgmt_inq_stats	rpc_mgmt_is_server_listening
rpc_mgmt_stats_vector_free	rpc_mgmt_stop_server_listening
rpc_network_inq_protseqs	rpc_network_is_protseq_valid
rpc_object_inq_type	rpc_object_set_inq_fn
rpc_object_set_type	rpc_protseq_vector_free
rpc_server_inq_bindings	rpc_server_inq_if
rpc_server_listen	rpc_server_register_if
rpc_server_unregister_if	rpc_server_use_all_protseqs_if
rpc_server_use_protseq_ep	rpc_server_use_protseq_if
rpc_ss_allocate	rpc_ss_free
rpc_string_binding_compose	rpc_string_binding_parse
rpc_string_free	uuid_compare
uuid_create	uuid_create_nil
uuid_equal	uuid_from_string
uuid_hash	uuid_is_nil
uuid_to_string	

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install RPC in your TPF 4.1 system.

1. Install program update tape (PUT) 11.
2. Compile, assemble, and link all code associated with this APAR. See the APEDIT for the complete list.
3. Load all code to the TPF 4.1 system.
4. Generate a universal unique identifier (UUID) for the new RPC interface by using the UUID Generator Utility on an IBM OS/390 system.
5. Create an Interface Definition Language (IDL) file that includes the UUID and the remote procedures with their input and output parameters.

6. Compile the IDL file with an IDL compiler to generate header files and stub files for client and server applications on an IBM OS/390 system.
7. Include the header file in the server application. Compile and link the server stub file and the server application on the server platform (this would be where you compile and link all your TPF code).
8. Include the header file in the client application. Compile and link the client stub file and the client application on the client platform.
9. Load the server code to your TPF 4.1 system. RPC servers are processor and subsystem unique.
10. Cycle the TPF 4.1 system to 1052 state or higher.
11. To increase thread resources, change the thread parameters in keypoint A (CTKA) by entering the ZCTKA ALTER command with the MTHD and TSTK parameters specified. Restart your system by entering the ZRIPL command.
12. Define an Internet daemon (INETD) entry for the new server by entering the ZINET ADD command with the S, MODEL-RPC, and PGM parameters specified.
13. Cycle the TPF 4.1 system to CRAS state or higher.
14. Verify that TCP/IP support is active in the TPF 4.1 system and that required offload devices or Internet Protocol (IP) routers are available and active. Enter the ZCLAW DISPLAY command with the ACTIVE parameter specified to check the active CLAW workstations, and the ZTTCP DISPLAY command with the ACTIVE parameter specified to display all active IP routers.
15. Start the server using the INETD by entering the ZINET START command with the S parameter specified.

Clients can now access remote procedures from any client platform.

See *TPF Operations* for more information about the ZCLAW DISPLAY, ZCTKA ALTER, ZINET ADD, ZINET START, ZRIPL, and ZTTCP DISPLAY commands.

Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements (APAR PJ26693)

The following section discusses the migration considerations for Mapping of Airline Traffic over Internet Protocol (MATIP) enhancements.

Prerequisite APARs

See the APEDIT for APAR PJ26693 for information about prerequisite APARs.

Functional Overview

Mapping of Airline Traffic over Internet Protocol (MATIP) enhancements expands MATIP support that was previously shipped by providing a way to define a host descriptor table for Type-A and Type-B hosts. It does so by adding new parameters to the ZMATP command, new error messages, and a new user exit. See "Mapping of Airline Traffic over Internet Protocol (MATIP) (APAR PJ26161)" on page 554 for information on MATIP support that was previously shipped.

If you are migrating from the original MATIP support on PUT 10 (APAR PJ26161) to these MATIP enhancements, you must define one or more host names in the new MATIP host name table by entering the ZMATP command to start MATIP client sessions with a remote host or workstation. Without an appropriate host name, the TPF 4.1 system is unable to obtain an Internet Protocol (IP) address that is needed to start the client session. In addition, you must modify the new MATIP host name user exit to locate the host name in the host name table that is used to start a specific MATIP client session.

Agent set control unit (ASCU) information was previously defined and changed through the MATIP ASCU user exit and the MATIP security user exit. Now you can also change and define ASCUs through the ZMATP command as well as associating ASCUs with a specific host name. The ASCU information is preserved on file so that it does not have to be specified again after the TPF 4.1 system is re-IPled. The DISPLAY parameter of the ZMATP command has been enhanced to display various characteristics associated with a specific MATIP session.

Architecture

The architecture for MATIP enhancements is based on that for MATIP support, allowing for the management of Transmission Control Protocol/Internet Protocol (TCP/IP) wrappers around messages in legacy protocols. These wrappers allow the messages to be sent over TCP/IP networks. MATIP enhancements will continue to provide TPF server and TPF client capabilities in the three Societe Internationale de Telecommunications Aeronautiques (SITA) message types:

- Type-A Conversational
- Type-A Host-to-Host
- Type B.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 693 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 693. Changes to Build Scripts for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMATBS	DLL	Changed	Added the MATIP host name user exit, UMATCH, and the ZMATP TPF collection support (TPFCS) command handler.

Object Code Only (OCO) Stubs: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 694 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 694. Changes to General Use C/C++ Language Header Files for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$iscfdt.h	Changed	No
c\$trmeq.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 695 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 695. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$matp.h	Changed	No
i\$mscb.h	Changed	No
netdb.h	Changed	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 696 on page 681 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 696. Changes to Library Members (Object Files) for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
C511	COMX	Changed	C Language	Updated to save the domain for child sockets.
C518	COMX	Changed	C Language	Updated to bypass offload processing if information is available in the TPF 4.1 system.
C519	COMX	Changed	C Language	Updated to bypass offload processing if information is available in the TPF 4.1 system.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 697 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 697. Changes to Members (Object Files) for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CMACMD	DLL	Changed	C Language	Updated to access new control block structures that contain host names and ASCU information.
CMADAT	DLL	Changed	C Language	Updated to access new control block information.
CMAF	DLM	Changed	C Language	Updated to add support for new parameters on the ZMATP command.
CMATAB	DLL	Changed	C Language	Allocated control block structures for host names and ASCUs.
CMATO2	DLL	New	C Language	Saves host names and ASCUs in TPF collection support.
CMIC	DLL	Changed	C Language	Updated to add an additional parameter to the session manager function call.
CMOA	DLM	Changed	C Language	Updated to use new control block structures.
CMOB	DLM	Changed	C Language	Updated to use new control block structures.
CRII	DLM	Changed	C Language	Enabled to use TCP/IP native stack support.
UMATCH	DLL	New	C Language	MATIP host name user exit.
UMATSE	DLL	Changed	C Language	Updated the sample code.
UMATSS	DLL	Changed	C Language	Updated to add a comment to the prolog.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 698 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 698. Changes to Copy Members for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CLXA	Assembler	CCCCP1	Not Applicable	Changed	Updated processing of the ROUTC macro.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 699 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 699. Changes to Data Macros for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ISCFDT	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 700 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 700. Changes to Selected Equate Macros for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
TRMEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 701 on page 683 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the

SIP Stage II deck.

Table 701. Changes to SIP Skeleton and Internal Macros for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 702 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 702. Changes to SIP Stage II Macros for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 703 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 703. Changes to Segments for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CMID	Real-Time Assembler	Not Applicable	New	Issues the CINFC macro to obtain the number of line numbers, interchange addresses, and terminal addresses (LNIATAs) in the TPF 4.1 system.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 704. Changes to ECB User Exits for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
MATIP Host Name User Exit	CMACMD	UMATCH	New	Selects remote hosts or modifies host record data areas for inbound and outbound sessions.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 705 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 705. Changes to Commands for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Command	New, Changed, or No Longer Supported?	Description of Change
ZMATP	Changed	Updated to add new parameters.

Messages and System Errors

Table 706 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 706. Changes to Messages and System Errors for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MATP0017I	Online	New
MATP0018I	Online	New
MATP0019W	Online	New
MATP0020I	Online	New
MATP0021I	Online	New
MATP0022E	Online	New
MATP0023E	Online	New

Table 706. Changes to Messages and System Errors for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MATP0024E	Online	New
MATP0025E	Online	New
MATP0026I	Online	New
MATP0027I	Online	New
MATP0028E	Online	New
MATP0029E	Online	New
MATP0030E	Online	New
MATP0031E	Online	New
MATP0032E	Online	New
MATP0055E	Online	Changed

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

A specific area of the system heap has been allocated for MATIP enhancements such as the host name table and the LNIATA chain. The number of LNIATAs used in the host name table is the same as the number of LNIATAs configured in keypoint C.

File storage has been allocated for host name and ASCU information. The number of hosts is determined by using the number of hosts defined in the TPF collection support MATIP_DS database with half the number of host names added.

You can define the size of a core memory area (the MATIP Session Control Block (MSCB)) by using the ZNKEY command with the following parameters specified:

- The MAXASCU parameter represents the total number of MATIP ASCUs that can be defined to the TPF 4.1 system at one time. Each ASCU that is defined requires 20 bytes of storage.
- The MAXMATIP parameter represents the total number of MATIP sessions (Type-A Conversational, Type- A Host-to-Host, and Type B) that will be active at one time. Each MATIP session that is defined requires 64 bytes of storage.

See *TPF Operations* for more information about the ZNKEY command.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 707 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 707. Changes to TPF Publications for Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for MATIP enhancements.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for MATIP enhancements.
<i>TPF Operations</i>	GTPOPR0B	Updated with information about the commands that were added and changed for MATIP enhancements.
<i>TPF System Installation Support Reference</i>	GTPINR0B	Updated with information about the UMATCH user exit that was added for MATIP enhancements.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before you can use MATIP enhancements you must complete the following two phases:

- Analyzing the enhancements to determine if you want to install them in your TPF 4.1 system.
- Installing the enhancements in your TPF 4.1 system.

Analyzing Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

To determine if you will be able to install MATIP enhancements in your TPF 4.1 system, do the following:

1. If this is the first time that you have used MATIP, ensure that all the host names you are using are on the DNS nameserver before you install MATIP enhancements.

If you have used MATIP addresses previously, see your network administrator to ensure that all host names are associated with the IP addresses in MATIP enhancements.

2. Analyze your current available LNIATAs to determine which are used for MATIP devices and IP Bridge devices, and to create a list of these LNIATAs according to the following types:
 - Type-A conversational
 - Type-A conversational printer device
 - Type-A host-to-host
 - Type B
 - IP Bridge.
3. Analyze your current applications that now send data across a non-IP network and will be used to send data across an IP network to a MATIP device or a IP Bridge device. Your applications will fall into one of the following categories:
 - Applications that use LNIATAs

Applications that will be used to send data across an IP network issue a ROUTC macro with the LNIATA of the remote terminal or system in the RCPLDES3 destination field of the routing control parameter list (RCPL). The LNIATA used in the RCPL is classified as a MATIP or IP Bridge device by the ZMATP command when the TPF 4.1 system is started.

The MATIP host name user exit, UMATCH, is used to associate LNIATAs with host names for MATIP sessions that do not have specified host names.
 - Applications that do not use LNIATAs

Applications that do not use LNIATAs to send Type-A host-to-host or Type-B message traffic have the ability to set the RCPLORG destination field to contain a pointer to a host name of up to 255 alphanumeric characters that ends in a null character. The application enters the CMOA MATIP program for Type-A host-to-host traffic or the CMOB program for Type-B traffic. The host name is passed to an IP address when starting a Type-A host-to-host session or a Type-B session and a message is sent across the MATIP session. If MATIP is able to connect to the desired remote session, it returns the host ordinal (an index to the host name in the host name table) to the application after the session is started and the data is sent. The application passes that host ordinal number to RCPLDES on subsequent enters to the CMOA or CMOB programs when additional data is sent across the session.
4. After analyzing your applications, make any changes necessary to enable them to run with MATIP enhancements.
5. Continue with “Installing Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements” to install MATIP enhancements in your TPF 4.1 system.
- 6.

Note: The following configurations that were previously allowed in the original MATIP support on PUT 10 (APAR PJ26161) are not supported with MATIP enhancements:

- Configurations that have a MATIP server communicating with a MATIP client on the same machine (LPAR).
- Configurations where the server receives 2 connect requests from the remote client intended for multiple hosts on the same processor at the same time.

Installing Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements

To install MATIP enhancements in your TPF 4.1 system, do the following:

1. Complete the procedure for “Analyzing Mapping of Airline Traffic over Internet Protocol (MATIP) Enhancements” on page 686.

2. Install program update tape (PUT) 11.
3. Ensure that TPF collection support (TPFCS) is installed. See “TPF Collection Support (APAR PJ25098)” on page 403 and “TPF Collection Support Enhancements (APAR PJ25332)” on page 526 for information about installing TPFCS.
4. Code the MATIP host name user exit, UMATCH, listed in “ECB User Exits” on page 683 to associate LNIATAs and host names when establishing a session as a TPF client. Update the application programs associated with the user exit if necessary.
5. Define the MAXASCU and MAXMATIP parameters on the SNAKEY macro in keypoint 2 (CTK2). See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.
6. Compile or reassemble all DLL and DLM members as necessary. See Table 697 on page 681 for information about the DLL and DLM members.
7. Run the system allocator to include all the new segments added by MATIP enhancements. See Table 703 on page 683 for information about the segments.
8. Reassemble the CMID segment.
9. Reassemble the CCCCCP1 CSECT.
10. Run the CBLD program to create the link-edit decks to the DLLs and DLMs.
11. Link the DLLs and DLMs.
12. Link the control program (CP).
13. Load the following to your TPF 4.1 system:
 - Updated CP segments
 - New and updated DLMs and DLLs
 - New and updated assembler segments
 - Updated applications.
14. Perform an initial program load (IPL) of the TPF 4.1 system.
15. Cycle the TPF 4.1 system to CRAS state or above.
16. Enter the ZBROW QUALIFY command with the SET parameter specified to view the TPF collection support database of host names using TPFCS browsing.
17. Enter the ZDTCP command with the DNS and PRIMARY parameters specified to define the primary name server, or the DNS and SECNDRY parameters specified to define the secondary name server.
18. Enter the ZMATP command with the DEFINE or ALTER parameter specified to define the necessary LNIATAs as MATIP devices or IP Bridge devices. When you enter the ZMATP command, refer to the list of LNIATAs that you created in step 2 on page 687.

If you want to define a host name and a list of agent set control units (ASCUs) you can enter either the ZMATP command with the DEFINE parameter specified or the MATIP host name user exit.

If you want to add additional ASCUs to a defined host, you can enter either the ZMATP command with the ALTER parameter specified or the MATIP host name user exit.

See *TPF Operations* for more information about the ZMATP command.
19. Define the Internet daemon (INETD) listeners for MATIP devices and IP Bridge devices by entering the following ZINET ADD commands. If you are using a combination of MATIP Type-A, MATIP Type-B and IP Bridge devices, enter all

of the commands in any order. If you are using one or two device types but not all three types, enter the command for the type of device.

- For MATIP Type-A devices:

**ZINET ADD S-MATIPA MODEL-AOR AORL-4 PGM-CMIA PROT-TCP
PORT-350 STATE-CRAS**

- For MATIP Type-B devices:

**ZINET ADD S-MATIPB MODEL-AOR AORL-4 PGM-CMIB PROT-TCP
PORT-351 STATE-CRAS**

- For IP Bridge devices:

**ZINET ADD S-IPBRIDGE MODEL-AOR PGM-CRII PROT-TCP
PORT-*userport***

See *TPF Operations* for more information about the ZINET ADD command.

20. Enter the ZNKEY command to verify that the MAXASCU and MAXMATIP parameters are defined. See *TPF Operations* for more information about the ZNKEY command.
21. Do one of the following to activate MATIP enhancements for client sessions that are started by the TPF 4.1 system:
 - If the TPF 4.1 system is in CRAS state or above, define an individual host name by entering the ZMATP command with the DEFINE and RHOSTN parameters specified. To start a host name, do one of the following:
 - To start an individual host name, enter the ZMATP command with the START and RHOSTN parameters specified.
 - To start multiple host names, do one of the following:
 - Start each defined host name individually by entering the ZMATP command with the START and RHOSTN parameters specified.
 - Start all defined host names at the same time by entering the ZMATP command with the STOP parameter specified and then entering the ZMATP command with the START parameter specified.

See *TPF Operations* for more information about the ZMATP command.

- If the TPF 4.1 system is in 1052 state, cycle the TPF 4.1 system to CRAS state or above.

Note: You do not have to start MATIP enhancements to use an IP Bridge device.

Tape Record Migration (APAR PJ26577)

The following section discusses the migration considerations for tape record migration.

Prerequisite APARs

See the APEDIT for APAR PJ26577 for information about prerequisite APARs.

Functional Overview

Tape record migration permits tape records to be migrated to file address compute (FACE) program table processor unique fixed file record types, which removes the constraints that are imposed by the current method of ordinal-based processor uniqueness. Changes to the ZTDEV command and tape restart support the migration and initialization of tape records to processor unique fixed file record types.

Ordinal-based processor uniqueness for fixed file record types means that adding processors is both difficult and time-consuming. Processor unique fixed file record types alleviate the problem of allocating and managing ordinals when you are changing the number of generated processors in your complex.

Architecture

Updates in tape support affect the following areas:

- Tape record migration
- Tape restart
- FACE table generator (FCTBG).

Current tape support for the TPF 4.1 system uses the following three fixed file record types to store tape records:

- #TLDMM (subsystem user (SSU) unique)
- #TDATR (shared)
- #IBMM4 (shared).

All of these record types use ordinal-based processor uniqueness; that is, each processor is allocated specific ordinals to simulate processor unique records. Tape record migration uses FACE table processor unique fixed file record types that are independent of ordinal allocation.

When tape record migration is installed, tape support for a processor uses three new processor unique fixed file record types to store tape records. Records from the ordinal-based fixed file record types must be migrated to the processor unique fixed file record types or the processor unique fixed file record types must be initialized. When a processor enters tape restart, each of the processor unique fixed file record types for that processor is migrated or initialized.

Processor unique fixed file record types are as follows:

- #TPLBL (processor and SSU unique), which replaces #TLDMM
- #TDTDR (processor unique), which replaces #TDATR
- #IBMMP4 (processor unique), which contains one of the records that was moved from #IBMM4.

Changes to the FCTBG support the new fixed file record types and provide a method to verify these record types.

A processor complex can have a combination of processors, where some processors are using the processor unique fixed file record types and some are using the ordinal-based fixed file record types. Processors without tape record migration installed continue to use and update ordinal-based fixed file record types. Processors that have tape record migration installed (migrated processors) use the processor unique fixed file record types and ignore any ordinal-based fixed file record types.

There are constraints for the capture and restore utility in a complex with a combination of processors. The capture utility captures both the #TLDMM and #TPLBL fixed file record types for the primary subsystem user in the current subsystem. After the first processor in the processor complex has completed tape record migration, the capture utility must capture #TLDMM records for the processors that are using ordinal-based fixed file record types and #TPLBL fixed file records for the processors that are using processor unique fixed file record types. Because only the migrated processor recognizes the #TPLBL fixed file record types, a migrated processor must be the primary capture processor. The restore utility must be run from a migrated processor for the same reason.

Note: There is still a limit of eight loosely coupled processors in a complex.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 708 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 708. Changes to General Use C/C++ Language Header Files for Tape Record Migration

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$fbdt0.h	Changed	Yes; you need to recompile FTSP03.
c\$fer0.h	Changed	No
c\$fva0.h	Changed	No
c\$syseq.h	Changed	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 709 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 709. Changes to Copy Members for Tape Record Migration

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
TPFGBL		Not Applicable	Not Applicable	Changed	Added a global equate to support new fixed file record types.

Fixed File Records

Table 710 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 710. Changes to Fixed File Records for Tape Record Migration

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMMP4	New	Created by tape record migration.
#IBMM4	Changed	The tape group definition table (TGDT) was moved from this fixed file record type to the #IBMMP4 fixed file record type.
#TDATR	No Longer Supported	Not Applicable.
#TDTDR	New	Created by tape record migration.
#TLDMR	No Longer Supported	Not Applicable.
#TPLBL	New	Created by tape record migration. This record defaults to nonrestorable, as defined by the RAMFIL macro with the RESTORE parameter specified.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 711 on page 693 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 711. Changes to Data Macros for Tape Record Migration

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ITDAT	Changed	No
ITDVRT	Changed	No
ITGDT	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 712 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 712. Changes to Selected Equate Macros for Tape Record Migration

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SYSEQ	Changed	No
TAPEQ	Changed	Yes; you need to reassemble COSM.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 713 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 713. Changes to SIP Skeleton and Internal Macros for Tape Record Migration

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
GENR	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 714 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 714. Changes to SIP Stage II Macros for Tape Record Migration

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 715 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 715. Changes to Segments for Tape Record Migration

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BXBL	Real-Time Assembler	Not Applicable	Changed	Updated to capture #TLDMR and #TPLBL fixed file record types.
CORB	Real-Time Assembler	Not Applicable	Changed	Updated to provide future support for more than eight loosely coupled processors.
CORK	Real-Time Assembler	Not Applicable	Changed	Added new messages to support migrating and initializing tape records from ordinal-based fixed file record types to FACE table processor unique fixed file record types.
COSA	Real-Time Assembler	Not Applicable	Changed	Updated to support the #TPLBL fixed file record type.
COSB	Real-Time Assembler	Not Applicable	Changed	Updated to support the #TDTDR fixed file record type.
COSD	Real-Time Assembler	Not Applicable	Changed	Updated to support the #TPLBL fixed file record type.
COS5	Real-Time Assembler	Not Applicable	Changed	Added support for the ZTDEV command with the MIGRATE and CLEAR parameters.
COS6	Real-Time Assembler	Not Applicable	Changed	Updated to provide support for the #IBMMP4 and #TDTDR fixed file record types.
COS7	Real-Time Assembler	Not Applicable	Changed	Updated to provide support for the #IBMMP4 and #TDTDR fixed file record types.
COS8	Real-Time Assembler	Not Applicable	Changed	Updated to provide support for the #TDTDR fixed file record type.
COTH	Real-Time Assembler	Not Applicable	Changed	Updated to provide support for the #TPLBL fixed file record type and to move the TPLD and TLMR record initialization routine to the COT9 segment.
COTK	Real-Time Assembler	Not Applicable	Changed	Updated to provide support for the #IBMMP4 fixed file record type.
COT1	Real-Time Assembler	Not Applicable	Changed	Updated comments only; no code changes were made.
COT2	Real-Time Assembler	Not Applicable	Changed	Added support to migrate TGDT and DTDAT records from the ordinal-based fixed file record type to the FACE table processor unique fixed file record type.
COT3	Real-Time Assembler	Not Applicable	Changed	Added support to migrate TPLD and TLMR records from the ordinal-based fixed file record type to the FACE table processor unique fixed file record type.
COT5	Real-Time Assembler	Not Applicable	Changed	Added support for the ZTDEV command with the MIGRATE and CLEAR parameters.

Table 715. Changes to Segments for Tape Record Migration (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
COT9	Real-Time Assembler	Not Applicable	New	Supports the migration and initialization of tape records from ordinal-based fixed file record types to FACE table processor unique fixed file record types.
FTER00	C Language	FCTBG	Changed	Added messages to support the new fixed file validation routine.
FTVA02	C Language	FCTBG	Changed	Added validation to support processor and subsystem user unique record types.
FTVA03	C Language	FCTBG	Changed	Updated all record definitions to include a new field and added new record definitions.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 716 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 716. Changes to SYSEQ Tags for Tape Record Migration

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
TGDTORD	0	Changed
TGDTORD_OLD	93	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 717 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 717. Changes to Commands for Tape Record Migration

Command	New, Changed, or No Longer Supported?	Description of Change
ZTDEV	Changed	Added the MIGRATE and CLEAR parameters.

Messages and System Errors

Table 718 on page 696 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 718. Changes to Messages and System Errors for Tape Record Migration

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000762	System Error	Changed
000764	System Error	Changed
COTH0093W	Online	Changed
COT20383A	Online	New
COT20384I	Online	New
COT20385I	Online	New
COT50007I	Online	New
COT50008I	Online	New
COT90093W	Online	New
COT90386I	Online	New
COT90387I	Online	New
COT90388W	Online	New
COT90389I	Online	New
COT90390I	Online	New
FCTB0120E	Offline	New
FCTB0121E	Offline	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

Run the file address compute (FACE) program table generator to produce a new FACE table. Run SIP to verify the new fixed file records.

See *TPF System Generation* for more information about the FACE table generator and SIP.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 719 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 719. Changes to TPF Publications for Tape Record Migration

Publication Title	Softcopy File Name	Description of Change
<i>TPF Database Reference</i>	GTPDBR09	Updated with information about TPLD and TLMR fixed file records not being restored for tape record migration.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages that were added for tape record migration.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for tape record migration.
<i>TPF Operations</i>	GTPOPR0B	Updated with information about the commands that were added and changed for tape record migration.
<i>TPF System Generation</i>	GTPSYG0B	Updated with information about the fixed file records that were added or are no longer supported for tape record migration.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install tape record migration on your TPF 4.1 system.

1. Install program update tape (PUT) 11, which contains APAR PJ26577 for tape record migration, on the TPF 4.1 system.
2. Update the record ID attribute table (RIAT), as appropriate.
 - The #IBMMP4 fixed file record type, ordinal 0, has a RIAT ID of 00EF.
 - The #TDTDR fixed file record type has a RIAT ID of 00FB.
 - The #TPLBL fixed file record type has a RIAT ID of E3E9.

See *TPF System Generation* for more information about the RIAT.

3. Update the SIP RAMFIL macro input statements to the FACE table generator (FCTBG):
 - a. Specify new record types in the RECID parameter:
 - #IBMMP4 fixed file record type
 - #TDTDR fixed file record type
 - #TPLBL fixed file record type.

- b. Ensure that the subsystem users (SSUs), processors, and I-streams correspond correctly with the new fixed file record types in the USER parameter.

#IBMMP4 fixed file record type

This fixed file record type is processor unique. It is defined for all processors in all subsystems.

#TDTDR fixed file record type

This fixed file record type is processor unique. It is defined for all processors in the BSS only.

#TPLBL fixed file record type.

This fixed file record type is SSU and processor unique. It is defined for all SSUs and all processors in all subsystems.

See *TPF System Generation* for more information about the RAMFIL macro.

4. Run the FCTBG to create a new FACE table.
 5. Assemble the SIP stage I deck to create a SIP stage II deck.
 6. Run SIP stage II.
 7. Perform a fresh load on the processor:
 - Perform a hard IPL of the processor; the tape group definition table (TGDT) record, the tape label directory (TPLD) records, and tape label mask records (TLMRs) are automatically migrated or initialized by the TPF 4.1 system.
 - If the TGDT record in the #IBMMP4 fixed file record type is not valid, the processor tries to migrate the TGDT record from the #IBMM4 fixed file record type. If the TGDT record in the #IBMM4 fixed file record type is not valid or if the processor cannot access #IBMM4, the processor initializes the TGDT record in the #IBMMP4 fixed file record type.
 - If one or more of the TPLD records or TLMRs in the #TPLBL fixed file record type for the current SSU are not valid, the processor tries to migrate the TPLD and TLMR records in the #TLDMR fixed file record type to the #TPLBL fixed file record type. If any of the TPLD records or TLMRs in the #TLDMR fixed file record type are not valid or the processor cannot access #TLDMR, the processor initializes the TPLD records and TLMRs in the #TPLBL fixed file record type. (Before tape record migration support, you would have entered the ZTLMR command with the INITIALIZE parameter specified to initialize the TPLD records and TLMRs.)
 - Each SSU is processed independently; for example, the TLMR and TPLD records might be initialized for one SSU and migrated for another SSU **on the same IPL.**
 8. If the DTDAT control record in the #TDTDR fixed file record type is not valid, the processor does one of the following:
 - If the processor ordinal number is 0, the processor tries to migrate the DTDAT records from the #TDATR fixed file record type to the #TDTDR fixed file record type. If the DTDAT records in the #TDATR fixed file record type are not valid or the processor cannot access #TDATR, the processor initializes the DTDAT records in the #TDTDR fixed file record type.
 - If the processor ordinal number is 1–7, the TPF 4.1 system suspends tape restart and issues a message prompting you to enter the ZTDEV command with the MIGRATE parameter specified (to migrate the DTDAT records) or the CLEAR parameter specified (to clear the DTDAT records).
- If the MIGRATE parameter is specified, the TPF 4.1 system tries to migrate the DTDAT records from the #TDATR fixed file record type to the #TDTDR fixed file record type; the TPF 4.1 system clears the records if the DTDAT

records in the #TDATR fixed file record type are not valid or if it cannot access the #TDATR fixed file record type.

Note: Use the MIGRATE parameter only if the current processor has valid #TDATR fixed file records. (The #TDATR records are valid if the processor was IPLed before tape record migration was applied.) Otherwise, enter the ZTDEV command with the CLEAR parameter specified.

If the CLEAR parameter is specified, the DTDAT records in the #TDTDR fixed file record type are cleared. Clearing the DTDAT records permits tape restart to initialize the DTDAT records in the #TDTDR fixed file record type when tape restart continues.

Note: A processor migrates or initializes its own tape records only; it does not affect the records of other processors. Therefore, all processors must be loaded and IPLed at least once to migrate all records.

When **all** processors in the complex are IPLed, the #TLDMMR and #TDATR fixed file record types can be removed. These record types are only required when nonmigrated processors are active in the complex or when nonmigrated processors need to migrate these records to the new record type.

TPF Support for VisualAge Client (APARs PJ26600, PJ26581, and PJ26666)

The following section discusses the migration considerations for TPF support for VisualAge client.

Prerequisite APARs

See the APEDIT for APARs PJ26600, PJ26581, and PJ26666 for information about prerequisite APARs.

Functional Overview

TPF Support for VisualAge Client includes the following three small programming enhancements (SPEs) for program update tape (PUT) 11:

- Debug on system error
- Universal data display
- Trace on production.

Debug on system error (APAR PJ26600) helps you to recover after getting a system error while running an application program. When you see a problem in the program, debug on system error gives you the opportunity to correct the error and to continue running the program. To use debug on system error, you must have an active debugger session for the TPF Assembler Debugger for VisualAge Client or TPF C Debugger for VisualAge Client.

The *universal data display* (APAR PJ26581) provides a single interface to display entry control block (ECB) data for the TPF Assembler Debugger for VisualAge Client or TPF C Debugger for VisualAge Client. The ECB data is more comprehensive and more readable with the universal data display (UDD) than with displays that were previously available; the UDD provides for views of the ECB work areas, levels, and other selected fields. The UDD shows you a seamless view of the ECB no matter which debugger is active.

Trace on production (APAR PJ26666) offers enhancements to the ZDEBUG command, including the ability to disable the TPF Assembler Debugger for VisualAge Client or TPF C Debugger for VisualAge Client. You can also display trace registration information for one or both of the trace-by-program and trace-by-terminal tables whether the entry status is active or nonactive. You can also clear the trace entry for a specified Internet Protocol (IP) address.

Architecture

Debug on system error sets an implied breakpoint when the ECB that is being traced takes a system error in the program. You can toggle the exception filter for the debuggers from the debugger graphical user interface (GUI); the TEST(ALL) filter option sets the implied breakpoint when system errors occur. If the system error occurs in an area that contains hooks, the TPF C Debugger for VisualAge Client is activated; otherwise, the TPF Assembler Debugger for VisualAge Client is activated.

One of the debuggers is activated when you are receiving system errors in any of the following:

- Application programs; for example, real-time programs such as assembler programs or dynamic load modules (DLMs).
- Library routines.

- Dynamic link libraries (DLLs).

When the debugger is active, you can select one of the following options:

Examine	This option forces the application to go to the next sequential instruction (NSI). The source of the program where the error occurred is presented to you for the TPF C Debugger for VisualAge Client. The disassembled listing is shown to you when you are using the TPF Assembler Debugger for VisualAge Client.
Step exception	This option forces the system error to occur. It also sets a breakpoint at the next sequential instruction.
Run exception	This forces the system error to occur and runs to the next breakpoint.

Neither of the debuggers is activated when the following conditions occur:

- When a system error occurs in the control program
- When a system error occurs in a program for which the NODBUG option is set in the program allocation table (PAT)
- When a system error occurs during the cycle-down procedure
- When a system error occurs while you are trying to activate a debugger from a previous system error
- Catastrophic system errors.

The UDD is a client/server application that consists of two components:

- The TPF host (server) component is shipped with the TPF 4.1 system. Once the server component is loaded, activate it by entering the following: **ZINET ADD S-VAUDD PGM-CUDZ PORT-8008 P-TCP MODEL-NOWAIT**
This command instructs the Internet daemon (INETD) to listen on port 8008 for a start request from the workstation component. The Internet daemon starts a new instance of the universal data display server (UDDS). The UDDS searches for all of the ECBs that are being debugged from the workstation that started the client. The ECBs are then sent to the client to be displayed. The UDDS listens to C signals (from the debuggers), which indicate whether an ECB was changed or ended. The client is notified of these events and the display is updated accordingly.
- The workstation component is started by selecting a user-configured toolbar button on the VisualAge TPF integrated development environment (IDE). It sends an initial request to the UDDS to establish a new socket with the universal data display client (UDDC). The UDDC accepts the ECBs (one or more) that are being debugged from the UDDS.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the

TPF C/C++ Language Support User's Guide and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 720 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 720. Changes to Build Scripts for TPF Support for VisualAge Client

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
APAR PJ26581			
CUDZBS	C++ Language	New	Created for UDD support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 721 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 721. Changes to General Use C/C++ Language Header Files for TPF Support for VisualAge Client

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
APAR PJ26600		
c\$cinfc.h	Changed	No
APARs PJ26600 and PJ26581		
c\$eb0eb.h	Changed	No
APAR PJ26666		
c\$idsicd.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 722 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 722. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF Support for VisualAge Client

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
APAR PJ26600		
i\$ecb3.h	Changed	No
APAR PJ26581		
i\$udcl.hpp	Changed	No
APARs PJ26600 and PJ26581		
i\$udbg.hpp	Changed	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 723 on page 703 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 723. Changes to Library Members (Object Files) for TPF Support for VisualAge Client

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
APAR PJ26600				
CSERRC	CTAL	Changed	C Language	Updated for debug on system error support.

Link-Edited Modules: Table 724 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 724. Changes to Link-Edited Modules for TPF Support for VisualAge Client

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
APARs PJ26600 and PJ26581		
CDBG40	Changed	Updated for debug on system error and UDD support.
CPLX40	Changed	Updated for debug on system error and UDD support.

Members (Object Files): Table 725 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 725. Changes to Members (Object Files) for TPF Support for VisualAge Client

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
APAR PJ26600				
CDBS	CDBS	Changed	C Language	Updated for debug on system error support.
CUD2	CUD2	Changed	C Language	Updated for debug on system error support.
CUD3	CUD2	Changed	C Language	Updated for debug on system error support.
CUD4	CUD2	Changed	C Language	Updated for debug on system error support.
CUD5	CUD2	Changed	C Language	Updated for debug on system error support.
APAR PJ26581				
CUDY	CUDZ	New	Assembler	Created for UDD support.
CUDZ	CUDZ	New	C++ Language	Created for UDD support.
CUD0	CUD0	Changed	C Language	Updated for UDD support.
APAR PJ26666				
CUDXDA	CDBS	Changed	Real-Time Assembler	Updated to disable user exits for the TPF Assembler Debugger for VisualAge Client.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Copy Members

Table 726 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 726. Changes to Copy Members for TPF Support for VisualAge Client

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
APAR PJ26600					
CHSZ	Control Program	CCNUCL	Not Applicable	Changed	Updated for debug on system error support.
CICR	Control Program	CCNUCL	Not Applicable	Changed	Updated for debug on system error support.
CPSE	Control Program	CCCPSE	Not Applicable	Changed	Updated for debug on system error support.
CUDT	Control Program	CCVAGE	Not Applicable	Changed	Updated for debug on system error support.
CUDU	Control Program	CCVAGE	Not Applicable	Changed	Updated for debug on system error support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 727 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 727. Changes to Data Macros for TPF Support for VisualAge Client

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
APAR PJ26600		
EB0EB	Changed	No
IDSBG	New	No
IUDBG	Changed	No
APAR PJ26666		
IDSICD	Changed	No

General Macros: Table 728 on page 705 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 728. Changes to General Macros for TPF Support for VisualAge Client

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
APAR PJ26600		
CINFC	Changed	No

Selected Equate Macros: Table 729 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 729. Changes to Selected Equate Macros for TPF Support for VisualAge Client

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
APARs PJ26600 and PJ26581		
IEQCE2	Changed	No
APAR PJ26600		
CZ1SE	Changed	No
IEQCE3	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 730 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 730. Changes to SIP Skeleton and Internal Macros for TPF Support for VisualAge Client

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
APARs PJ26600, PJ26581, and PJ26666	
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 731 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 731. Changes to SIP Stage II Macros for TPF Support for VisualAge Client

SIP Stage II Macro	New, Changed, or No Longer Supported?
APARs PJ26600 and PJ26581	
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 732 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 732. Changes to Segments for TPF Support for VisualAge Client

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
APAR PJ26600				
CPSA	Real-Time Assembler	Not Applicable	Changed	Updated to turn off the trace entry for a child ECB.
CPSZ	Real-Time Assembler	Not Applicable	New	Created for debug on system error.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 733 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 733. Changes to Commands for TPF Support for VisualAge Client

Command	New, Changed, or No Longer Supported?	Description of Change
APAR PJ26666		
ZDEBUG	Changed	Added additional parameters.

Messages and System Errors

Table 734 on page 707 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 734. Changes to Messages and System Errors for TPF Support for VisualAge Client

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
APAR PJ26581		
CUDZ0001E	Online	New
CUDZ0002E	Online	New
CUDZ0003E	Online	New
CUDZ0099E	Online	New
APAR PJ26666		
CDBS0008E	Online	New
CDBS0011I	Online	New
CDBS0012I	Online	New
CDBS0013I	Online	New
CDBS0014I	Online	New
CDBS0015I	Online	New
CDBS0016I	Online	New
CDBS0017I	Online	New
CDBS0018W	Online	New
CDBS0019I	Online	New

Performance or Tuning Changes

APAR PJ26468 improves the performance of the TPF C Debugger for VisualAge Client.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 735 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 735. Changes to TPF Publications for TPF Support for VisualAge Client

Publication Title	Softcopy File Name	Description of Change
<i>TPF Library Guide</i>	GTPDOC0B	Updated with definitions for new terminology in the master glossary.

Table 735. Changes to TPF Publications for TPF Support for VisualAge Client (continued)

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF Support for VisualAge Client.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for TPF Support for VisualAge Client.
<i>TPF Operations</i>	GTPOPR0B	Updated with information about the commands that were changed for TPF Support for VisualAge Client.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TPF Support for VisualAge Client on your TPF 4.1 system.

1. Update the library system with the contents of program update tape (PUT) 11.
2. Install the current version of VisualAge TPF for Windows NT.
3. Install the UDD client code from the following Web site:
<http://www.ibm.com/software/ad/vatpf>
4. Compile your applications. If you are changing load modules (DLLS, DLMS, or LLMS), you must compile your applications with the IBM OS/390 C/C++ Version 2 Release 6 compiler.

Program Update Tape 12 (PUT 12)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 12 (PUT 12).

SPE	Where to Go For More Information
File Transfer Protocol (FTP) Server Support	"File Transfer Protocol (FTP) Server Support (APAR PJ27028)" on page 710
TPFCS Recoup Index Command Support	"TPFCS Recoup Index Command Support (APAR PJ26887)" on page 717
Transmission Control Protocol/Internet Protocol Support for the TPF Application Requester	"Transmission Control Protocol/Internet Protocol Support for the TPF Application Requester (APAR PJ27079)" on page 725
Transmission Control Protocol/Internet Protocol (TCP/IP) PUT 12 Enhancements	"Transmission Control Protocol/Internet Protocol (TCP/IP) PUT 12 Enhancements (APARs PJ26890 and PJ26904)" on page 734
Turbo Enhancements for TPF Support of MQSeries Local Queue Manager	"Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (APAR PJ27023 and APAR PJ27050)" on page 744

TPF 4.1 PUT 12 is compiled with the IBM OS/390 C/C++ Version 2 Release 8 compiler. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

File Transfer Protocol (FTP) Server Support (APAR PJ27028)

The following section discusses the migration considerations for File Transfer Protocol (FTP) server support.

Prerequisite APARs

See the APEDIT for APAR PJ27028 for information about prerequisite APARs.

Functional Overview

File Transfer Protocol (FTP) server support allows you to transfer files between the TPF 4.1 system and a remote host that supports Transmission Control Protocol/Internet Protocol (TCP/IP) and FTP clients. FTP server support provides the following benefits:

- Reliable file transfer. FTP server support is built on the transport layer of Transmission Control Protocol (TCP) services.
- Features and options such as user authentication, data conversion, and directory listings.
- Support for the following file system files:

File System File Name	Description
/etc/ftpusers	Contains the names of users that may not log in to the system through the FTP server.
/etc/ftpwelcome	A welcome notice that contains a welcome message.
/etc/motd	A welcome notice presented after you log on that contains a logon message.
/etc/nologin	A notice displayed when access is denied that contains a message stating that the logon is rejected. Attention: If the etc/nologin file exists, the FTP server will not be available and you will not be able to log on.

- Support for the following FTP clients:
 - Windows NT
 - UNIX
 - OS/390.

Architecture

The FTP server establishes two connections between the client and server processes: one connection for control information (commands and responses), and the other connection for the data that is transferred.

The FTP client on the remote host is prompted for access information, such as the logon name and password on the remote system.

The files can be transferred in both directions. The FTP server can handle both binary and text files.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about C/C++ language.

Build Scripts: Table 736 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 736. Changes to Build Scripts for FTP Server Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CFTPBS	DLM	New	Added for FTP server support.
CISOBS	DLM	Changed	Added for FTP server support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 737 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 737. Changes to General Use C/C++ Language Header Files for FTP Server Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
reusable.h	Changed	No
string.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 738 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 738. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for FTP Server Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
extern.h	New	No
ftp.h	New	No
telnet.h	New	No
utmp.h	New	No

Library Interface Scripts: Table 739 on page 712 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 739. Changes to Library Interface Scripts for FTP Server Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	Updated to add the strdup C library function.

Library Members (Object Files): Table 740 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 740. Changes to Library Members (Object Files) for FTP Server Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
COSTRD	CISO	New	C Language	Created for the strdup C library function.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 741 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 741. Changes to Members (Object Files) for FTP Server Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFTP1	CFTP	New	C Language	Created for the FTP server main function.
CFTP2	CFTP	New	C Language	Created for the FTP command file.
CFTP3	CFTP	New	C Language	Created for the FTP server list function.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 742 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 742. Changes to SIP Skeleton and Internal Macros for FTP Server Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 743 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 743. Changes to SIP Stage II Macros for FTP Server Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

There are no changes.

Commands

There are no changes.

Messages and System Errors

Table 744 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 744. Changes to Messages and System Errors for FTP Server Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
FTPD001I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 745 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 745. Changes to TPF Publications for FTP Server Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0B	Updated with an overview for FTP server support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0C	Added strdup to the appendix of standard C functions that are supported by the TPF 4.1 system.
<i>TPF Concepts and Structures</i>	GTPCON09	Updated with an overview for FTP server support.
<i>TPF Library Guide</i>	GTPDOC0C	Updated an existing term, well-known port, for FTP server support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about a message that was added for FTP server support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG202	Updated with migration considerations for FTP server support.

Table 745. Changes to TPF Publications for FTP Server Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF System Generation</i>	GTPSYG0C	Updated with information about FTP server support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW08	Updated with an overview for FTP server support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install FTP server support on your TPF 4.1 system.

1. Install program update tape (PUT) 12.
2. Verify that all users of FTP server support are in the passwd file by doing the following.
 - a. Create a backup copy of the passwd/group file by entering the following:
 - **ZFILE cp /etc/passwd /etc/passwd.bck**
 - **ZFILE cp /etc/group /etc/group.bck**
 - **ZFILE chmod 500 /etc/passwd.bck**
 - **ZFILE chmod 500 /etc/group.bck**

See *TPF Operations* for more information about the ZFILE cp and ZFILE chmod commands.

- b. Transfer the password file. Use Trivial File Transfer Protocol (TFTP) to transfer the file to an appropriate system where you can edit the file.

For example, to receive the file from your TPF 4.1 system to a system where you can edit the file, enter the following:

TFTP *tpf.inet.addr* get /etc/passwd passwd

Where:

tpf.inet.addr

is the Internet Protocol (IP) address for your TPF 4.1 system or its dotted decimal equivalent.

etc/passwd

is the directory.

- c. Edit the passwd file using a local editor.

The file must contain the following lines for the FTP user:

ftp::19:1::usr/ftp:

The file must contain the following lines for the anonymous user:

anonymous::263:1::usr/anonymous:

- d. Transfer the passwd file back to the TPF 4.1 system by using the command that is appropriate to the system where you maintain your passwd/group file. For example, to send the passwd file to your TPF 4.1 system from another system, enter the following:

TFTP *tpf.inet.addr* put passwd /etc/passwd

Where:

tpf.inet.addr

is the IP address for your TPF 4.1 system or its dotted decimal equivalent.

passwd

is the file name of the passwd file on your PC.

3. Build your FTP subtree according to the following rules:

ftp Make the home directory mode 555 and owned by the root directory. The home directory must not be written to unless you are a superuser.

ftp/pub

Make this directory mode 777 and owned by ftp. Guests can then place files in this directory, which can be accessed by the anonymous account.

Based on the modifications in step 2c on page 715, enter the following commands to set up the ftp, ftp/etc, and ftp/pub directories:

- **ZFILE mkdir /usr/ftp**
- **ZFILE mkdir /usr/ftp/pub**
- **ZFILE chmod 555 /usr/ftp**
- **ZFILE chmod 777 /usr/ftp/pub**

See *TPF Operations* for more information about the ZFILE mkdir and ZFILE chmod commands.

4. Add the Internet daemon definition for the FTP server using the command by entering:

ZINET DISPLAY S-* C-F

If the FTP server is not defined, enter:

- **ZINET ADD S-FTP PGM-CFTP P-TCP PORT-21 MODEL-NOWAIT
USER-root ACT-OPER MAXPROC-10**

See *TPF Operations* for more information about the ZINET DISPLAY and ZINET ADD commands.

5. Start the FTP server by entering:

- a. **ZINET START**
- b. **ZINET START S-FTP.**

See *TPF Operations* for more information about the ZINET START command.

When the FTP server has been successfully started, a message will be displayed stating that the server is now accepting connections.

TPFCS Recoup Index Command Support (APAR PJ26887)

The following section discusses the migration considerations for TPF collection support (TPFCS) recoup index command support.

Prerequisite APARs

See the APEDIT for APAR PJ26887 for information about prerequisite APARs.

Functional Overview

TPFCS has been enhanced in the following ways:

- The ZBROW RECOUP command was added to help manage recoup indexes, which describe the location of embedded file addresses and persistent identifiers (PIDs) in collections. With this command, you can:
 - Create and delete recoup indexes
 - Add and delete entries in a recoup index
 - Display a recoup index
 - Create and remove recoup index associations with collections.

See *TPF Operations* for more information about the ZBROW RECOUP command.

- The T02_getCollectionKeys application programming interface (API) has been added, which returns a temporary collection containing the primary key values for all elements in a keyed collection.

See the *TPF C/C++ Language Support User's Guide* for more information about this API.

- In addition to the enhancements listed, the following have been corrected:
 - TPFCS now enforces unique tokens for any recoup index created after this change is installed.
 - Errors in processing the T02_removeRecoupIndexFromPID API have been eliminated.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 746 on page 718 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 746. Changes to Build Scripts for TPFCS Recoup Index Command Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CJ10BS	DLM	Changed	Changed the build script for the ZBROW RECOUP command.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 747 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 747. Changes to General Use C/C++ Language Header Files for TPFCS Recoup Index Command Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$to2.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 748 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 748. Changes to General Use C/C++ Language Header Files for TPFCS Recoup Index Command Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$to2b.h	Changed	No
c\$to2m.h	Changed	No
c\$to2r.h	Changed	No

Library Interface Scripts: Table 749 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 749. Changes to Library Interface Scripts for TPFCS Recoup Index Command Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CJ00XV	Changed	Updated to support the T02_getCollectionKeys function.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 750 on page 719 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 750. Changes to Members (Object Files) for TPFCS Recoup Index Command Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CJ106	CJ10	Changed	C Language	Removed the RCPINDEX parameter from the ZBROW COLLECTION functional message.
CJ114	CJ10	New	C Language	Created for the ZBROW RECOUP command.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 751 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 751. Changes to Copy Members for TPFCS Recoup Index Command Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CJ001	Real-Time Assembler	CJ003	CJ00	Changed	Updated to add the T02_getCollectionKeys function.
CJ101	Real-Time Assembler	CJ100	CJ10	Changed	Updated for the ZBROW RECOUP command.
CJ104	Real-Time Assembler	CJ100	CJ10	Changed	Updated for the ZBROW RECOUP command.
CJ303	Real-Time Assembler	CJ000	CJ00	Changed	Updated to add the T02_getCollectionKeys function.
CJ365	Real-Time Assembler	CJ006	CJ00	Changed	Updated to enforce unique recoup index entry tokens.
CJ366	Real-Time Assembler	CJ006	CJ00	Changed	Updated to enforce unique recoup index entry tokens.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 752 on page 720 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 752. Changes to Data Macros for TPFCS Recoup Index Command Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ITO2	Changed	No

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 753 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 753. Changes to SIP Skeleton and Internal Macros for TPFCS Recoup Index Command Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 754 on page 721 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 754. Changes to Commands for TPFCS Recoup Index Command Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZBROW COLLECTION	Changed	Removed the RCPINDEX parameter to display recoup indexes. The RCPINDEX parameter has been replaced by the ZBROW RECOUP command.
ZBROW RECOUP	New	Added for managing recoup indexes.

Messages and System Errors

Table 755 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 755. Changes to Messages and System Errors for TPFCS Recoup Index Command Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BROW0423I	Online	No Longer Supported
BROW0424I	Online	No Longer Supported
BROW0471E	Online	No Longer Supported
BROW0472E	Online	No Longer Supported
BROW1001I	Online	New
BROW1011I	Online	New
BROW1012I	Online	New
BROW1013I	Online	New
BROW1014I	Online	New
BROW1015I	Online	New
BROW1016I	Online	New
BROW1017I	Online	New
BROW1018I	Online	New
BROW1051E	Online	New
BROW1053E	Online	New
BROW1054E	Online	New
BROW1055E	Online	New
BROW1056E	Online	New
BROW1057E	Online	New
BROW1058W	Online	New
BROW1059E	Online	New
BROW1061E	Online	New

Table 755. Changes to Messages and System Errors for TPFCS Recoup Index Command Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BROW1062E	Online	New
BROW1063E	Online	New
BROW1064E	Online	New
BROW1065E	Online	New
BROW1066E	Online	New
BROW1067E	Online	New
BROW1070E	Online	New
BROW1072E	Online	New
BROW1073E	Online	New
BROW1074E	Online	New
BROW1075E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 756 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 756. Changes to TPF Publications for TPFCS Recoup Index Command Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0C	Added a C/C++ function for TPFCS recoup index command support.
<i>TPF Database Reference</i>	GTPDR0A	Updated with information about TPFCS recoup index command support.
<i>TPF Library Guide</i>	GTPDOC0C	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPFCS recoup index command support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG202	Updated with migration considerations for TPFCS recoup index command support.

Table 756. Changes to TPF Publications for TPFCS Recoup Index Command Support (continued)

Publication Title	Softcopy File Name	Description of Change
TPF Operations	GTPOPR0C	Updated with information about the commands that were added and changed for TPFCS recoup index command support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To add TPFCS recoup index command support to your existing TPF 4.1 system, do the following:

1. Install program update tape (PUT) 12.
2. Verify that the following are installed:
 - Header files listed in Table 747 on page 718 and Table 748 on page 718
 - Copy members listed in Table 751 on page 719
 - Macros listed in Table 752 on page 720 and Table 753 on page 720.
3. Run the LIBI offline program for all changed library interface scripts listed in Table 749 on page 718.
4. Reassemble the stage I deck.
5. Run the CBLD program for the build scripts listed in Table 746 on page 718.
6. Reassemble or recompile the following:
 - DLM members listed in Table 750 on page 719
 - CSECTs listed in Table 751 on page 719.
7. Link-edit the DLMS/DLLs that are listed in Table 750 on page 719 and Table 751 on page 719.
8. Load the updated object code to your TPF 4.1 system.

Fallback and Coexistence

As part of APAR PJ26887 and to enforce uniqueness of recoup index entry tokens, recoup indexes were changed so they are created as sorted set collections instead of sorted bag collections. Recoup indexes that were created before APAR PJ26887 as sorted bag collections will still be effective after APAR PJ26887 is applied and do not have to be changed to the new format.

If APAR PJ26887 must be removed from your TPF 4.1 system, you will need to remove all indexes created with it before you remove APAR PJ26887. However, you

can re-create these indexes after you remove APAR PJ26887. Once APAR PJ26887 has been removed, any attempt to access or delete a recoup index which was created by APAR PJ26887 will produce results that are not predictable.

Transmission Control Protocol/Internet Protocol Support for the TPF Application Requester (APAR PJ27079)

The following section discusses the migration considerations for TCP/IP support for the TPF Application Requester.

Prerequisite APARs

See the APEDIT for APAR PJ27079 for information about prerequisite APARs.

Functional Overview

The TPF Application Requester (TPFAR) feature has been enhanced to support connectivity by using Transmission Control Protocol/Internet Protocol (TCP/IP). This adds an additional level of operability with relational databases that use Distributed Relational Database Architecture (DRDA) level 3. Data can now be shared between database servers that are compliant with DRDA level 3 and a TPF application using the TPFAR feature. The communication manager providing TCP/IP network protocol support (CMNTCPIP) and the security manager (SECMGR) are supported at DRDA level 5. No other features of DRDA level 3 have been added.

An existing TPFAR application will continue to run without the need to recompile, reassemble, or reload. In addition, application programs that currently use the TPFAR feature can take advantage of new functions without recompiling, but rather by reconfiguring the internal Structured Query Language (SQL) database management system directory (SDD) by using the ZSQLD command to specify connection information for the TCP/IP host. The SDD has been expanded to 10 ordinals and modified to use processor unique fixed file record IBMMP4. This involves the migration of fixed file records from IBMM4 to IBMMP4. The ZSQLD command has been updated to allow you to associate an Internet Protocol (IP) address with a database name as well as to determine whether access to this database should be by a Systems Network Architecture (SNA) or TCP/IP connection. You can specify either a host name or an IP address to choose the TCP/IP host that you want to connect to. The ZSQLD parser has also been updated to receive the ZSQLD parameters in any order. See *TPF Operations* for more information about the ZSQLD command.

Hotcons are now supported to include TCP/IP socket connections. Previously, only hot conversations for LU 6.2 were supported. The TPF socket sweeper is disabled while connections are in the hotcon table. See *TPF ACF/SNA Network Generation* for more information about hotcons.

Note: Socket sweeper enhancements (APAR PJ26917), which is part of program update tape (PUT) 12, is required for TCP/IP support for the TPF Application Requester.

Support is provided for both offload and native stack devices.

Architecture

TCP/IP support for the TPFAR feature is based on DRDA level 3. DRDA is a connection protocol for distributed relational database processing that describes the contents of all the data objects that flow on either commands or replies between the application requester (AR) and the application server (AS).

The basis for DRDA is Distributed Data Management Architecture (DDM). DDM is the architecture that allows an application program to work on data that resides in a

remote system. DDM describes the common interfaces for the interchange of data; specifically, the commands, parameters, data objects, and reply messages. DDM levels are broken down into manager levels for the various components. The new manager levels supported with TCP/IP support for the TPFAR feature are CMNTCPIP and SECMGR.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 757 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 757. Changes to Build Scripts for TCP/IP Support for the TPF Application Requester

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CPGBBS	DLM	New	Created to support the translate table.
CRDABS	DLM	Changed	CREF was added to CRDABS.
CREABS	DLM	Changed	CREF was added to CRDEBS.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 758 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 758. Changes to General Use C/C++ Language Header Files for TCP/IP Support for the TPF Application Requester

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$icmn.h	Changed	Yes
c\$iddm.h	Changed	Yes
c\$iddmeq.h	Changed	Yes
c\$idir.h	Changed	Yes
c\$ihctcb.h	Changed	Yes
c\$imer.h	Changed	Yes
c\$isddcb.h	Changed	Yes
c\$istpcb.h	Changed	Yes
c\$syseq.h	Changed	Yes

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 759 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 759. Changes to Copy Members for TCP/IP Support for the TPF Application Requester

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Not Applicable	Changed	Updated to support TCP/IP hotcons.
CRD0	Control Program	CCNUCL	Not Applicable	Changed	Updated to support Distributed Relational Database Architecture (DRDA) level 3.

Fixed File Records

Table 760 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 760. Changes to Fixed File Records for TCP/IP Support for the TPF Application Requester

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
IBMMP4	Changed	Updated to move the SDD entries to a processor unique record.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 761 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 761. Changes to Data Macros for TCP/IP Support for the TPF Application Requester

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CFMDC	Changed	Yes
CZ1SE	Changed	Yes

Table 761. Changes to Data Macros for TCP/IP Support for the TPF Application Requester (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDDMEQ	Changed	Yes
IHCTCB	Changed	Yes
ISTPCB	Changed	Yes
SNAKEY	Changed	Yes

General Macros: There are no changes.

Selected Equate Macros: Table 762 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 762. Changes to Selected Equate Macros for TCP/IP Support for the TPF Application Requester

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SYSEQ	Changed	Yes

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 763 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 763. Changes to SIP Skeleton and Internal Macros for TCP/IP Support for the TPF Application Requester

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 764 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 764. Changes to SIP Stage II Macros for TCP/IP Support for the TPF Application Requester

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 765 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 765. Changes to Segments for TCP/IP Support for the TPF Application Requester

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CRDA	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDB	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDC	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDE	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDF	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDH	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDI	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDK	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDM	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRDO	C Language	CRDU	Changed	Updated with support for TCP/IP.
CRDP	C Language	CRDU	Changed	Updated with support for TCP/IP.
CRDU	C Language	CRDU	Changed	Updated with support for TCP/IP.
CRDV	C Language	CRDU	Changed	Updated with support for TCP/IP.
CRDZ	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CRD9	Real-Time Assembler	Not Applicable	Changed	Updated with support for TCP/IP.
CREA	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CREB	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CREF	C Language	CREA, CRDA	New	Created to support TCP/IP.
CREG	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CREH	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CREI	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CREK	C Language	CREA, CRDA	Changed	Updated with support for TCP/IP.
CSKA	Real-Time Assembler	Not Applicable	Changed	Updated with support for TCP/IP.
CSNAM	Real-Time Assembler	CISO	Changed	Updated with support for TCP/IP.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 766 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 766. Changes to SYSEQ Tags for TCP/IP Support for the TPF Application Requester

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#AR_SDD1	2	New
#AR_SDD2	3	New

Table 766. Changes to SYSEQ Tags for TCP/IP Support for the TPF Application Requester (continued)

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#AR_SDD3	4	New
#AR_SDD4	5	New
#AR_SDD5	6	New
#AR_SDD6	7	New
#AR_SDD7	8	New
#AR_SDD8	9	New
#AR_SDD9	10	New
#AR_SDD10	11	New
#AR_SDD_EOT	0	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 767 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 767. Changes to Commands for TCP/IP Support for the TPF Application Requester

Command	New, Changed, or No Longer Supported?	Description of Change
ZNKEY	Changed	Updated the MAXHCT parameter.
ZSQLD	Changed	Updated with new parameters for TCP/IP options.

Messages and System Errors

Table 768 on page 731 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 768. Changes to Messages and System Errors for TCP/IP Support for the TPF Application Requester

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0007E7	System Error	New
0007E8	System Error	New
CRD90021I	Online	Changed
NKEY0021E	Online	No Longer Supported
NKEY0022E	Online	No Longer Supported
NKEY0121E	Online	New
NKEY0122E	Online	New
SQLD0017I	Online	No Longer Supported
SQLD0018I	Online	No Longer Supported
SQLD0051W	Online	No Longer Supported
SQLD0052W	Online	No Longer Supported
SQLD0117I	Online	New
SQLD0118I	Online	New
SQLD0151W	Online	New
SQLD0152W	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

The TPFAR feature uses one socket for each connection, so the number of available sockets must, at least, equal the number of connections. Use the MAXSOCK parameter of the SNAKEY macro to set the maximum number of sockets. If hotcons are used, sockets are then saved in the hotcon table (HCT). See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro and the hotcon table.

System Initialization Program (SIP) and System Generation Changes

To use TCP/IP support for the TPFAR feature you must have sockets defined, so the MAXSOCK parameter of the SNAKEY macro must be greater than zero. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 769 on page 732 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 769. Changes to TPF Publications for TCP/IP Support for the TPF Application Requester

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF0B	Updated the MAXHCT parameter and added new definitions.
<i>TPF Application Requester User's Guide</i>	GTPARU04	Updated with information about TCP/IP support for the TPF Application Requester.
<i>TPF Library Guide</i>	GTPDOC0C	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TCP/IP support for the TPF Application Requester.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for TCP/IP support for the TPF Application Requester.
<i>TPF Operations</i>	GTPOPR0C	Updated the ZSQLD command for TCP/IP support for the TPF Application Requester.
<i>TPF Program Development Support Reference</i>	GTPPDV0C	Updated with a terminology change for TCP/IP support for the TPF Application Requester.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

TCP/IP support for the TPF Application Requester adds support for the TPFAR feature only.

Installation Validation

When you perform an initial program load (IPL) of the TPF 4.1 system, a Structured Query Language (SQL) database management system directory (SDD) migration message is displayed indicating that the SDD has been migrated successfully. If this message is not displayed, TCP/IP support for the TPF Application Requester has not been installed. After migration, all SDD modifications are saved in the new IBMMP4 fixed file records. The SDD migration message will continue to be displayed during TPF restart until an entry is added or modified in the SDD that will cause the SDD to be filed (for example, a ZSQLD command with the ADD parameter specified). See *TPF Operations* for more information about the ZSQLD command.

Migration Scenarios

To install TCP/IP support for TPFAR on your TPF 4.1 system, you must install program update tape (PUT) 12.

Notes:

1. Once you have installed TCP/IP support for the TPF Application Requester, all database modifications that you have made to the SDD by using the ZSQLD command are filed in the IBMMP4 fixed file record. See *TPF Operations* for more information about the ZSQLD command. If you need to fall back to a level of

code that does not have TCP/IP support for the TPF Application Requester (for example, to resolve a problem), all the database modifications that have been filed in fixed file record IBMMP4 become unavailable as soon as you load the back-level code. However, the database modifications filed in IBMMP4 will become available again at the next migration.

2. Socket sweeper enhancements (APAR PJ26917), which is part of PUT 12, is required for TCP/IP support for the TPF Application Requester.

Transmission Control Protocol/Internet Protocol (TCP/IP) PUT 12 Enhancements (APARs PJ26890 and PJ26904)

The following section discusses the migration considerations for TCP/IP PUT 12 enhancements.

Prerequisite APARs

See the APEDIT for APARs PJ26890 and PJ26904 for information about prerequisite APARs.

Functional Overview

TCP/IP PUT 12 enhancements has support for both Internet Protocol (IP) routing tables (APAR PJ26890) for TPF Transmission Control Protocol (TCP) client applications and TCP/IP network tools (APAR PJ26904):

- IP Routing Tables provides the following benefits to TPF TCP/IP native stack support:
 - TPF TCP client socket applications can connect to remote servers without having to explicitly bind to a specific TPF local IP address or rely on a single default local IP address when TPF is connected to multiple IP networks.

With support for IP routing tables, the IP address of the remote server can be associated with any local IP address defined on a given TPF processor. When the TPF client socket application attempts to connect to the remote server without first issuing a bind, the TPF 4.1 system will implicitly bind using the local IP address associated with the remote IP address of the server in the IP routing table.

If the TPF 4.1 system does not find an IP routing table entry for the desired remote server, the default local IP address is used. If multiple entries are found for the desired remote server, the TPF 4.1 system will round-robin through the local IP addresses of the entries in an attempt to balance the workload
 - The ability of a TPF processor to connect to multiple IP networks is enhanced. By removing the dependency on a single default local IP address, TPF processors have greater flexibility connecting to multiple IP networks. IP routing table entries can be set up to associate local IP addresses with a remote IP network.

The ZTRTE command manages the IP routing tables. Each time the ZTRTE command is used to add, delete, or modify IP routing table entries, the contents of the table are filed out. This enables the table to be rebuilt following an IPL of the TPF 4.1 system. You can also use the ZTRTE command to display the current contents of the table.

- The addition of TCP/IP network tools provides the ZSOCK command and enhances TCP/IP native stack support, shipped on program update tape (PUT) 11, in the following ways:
 - Formatted or unformatted socket control block information can be displayed to assist in diagnosing TCP/IP related problems.
 - A summary report of sockets based on your input selection criteria such as local IP address, local port number, remote IP address, remote port number, or protocol, can be displayed.
 - A specific socket or group of sockets again based on user input selection criteria can be selectively deactivated. This allows you to recover from IP network problems.

The LOCAL parameter was added to the ZDTCP command. This parameter allows you to specify which local TPF IP address you want to use with either the PING or TRACERTE parameters specified. The LOCAL parameter can be used with both TCP/IP offload support and TCP/IP native stack support.

Architecture

IP routing tables support is only used for TPF client socket applications and is only used to determine which local IP address will be used by the client socket. The TPF 4.1 system does **not** provide full IP routing table support and does **not** route packets that it receives to other hosts or routers. UDP TPF client socket applications or raw socket applications are **not** supported with IP routing tables.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TCP/IP PUT 12 enhancements, you must establish the required operating environment. The following section describes hardware and software requirements specific to TCP/IP PUT 12 enhancements.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

See “Operating Environment Requirements and Planning Information” on page 629 for more information about hardware and software requirements.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 770 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 770. Changes to Build Scripts for TCP/IP PUT 12 Enhancements

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CTFCBS	DLM	New	Created for the ZSOCK command parser.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 771 on page 736 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 771. Changes to General Use C/C++ Language Header Files for TCP/IP PUT 12 Enhancements

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	Changed	No
c\$fva0.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 772 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 772. Changes to Members (Object Files) for TCP/IP PUT 12 Enhancements

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CLTN	CLTN	Changed	C Language	Updated the ZDTCP command.
CLTQ	CLTN	Changed	C Language	Updated the ZDTCP command.
CLTT	CLTN	Changed	C Language	Updated the ZDTCP command.
CTFC	CTFC	New	C Language	Created for the ZSOCK command parser.
FTVA03	FCTB6	Changed	C Language	Added #IPRTE record definition checks.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 773 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 773. Changes to Copy Members for TCP/IP PUT 12 Enhancements

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CTI5	Control Program	CCCTIN	Not Applicable	Changed	Updated to allocate IP routing table storage.
CTTO	Control Program	CCTCP1	Not Applicable	Changed	Updated with IP routing table operations.

Fixed File Records

Table 774 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 774. Changes to Fixed File Records for TCP/IP PUT 12 Enhancements

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IPRTE	New	Created for the IP routing table.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 775 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the SNA communication macro or statement.

Table 775. Changes to Communication Macros and Statements for TCP/IP PUT 12 Enhancements

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 776 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 776. Changes to Data Macros for TCP/IP PUT 12 Enhancements

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
DLTEC	Changed	No
IPRTE	Changed	No
IPWBL	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 777 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 777. Changes to Selected Equate Macros for TCP/IP PUT 12 Enhancements

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 778 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 778. Changes to SIP Skeleton and Internal Macros for TCP/IP PUT 12 Enhancements

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 779 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 779. Changes to SIP Stage II Macros for TCP/IP PUT 12 Enhancements

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 780 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 780. Changes to System Macros (IBM Use Only) for TCP/IP PUT 12 Enhancements

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IPSDC	Changed	No

Segments

Table 781 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 781. Changes to Segments for TCP/IP PUT 12 Enhancements

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated to support the MAXRTE parameter on the ZNKEY command.
CTFA	Real-Time Assembler	Not Applicable	New	CTFA processes the ZSOCK command when either the DISPLAY or CONVERT parameter is specified along with the SOCKET parameter.
CTFB	Real-Time Assembler	Not Applicable	New	CTFB processes the ZSOCK command when the INACT parameter is specified to deactivate a specified socket or a group of sockets.

Table 781. Changes to Segments for TCP/IP PUT 12 Enhancements (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CTFC	C Language	CTFC	New	CTFC is the message parser for the ZSOCK command.
CTFD	Real-Time Assembler	Not Applicable	New	CTFD processes the ZSOCK command when the SUMMARY parameter is specified to display a table of selected socket descriptors and corresponding socket block entry information.
CTFE	Real-Time Assembler	Not Applicable	New	CTFE issues messages for the ZSOCK command.
CTF2	Real-Time Assembler	Not Applicable	Changed	CTF2 adds IP routing table entry checks to ZTTCP DELETE command processing.
CTSP	Real-Time Assembler	Not Applicable	New	CTSP processes the ZTRTE command parameters.
CTSR	Real-Time Assembler	Not Applicable	Changed	CTSR is updated to call CTSX to build the IP routing table.
CTSV	Real-Time Assembler	Not Applicable	New	CTSV adds error message processing for the ZTRTE command.
CTSX	Real-Time Assembler	Not Applicable	New	CTSX adds IP routing table processing.
CTSZ	Real-Time Assembler	Not Applicable	New	CTSZ adds parser processing for the ZTRTE command.
CTS1	Real-Time Assembler	Not Applicable	Changed	CTS1 is updated to search the IP routing table for a local IP address before assigning the default local IP address.
CVAB	Real-Time Assembler	Not Applicable	Changed	CVAB is updated to support the ZSOCK and ZTRTE commands.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 782 on page 740 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 782. Changes to Commands for TCP/IP PUT 12 Enhancements

Command	New, Changed, or No Longer Supported?	Description of Change
ZDTCP	Changed	Added the LOCAL parameter, allowing a local IP address to be specified with the PING or TRACEROUTE parameters.
ZNKEY	Changed	Added the MAXRTE parameter to specify the maximum number of IP routing table entries.
ZSOCK	New	Allows you to display TCP/IP native stack support socket control block information or the socket summary table, converts TCP/IP native stack support resource information, and deactivates TCP/IP native stack support resources.
ZTRTE	New	Allows you to manage the IP routing tables.
ZTTCP	Changed	Updated to prevent a local IP address from being deleted from the IP configuration table for TCP/IP native stack support when there are entries for that local address in the IP routing table.

Messages and System Errors

Table 783 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 783. Changes to Messages and System Errors for TCP/IP PUT 12 Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007830	System Error	New
007831	System Error	New
007832	System Error	New
007833	System Error	New
CTSX0001I	Online	New
CTSX0002I	Online	New
CTSX0003W	Online	New
CTSX0004E	Online	New
CTSX0007I	Online	New
CTSX0008W	Online	New
CTSX0009E	Online	New
DTCP0057E	Online	New
DTCP0060E	Online	New
DTCP0061E	Online	New
SOCK0010I	Online	New
SOCK0011I	Online	New
SOCK0012E	Online	New
SOCK0013E	Online	New

Table 783. Changes to Messages and System Errors for TCP/IP PUT 12 Enhancements (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SOCK0014E	Online	New
SOCK0015E	Online	New
SOCK0016I	Online	New
SOCK0017E	Online	New
SOCK0018I	Online	New
SOCK0019I	Online	New
SOCK0020E	Online	New
SOCK0021I	Online	New
SOCK0022I	Online	New
SOCK0023E	Online	New
TRTE0001I	Online	New
TRTE0002I	Online	New
TRTE0003I	Online	New
TRTE0004I	Online	New
TRTE0005I	Online	New
TRTE0050E	Online	New
TRTE0051E	Online	New
TRTE0053E	Online	New
TRTE0054E	Online	New
TRTE0055E	Online	New
TRTE0056E	Online	New
TRTE0057E	Online	New
TRTE0058E	Online	New
TRTE0059E	Online	New
TRTE0060E	Online	New
TRTE0061E	Online	New
TRTE0062E	Online	New
TRTE0063E	Online	New
TRTE0064E	Online	New
TRTE0065E	Online	New
TRTE0066E	Online	New
TRTE0067E	Online	New
TRTE0068E	Online	New
TRTE0069E	Online	New
TRTE0070E	Online	New
TTCP0150E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

The MAXRTE parameter of the SNAKEY macro is used to specify the maximum number of IP routing table entries, which defines the size of the IP routing table.

The maximum number of entries is 2048 for each TPF processor, and the size of an entry is 64 bytes. Table information is processor unique. Storage for the table is not allocated if TCP/IP native stack support is not defined for the given TPF processor. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 784 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 784. Changes to TPF Publications for TCP/IP PUT 12 Enhancements

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF0B	Added the MAXRTE parameter to the SNAKEY macro.
<i>TPF Library Guide</i>	GTPDOC0C	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TCP/IP PUT 12 enhancements.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG202	Updated with migration considerations for TCP/IP PUT 12 enhancements.
<i>TPF Operations</i>	GTPOPR0C	Updated with information about the commands that were added and changed for TCP/IP PUT 12 enhancements.
<i>TPF Program Development Support Reference</i>	GTPPDR0C	Updated with a new dump tag.
<i>TPF System Generation</i>	GTPSYG0C	Updated the fixed file records.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW08	Updated the <code>ioctl</code> function with two new parameters and summarized the functions provided by the ZSOCK command.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TCP/IP PUT 12 enhancements on your TPF 4.1 system.

1. Install program update tape (PUT) 12.
2. Verify that TCP/IP native stack support is defined on your TPF 4.1 system. See "TCP/IP Native Stack Support (APAR PJ26683)" on page 626 for more information about TCP/IP native stack support.
3. Define the maximum number of entries in the IP routing table by setting the MAXRTE parameter of the SNAKEY macro in keypoint record 2 (CTK2).
4. Define and allocate the #IPRTE fixed file record for IP routing table support. For more information on how to calculate the number of records to allocate, see *TPF ACF/SNA Network Generation*.
5. Assemble CTK2 and load it to your TPF 4.1 system.
6. Cycle the TPF 4.1 system to 1052 state or higher.
7. Define and display IP routing table entries by entering the ZTRTE command. The IP routing table entries associate a TPF local IP address with a remote IP address or a subnet of remote IP addresses. The IP routing table entries can then be used when TPF TCP client socket applications attempt to establish a connection to remote server applications with explicitly issuing the bind function for a local IP address.
8. Ensure that the TPF 4.1 system is in CRAS state or higher and activate TCP/IP native stack support links to channel-attached IP routers.
9. Activate TCP client socket applications on the TPF 4.1 system to use IP routing table support.

Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (APAR PJ27023 and APAR PJ27050)

The following section discusses the migration considerations for turbo enhancements for TPF support of MQSeries local queue manager.

Prerequisite APARs

See the APEDIT for APAR PJ27023 and APAR PJ27050 for information about prerequisite APARs.

Functional Overview

The following turbo enhancements for TPF support of MQSeries local queue manager are provided to improve the usability of TPF MQSeries local queue manager support:

- The TPF resource manager to control application programming interfaces (APIs) is enabled. With this change, MQSeries API functions (MQPUT, MQGET, MQPUT1) will participate in transaction scopes. Previously, the transaction manager had no knowledge of MQSeries APIs.
- Processor unique queues have become resident in memory. Previously, performance lagged when many messages were put to and retrieved from a single queue. With this enhancement, processor unique queues reside in memory and are made persistent over an initial program load (IPL) by filing (sometimes called checkpointing) the queues to fixed file records in regular time intervals and maintaining a log of all updates between checkpoints on the recovery log.

Architecture

Two architectural issues are addressed with turbo enhancements for TPF support of MQSeries local queue manager:

Transaction Manager: Previously, when an application established a commit scope around any MQSeries API, the queues being serviced were locked until the commit scope ended. Because the application maintained a commit scope for an extended period of time, the queue could be inaccessible for as long as the application determined.

A resource manager (RM) was implemented for MQSeries. Now, MQSeries APIs do not lock queues within the commit scope, so they are not left inaccessible for an indefinite period of time.

Performance: To access processor unique queues at a faster rate, the queues are now resident in memory. They are checkpointed on a time-initiated basis to fixed file records while using the recovery log to log all changes to the queues that occur between checkpoints. The logged changes will then be available during TPF 4.1 system restart and will be applied to the checkpointed copy of the queues so that the queue is restored to the state it was in before the system was IPLed.

Processor unique queues are now memory queues, while processor shared queues remain TPF collection support queues. Memory queues reside in system work blocks (SWBs) that have been increased in size from 512 to 1024 bytes.

Because applications can stall or network links can become disabled, it is possible for queues to increase in size for an extended period of time without being serviced.

For memory queues (this means TPF 4.1 system resources) SWBs may become depleted and cause the TPF 4.1 system to enter input list shutdown without a way to free those resources. A sweep function was implemented that permits memory queues to be filed to TPF collection support binary large objects (BLOBs) when the queue has not been serviced (messages have not been removed from the queue) within a specified period of time.

Nonpersistent messages, which were made persistent previously, will no longer survive an IPL of the TPF 4.1 system.

In addition to the above performance and resource manager architectural changes, the following enhancements have been made to the support of TPF MQSeries local queue manager:

- A new command has been added to migrate and fall back queues to and from TPF systems prior to turbo enhancements for TPF support of MQSeries local queue manager.
- Fast sender channels now send both persistent and nonpersistent messages. Previously fast sender channels sent only nonpersistent messages.
- Nonpersistent messages are now removed from processor unique queues when the local queue manager is stopped and started.
- A new purge option has been added to the ZMQSC DELETE QL command that will delete the queue even if the queue is not empty.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with turbo enhancements for TPF support of MQSeries local queue manager, you must establish the required operating environment. The following section describes hardware and software requirements specific to turbo enhancements for TPF support of MQSeries local queue manager.

"Operating Environment Requirements and Planning Information" on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no changes.

Software (Programming Requirements)

The following section contains information about software requirements.

You must use the IBM OS/390 C/C++ Version 2 Release 8 compiler or later version or release to compile the TPF MQSeries programs. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 785 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 785. Changes to Build Scripts for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CISOBS	LLM	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQFBS	DLM	New	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQKBS	DLL	New	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQMBS	DLM	New	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQSBS	DLL	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQXBS	DLM	New	Added for turbo enhancements for TPF support of MQSeries local queue manager.
COMXBS	LLM	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CTALBS	LLM	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUIBBS	DLM	New	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CUIEBS	DLM	No Longer Supported	Deleted for turbo enhancements for TPF support of MQSeries local queue manager.
CUIKBS	DLM	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUIUBS	DLM	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.

Dynamic Load Module (DLM) Stubs: Table 786 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 786. Changes to Dynamic Load Module (DLM) Stubs for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

DLM Stub	New, Changed, or No Longer Supported?
CL23	New
CL26	New
CUIU	New

General Use C/C++ Language Header Files: Table 787 on page 747 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 787. Changes to General Use C/C++ Language Header Files for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	Yes
c\$ipbt.h	Changed	Yes
cmqc.h	Changed	Yes
c\$syseq.h	Changed	Yes
sysapi.h	Changed	Yes

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 788 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 788. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
amquscrw.h	Changed	Yes
c\$mqcp.h	New	Yes
c\$mqdc.h	Changed	Yes
c\$mqmg.h	Changed	Yes
c\$mqmi.h	New	Yes
c\$mqrm.h	New	Yes
c\$mq.s.h	Changed	Yes
i\$fsqu.h	Changed	Yes
i\$glue.h	Changed	Yes
i\$mqrt.h	New	Yes
i\$netd.h	Changed	No
i\$tmcr.h	Changed	Yes (CL12, CL13, CL14, CL15, CXARCV)

Library Interface Scripts: Table 789 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 789. Changes to Library Interface Scripts for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.

Library Members (Object Files): Table 790 on page 748 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 790. Changes to Library Members (Object Files) for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CCOMIC	CTAL	Changed	C Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CFACZC	CTAL	New	Assembler	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQPCM	CTAL	New	Assembler	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CTMCCR	CTAL	New	Assembler	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CXQCMT	CTAL	New	Assembler	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CXQPRP	CTAL	New	Assembler	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CXQRCV	CTAL	New	C Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CXQRLB	CTAL	New	Assembler	Added for turbo enhancements for TPF support of MQSeries local queue manager.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 791 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 791. Changes to Members (Object Files) for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CCCCXA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CCCITA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CCCMXA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CCERRA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.

Table 791. Changes to Members (Object Files) for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CCLIBA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQAPI	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQBAT	CMQS	New	Object Code Only	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQBLD	CMQK	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQCKC	CMQK	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQCKP	CUIU	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQCKQ	CMQK	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQCOL	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQERR	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQFRM	CMQF	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQFTR	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQGBL	CMQS	No Longer Supported	Object Code Only	Deleted for turbo enhancements for TPF support of MQSeries local queue manager.
CMQGRU	CUIU	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQHSH	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQL	CMQL	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQMCA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQMGC	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQMGR	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.

Table 791. Changes to Members (Object Files) for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CMQMRM	CMQM	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQMTR	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQNPM	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQNPS	CMQS	No Longer Supported	C++ Language	Deleted for turbo enhancements for TPF support of MQSeries local queue manager.
CMQQUE	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQR	CMQR	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQRCV	CMQS	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQRM	CMQS	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQSWP	CMQS	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQUTL	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMQXLR	CMQX	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CMQXRM	CMQX	New	C++ Language	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CRCCCA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRCMNA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRCMSA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRCRSA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRCSIA	CMQS	Not Applicable	Object Code Only	This member was not updated; however, it was recompiled.
CRERRA	CMQS	Not Applicable	Object Code Only	This member was not updated; however, it was recompiled.

Table 791. Changes to Members (Object Files) for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CREXTA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRFPTA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRMCLA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRMCVA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRMMQA	CMQS	Not Applicable	Object Code Only	This member was not updated; however, it was recompiled.
CRM RCA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRM RSA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRMSAA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRMSSA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CRMTRA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUIB	CUIB	New	Object Code Only	Added for turbo enhancements for TPF support of MQSeries local queue manager.
CUIE	CUIE	No Longer Supported	Object Code Only	Deleted for turbo enhancements for TPF support of MQSeries local queue manager.
CUIF	CUIF	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUIM	CUIM	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUIQ	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUIS	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUIX	CUIX	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUSCCA	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.

Table 791. Changes to Members (Object Files) for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CUSCCD	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUSCPF	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUSCQL	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUSCQM	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUSCQR	CMQS	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CUSCRW	CUSC	Changed	C++ Language	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CXCMMW	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CXCSSW	CMQS	Changed	Object Code Only	Updated for turbo enhancements for TPF support of MQSeries local queue manager.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 792 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 792. Changes to Copy Members for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CFMCC	Control Program	ICDF	Not Applicable	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CICR	Control Program	CCNUCL	Not Applicable	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CL10	Control Program	CCTLOG	Not Applicable	Changed	Updated TPF log manager to support turbo enhancements for TPF support of MQSeries local queue manager.

Table 792. Changes to Copy Members for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CL20	Control Program	CCTLOG	Not Applicable	Changed	Updated TPF log manager to support turbo enhancements for TPF support of MQSeries local queue manager.
CL30	Control Program	CCTLOG	Not Applicable	Changed	Updated TPF log manager to support turbo enhancements for TPF support of MQSeries local queue manager.
CLHL	Control Program	CCLHR	Not Applicable	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CMIS	Control Program	CCNUCL	Not Applicable	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CT05	Control Program	CCCTIN	Not Applicable	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.
CT41	Control Program	CCCTIN	Not Applicable	Changed	Updated for turbo enhancements for TPF support of MQSeries local queue manager.

Fixed File Records

Table 793 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 793. Changes to Fixed File Records for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IMQCK	New	Added for turbo enhancements for TPF support of MQSeries local queue manager checkpoint record.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 794 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 794. Changes to Data Macros for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ICRCR	Changed	Yes. CL31, CXACMT, CXAEND, CXAPRP, CXARLB, CXASTR, CXPCMT, and CXPRLB.

Table 794. Changes to Data Macros for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ICRCT	Changed	Yes. CL31, CXACMT, CXAEND, CXAPRP, CXARLB, CXASTR, CXPCMT, and CXPRLB.
IMQRM	New	Yes

General Macros: Table 795 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 795. Changes to General Macros for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	Yes

Selected Equate Macros: Table 796 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 796. Changes to Selected Equate Macros for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZOCP	Changed	Yes
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 797 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 797. Changes to SIP Skeleton and Internal Macros for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 798 on page 755 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 798. Changes to SIP Stage II Macros for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 799 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 799. Changes to System Macros for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CPLKC	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 800 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 800. Changes to Segments for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CBR0	Real-Time Assembler	Not Applicable	Changed	Updated to support the SWB size change in MPIF.
CL11	Real-Time Assembler	Not Applicable	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager transaction services.
CL21	Real-Time Assembler	Not Applicable	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager transaction services.
CL22	Real-Time Assembler	Not Applicable	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager transaction services.
CL23	Real-Time Assembler	Not Applicable	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager transaction services.
CL24	Real-Time Assembler	Not Applicable	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager transaction services.
CL26	Real-Time Assembler	Not Applicable	New	Added to support turbo enhancements for TPF support of MQSeries local queue manager transaction services.
CTKS	Real-Time Assembler	Not Applicable	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager cycle scheduler.
JRA2	Offline PL/I	DATAREAD	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager.
JRM1	Offline PL/I	DATAREAD	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager.

Table 800. Changes to Segments for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
JRM5	Offline PL/I	DATAREAD	Changed	Updated to support turbo enhancements for TPF support of MQSeries local queue manager.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 801 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 801. Changes to Commands for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQSC ALT CHL	Changed	Updated to restrict changes to the transmission queue name associated with a channel.
ZMQSC ALT MQP	Changed	Updated the examples.
ZMQSC ALT QA	Changed	Updated the examples.
ZMQSC ALT QL	Changed	Updated to add the MAXDEPTH and SWEETIME parameters.
ZMQSC ALT QR	Changed	Updated the examples.
ZMQSC DEF MQP	Changed	Updated to remove the MAXMCA and MAXQUE parameters, and add the MAXDEPTH and SWEETIME parameters.
ZMQSC DEF QA	Changed	Updated the examples.
ZMQSC DEF QL	Changed	Updated to add the MAXDEPTH and SWEETIME parameters.
ZMQSC DEF QR	Changed	Updated the examples.
ZMQSC DEL	Changed	Updated to add the PURGE parameter.
ZMQSC DISPLAY	Changed	The output of the display queue was updated to add the MAXDEPTH and SWEETIME parameters, and to delete the MAXMCA and MAXQUE parameters. The output of the display queue manager was updated to remove the MAXMCA and MAXQUE parameters and add the SWEETIME and MAXDEPTH default parameters.
ZMQSC MIGRATE	New	This command is used to migrate TPF MQSeries to turbo enhancements for TPF support of MQSeries local queue manager.
ZMQSC START	Changed	Updated to ensure that a queue manager that is started will automatically start during the next cycle to NORM state.

Table 801. Changes to Commands for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQSC STOP	Changed	Updated to ensure that a queue manager that is stopped will not automatically start the next time the TPF 4.1 system cycles to NORM state.
ZMQSC SWQ	Changed	Updated to restrict a swing queue from the transmission queues associated with channels that are not in doubt; and so channels associated with the transmission queue must be stopped and not in doubt. Also updated so a queue that is the subject of a swing cannot also be the object of a swing and vice versa.

Messages and System Errors

Table 802 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 802. Changes to Messages and System Errors for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
009307	System Error	New
009308	System Error	New
009309	System Error	New
009310	System Error	New
009311	System Error	New
009312	System Error	New
009313	System Error	New
009314	System Error	New
009315	System Error	New
009316	System Error	New
009317	System Error	New
009318	System Error	New
009319	System Error	New
009320	System Error	New
MQSC0008I	Online	No Longer Supported
MQSC0015I	Online	No Longer Supported
MQSC0016I	Online	No Longer Supported
MQSC0017I	Online	No Longer Supported
MQSC0023W	Online	No Longer Supported
MQSC0024W	Online	No Longer Supported

Table 802. Changes to Messages and System Errors for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0025E	Online	No Longer Supported
MQSC0034E	Online	No Longer Supported
MQSC0040E	Online	No Longer Supported
MQSC0041E	Online	No Longer Supported
MQSC0044I	Online	No Longer Supported
MQSC0050E	Online	New
MQSC0051E	Online	No Longer Supported
MQSC0052I	Online	No Longer Supported
MQSC0053E	Online	No Longer Supported
MQSC0054E	Online	No Longer Supported
MQSC0055I	Online	No Longer Supported
MQSC0056I	Online	No Longer Supported
MQSC0057I	Online	New
MQSC0058E	Online	New
MQSC0059W	Online	No Longer Supported
MQSC0060E	Online	New
MQSC0062E	Online	No Longer Supported
MQSC0063E	Online	No Longer Supported
MQSC0064E	Online	New
MQSC0065W	Online	New
MQSC0067E	Online	New
MQSC0069I	Online	New
MQSC0070E	Online	New
MQSC0071E	Online	No Longer Supported
MQSC0072E	Online	No Longer Supported
MQSC0074E	Online	No Longer Supported
MQSC0077E	Online	No Longer Supported
MQSC0078E	Online	Changed
MQSC0079E	Online	Changed
MQSC0082E	Online	No Longer Supported
MQSC0084E	Online	No Longer Supported
MQSC0089E	Online	No Longer Supported
MQSC0086E	Online	New
MQSC0088I	Online	New
MQSC0091E	Online	No Longer Supported
MQSC0092E	Online	New
MQSC0093E	Online	New
MQSC0094E	Online	New
MQSC0095E	Online	New
MQSC0096E	Online	New
MQSC0097E	Online	New
MQSC0098E	Online	New
MQSC0099E	Online	New

Table 802. Changes to Messages and System Errors for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0100E	Online	New
MQSC0119E	Online	New
MQSC0135E	Online	New
MQSC0137E	Online	New
MQSC0141E	Online	New
MQSC0142E	Online	New
MQSC0143I	Online	New
MQSC0145I	Online	New
MQSC0146I	Online	New
MQSC0147E	Online	New
MQSC0148I	Online	New
MQSC0149I	Online	New
MQSC0154E	Online	No Longer Supported
MQSC0155E	Online	No Longer Supported
MQSC0157E	Online	Changed
MQSC0165E	Online	No Longer Supported
MQSC0167E	Online	New
MQSC0168E	Online	New
MQSC0169E	Online	New
MQSC0170E	Online	New
MQSC0171E	Online	New
MQSC0172E	Online	New
MQSC0173I	Online	New
MQSC0174E	Online	New
MQSC0175E	Online	New
MQSC0176E	Online	New
MQSC0178E	Online	New
MQSC0179E	Online	No Longer Supported
MQSC0210E	Online	New
MQSC0211E	Online	New
MQSC0212E	Online	New
MQSC0213E	Online	New
MQSC0302E	Online	No Longer Supported
MQSC0303E	Online	No Longer Supported
MQSC0341E	Online	New
MQSC0342E	Online	New
MQSC0343E	Online	New
MQSC0344E	Online	New
MQSC0345V	Online	New
MQSC0346E	Online	New
MQSC0347E	Online	New
MQSC0348E	Online	New
MQSC0501E	Online	No Longer Supported

Table 802. Changes to Messages and System Errors for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0502E	Online	No Longer Supported
MQSC0504E	Online	No Longer Supported
MQSC0507E	Online	No Longer Supported
MQSC0511W	Online	No Longer Supported
MQSC0512W	Online	New
MQSC0600E	Online	New
MQSC0601E	Online	New
MQSC0602E	Online	New
MQSC0603E	Online	New
MQSC0604E	Online	New
MQSC0605E	Online	New
MQSC0606E	Online	New
MQSC0607I	Online	New
MQSC0608I	Online	New
MQSC0609I	Online	New
MQSC0610I	Online	New
MQSC0611I	Online	New
MQSC0612I	Online	New
MQSC0613E	Online	New
MQSC0614E	Online	New
MQSC0615E	Online	New
MQSC0616E	Online	New
MQSC0617E	Online	New
MQSC0618E	Online	New
MQSC0619E	Online	New
MQSC0701I	Online	New
MQSC0702W	Online	New
MQSC0703W	Online	New
MQSC0706I	Online	New
MQSC0707E	Online	New
MQSC0801I	Online	New
MQSC0802I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes

Online System Load Changes

There are no changes.

Publication Changes

Table 803 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 803. Changes to TPF Publications for Turbo Enhancements for TPF Support of MQSeries Local Queue Manager

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0A	Updated with a new MQSeries overview chapter.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0B	Updated with C language function information that was added and changed for turbo enhancements for TPF support of MQSeries local queue manager.
<i>TPF Concepts and Structures</i>	GTPCON08	Updated with with a high-level overview of MQSeries.
<i>TPF Database Reference</i>	GTPDBR09	Updated TPF Transaction Services chapter with changes for turbo enhancements for TPF support of MQSeries local queue manager.
<i>TPF Library Guide</i>	GTPDOC0B	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for turbo enhancements for TPF support of MQSeries local queue manager.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG201	Updated with migration considerations for turbo enhancements for TPF support of MQSeries local queue manager.
<i>TPF Operations</i>	GTPOPR0B	Updated with information about the commands that were added and changed for turbo enhancements for TPF support of MQSeries local queue manager.
<i>TPF System Generation</i>	GTPSYG0B	Updated with information about fixed file records and system work blocks (SWBs) for turbo enhancements for TPF support of MQSeries local queue manager.
<i>TPF System Macros</i>	GTPSYS0B	Updated system macro information for turbo enhancements for TPF support of MQSeries local queue manager.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR0A	Updated data collection reduction reports that were changed for turbo enhancements for TPF support of MQSeries local queue manager.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

MQPUT, MQGET, and MQPUT1 functions all participate in transaction scopes. The MQINQ function was changed to allow applications to inquire about the current and maximum depth of a processor unique queue.

Database Changes

The following section summarizes the database changes for turbo enhancements for TPF support of MQSeries local queue manager.

Recovery Log DASD Requirements for MQSeries

To calculate the required number of records, use the following formula:

(ECBs per second (300) * the average size of the commit scope for each ECB (100 KB) * TPF queue manager checkpoint interval(5 seconds)) + (MQPUT/MQGET requests per second (1000) * the average size of a message (4 KB) * TPF queue manager checkpoint interval(5 seconds)) * (factor for padding (1.5))

For example, $(300 * 100 \text{ KB} * 5 = 150\,000 \text{ KB}) + (1000 * 4 \text{ KB} * 5 = 20\,000 \text{ KB}) * 1.5 = 255 \text{ MB}$.

Checkpoint Record Requirements for MQSeries

The suggested number of #IMQCK records is at least twice the number of allocated system work blocks (SWBs).

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to migrate your existing TPF 4.1 system to turbo enhancements for TPF support of MQSeries local queue manager. You must perform the following steps on each subsystem.

1. Install program update tape (PUT) 12.
2. Use the IBM OS/390 Assembler to assemble the following control program modules: CCCLHR, CCCPSE, CCCPSF, CCCTIN, CCFADC, CCIISC, CCNUCL, CCSTOR, CCTAPE, CCTHDS, CCTLOG, CCVFAC.
3. Use the IBM OS/390 Assembler to assemble the following modules: CBR0, CEL9, CFACZC, CL11, CL21, CL22, CL23, CL24, CL26, CL31, CMQPCM, COA4, CTKS, CTMCCR, CXACMT, CXAEND, CXAPRP, CXARLB, CXASTR, CXPCMT, CXPRLB, CXQCMT, CXQPRP, CXQRLB, ICDF, JCD4.
4. Use the IBM OS/390 C Version 2 Release 8 compiler or later version to compile the following programs: CCOMIC, CFS107, CFS110, CL12, CL13, CL14, CL15, CXARCV, CXQRCV.
5. Use the IBM OS/390 C++ Version 2 Release 8 compiler or later version to compile the following segments: CMQAPI, CMQBLD, CMQCKC, CMQCKP, CMQCKQ, CMQCOL, CMQFRM, CMQFTR, CMQGRU, CMQHSH, CMQMGC, CMQMGR, CMQMRRM, CMQNPM, CMQQUE, CMQRCV, CMQRM, CMQSWP, CMQUTL, CMQXLR, CMQXRM, CUIK, CUIM, CUIQ, CUIR, CUIS, CUIT, CUIV, CUIW, CUSCPF, CUSCQL, CUSCQM, CUSCQR, CUSCRW, CUSCUL.
6. Use the following build scripts to link-edit the following C libraries: CTALBS, COMXBS, CISOBS.
7. Use the following build scripts to link-edit and produce definition side-decks for the following dynamic link libraries (DLLs): CMQSBS, CMQKBS.

Note: The CMQS DLL imports side-deck information from the CMQK DLL, and the CMQK DLL imports side-deck information from the CMQS DLL. It is necessary to submit the link-edit twice for these DLLs to get a link-edit with no errors.

8. Use the following build scripts to link-edit the following dynamic load modules (DLMs): CL12BS, CL13BS, CL14BS, CL15BS, CMQFBS, CMQLBS,

CMQMBS, CMQRBS, CMQXBS, CUIBBS, CUIEBS, CUIFBS, CUIKBS, CUIMBS, CUIRBS, CUIUBS, CUIXBS, CUSCBS. Most of these DLMs import side-deck information from the CMQS DLL. Make sure the CMQS DLL has been link-edited and has produced a side-deck before link-editing any of these DLMs.

9. Use the PL/I compiler to compile the following PL/I programs: JRA2, JRM1, JRM5. Then, link-edit the DATAREAD execution module.
10. The size of the system work block (SWB) has increased from 512 to 1024 bytes. Any customer applications or user modifications that reference fields `_SWB_SIZE`, or `_SWB_SIZE_SYS` in header file `c$syseq.h` will need to be compiled. Any customer applications or user modifications that reference fields `CPSWB1` or `CPSWB2` in macro `CZOCF` will need to be assembled. Any user programs where logic depends on the size of the SWB being 512 bytes will need to be modified to handle a 1024 byte SWB.
11. Enter **ZINET STOP S-MQS** to stop the MQSeries listener.
12. Enter **ZMQSC STOP CHL-ALL** to stop all MQSeries channels (it may take a while to shut down all channels).
13. Enter **ZMQSC DISPLAY CHS-ALL INDOUBT** to find any sender channels that are stopped and in doubt.
14. Enter **ZMQSC RESOLVE CHL** to resolve the channel, and then continue repeating this step until there are no more in-doubt channels shown on the display.
15. Enter **ZMQSC DISPLAY CHS-ALL** to ensure no more channels are active in the processor.
16. Enter **ZMQSC STOP QMGR** to stop the queue manager.
17. Allocate the correct log size. See "Recovery Log DASD Requirements for MQSeries" on page 762 for more information.
18. Create a file address compute (FACE) table with the new #IMQCK records. See "Checkpoint Record Requirements for MQSeries" on page 762 for more information.
19. Recalculate the number of SWBs required by your system to support processor unique memory queues, because messages now reside in SWBs. Also, recalculate storage allocations to account for the size change in SWBs from 512 to 1024 bytes.
20. Set your sweeptime interval.
21. Load all the necessary programs to a new image on the TPF 4.1 system.
22. Perform an initial program load (IPL) of the new image and cycle up the TPF 4.1 system to NORM state.
23. Enter **ZMQSC MIGRATE BEGIN** to begin a migration mode on an individual processor in the loosely coupled complex where existing queues are converted to the turbo enhancements for TPF support of MQSeries local queue manager. You must enter **ZMQSC MIGRATE BEGIN** on each subsystem and each processor in the loosely coupled complex the first time it is IPLed with turbo enhancements for TPF support of MQSeries local queue manager applied and prior to starting the queue manager.
24. Enter **ZMQSC MIGRATE FALLBACK** on each subsystem if you want to fall back a processor to the previous version of TPF MQSeries local queue manager.
25. Enter **ZMQSC MIGRATE COMMIT** on each subsystem of any one processor in the loosely coupled complex when all processors in the loosely coupled

complex have been migrated and you will not fall back any processor in the complex to a system without turbo enhancements for TPF support of MQSeries local queue manager.

Additional Information: See *TPF Operations* for more information about the ZMQSC DISPLAY, ZMQSC RESOLVE, ZMQSC MIGRATE, and ZMQSC STOP commands.

Program Update Tape 13 (PUT 13)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 13 (PUT 13).

SPE	Where to Go For More Information
Domain Name System (DNS) Support	"Domain Name System (DNS) Support (APAR PJ27268)" on page 766
Enhancements to TPF Support for VisualAge Client	"Enhancements to TPF Support for VisualAge Client (APAR PJ27383)" on page 777
FIFO Special File Support	"FIFO Special File Support (APAR PJ27214)" on page 787
File System Tools	"File System Tools (APAR PJ27277)" on page 805
Infrastructure for 32-Way Loosely Coupled Processor Support	"Infrastructure for 32-Way Loosely Coupled Processor Support (APAR PJ27387)" on page 818
Integrated Online Pool Maintenance and Recoup Support	"Integrated Online Pool Maintenance and Recoup Support (APAR PJ27469)" on page 831
Loaders Enhancement for TPF Assembler Debugger	"Loaders Enhancement for the TPF Assembler Debugger for VisualAge Client (APAR PJ27422)" on page 881
Logical Record Cache and Coupling Facility (CF) Cache Support	"Logical Record Cache and Coupling Facility (CF) Cache Support (APAR PJ27083)" on page 894
OSA-Express Support	"OSA-Express Support (APAR PJ27333)" on page 907
TPF Data Event Control Block Support	"TPF Data Event Control Block Support (APAR PJ27393)" on page 923
TPF MQSeries Enhancements	"TPF MQSeries Enhancements (APARs PJ27230, PJ27231, PJ27351, and PJ27431)" on page 937

TPF 4.1 PUT 13 is compiled with the IBM OS/390 C/C++ Version 2 Release 9 compiler. See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Domain Name System (DNS) Support (APAR PJ27268)

The following section discusses the migration considerations for DNS support.

Prerequisite APARs

See the APEDIT for APAR PJ27268 for information about prerequisite APARs.

Functional Overview

Following is the DNS server support and the enhancements to DNS client support. You can use either or both options to:

- Enable the TPF 4.1 system to process incoming DNS requests, enabling load balancing of the Transmission Control Protocol/Internet Protocol (TCP/IP) connections in a loosely coupled complex (referred to as the DNS server portion)
- Customize the load balancing algorithms by using the UDNS user exit
- Enhance DNS client performance of your TPF 4.1 system by providing a cache to store information received from remote DNS servers (referred to as the client cache portion).

Architecture

While TCP/IP applications refer to host systems by their Internet Protocol (IP) addresses, you will find it easier to use host names because host names are easier to remember than IP addresses and host names change much less frequently than IP addresses. To enable the use of host names in a network, the DNS translates host names to IP addresses. The DNS provides host name to IP address mapping through network server hosts called *domain name servers*.

Before DNS support, the TPF 4.1 system only supported the DNS client function, meaning the TPF 4.1 system could send DNS requests but could not process incoming DNS requests. In addition, every DNS client request made by the TPF 4.1 system was sent to an external DNS server for processing. DNS support adds DNS server support to the TPF 4.1 system and enhances the TPF DNS client performance by adding caching capability for information received from external DNS servers.

The DNS server function enables the TPF 4.1 system to process incoming DNS requests for host names of the TPF 4.1 system. The TPF DNS server works with the UDNS user exit to select the appropriate TPF local IP address for each DNS request that is received. This allows you to load balance TCP/IP connections in your loosely coupled complex. Having DNS requests for TPF host names processed by the TPF 4.1 system rather than external DNS servers ensures that an inactive IP address is never passed back in the DNS response, and it centralizes the load balancing logic in one place. Because the TPF DNS server only processes requests for host names of the TPF 4.1 system itself, DNS requests for host names external to the TPF 4.1 system will continue to be processed by external DNS servers.

When a `gethostbyname()` or `gethostbyaddr()` API function call is issued, the TPF 4.1 system takes on the role of a DNS client. The TPF 4.1 system now includes a pair of DNS client caches: one that maps external host names to their IP addresses, and the other that maps external IP addresses to their host name. When the TPF 4.1 system sends a DNS request to an external DNS server and the response comes back, the information is then placed in the cache if the response indicates that the information is allowed to be cached. Subsequent `gethostbyname()` or `gethostbyaddr()` calls with the same input will be able to retrieve the information

locally from the TPF DNS client cache. By reducing the number of requests sent to the external DNS server, the performance of TPF socket client applications improves.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with DNS support, you must establish the required operating environment. The following section describes hardware and software requirements specific to DNS support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for TCP/IP-Based Communication: To use the DNS server portion, TCP/IP native stack support must be installed in the TPF 4.1 system. To use the DNS client portion, TCP/IP native stack support or TCP/IP offload support must be installed. See “TCP/IP Native Stack Support (APAR PJ26683)” on page 626 for more information about TCP/IP native stack support and “Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)” on page 221 for more information about TCP/IP offload support.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 804 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 804. Changes to Build Scripts for DNS Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CDNCBS	DLL	New	Build script for DNS server sipcc() send processing.
CDNEBS	DLM	New	Build script for /etc/hosts file processing.
CDNFBS	DLM	New	Build script for /etc/host.txt file processing.
CDNIBS	DLM	New	Build script for IPAST management processing.
CDNPBS	DLM	New	Build script for DNS server sipcc() receive processing.
CDNQBS	DLM	New	Build script for DNS client restart processing.
CDNRBS	DLM	New	Build script for DNS restart processing.

Table 804. Changes to Build Scripts for DNS Support (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CDNSBS	DLM	New	Build script for DNS server processing.
COMXBS	LLM	Changed	Updated to remove OCO comments from CGTHBA and CGTHBN library object files.
UDNSBS	DLM	New	Build script for DNS server user exit UDNS.

Dynamic Load Module (DLM) Stubs: Table 805 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 805. Changes to Dynamic Load Module (DLM) Stubs for DNS Support

DLM Stub	New, Changed, or No Longer Supported?
UDNS	CDNS

General Use C/C++ Language Header Files: Table 806 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 806. Changes to General Use C/C++ Language Header Files for DNS Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn	Changed	No
nameser.h	Changed	No
netdb.h	Changed	No
socket	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 807 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 807. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for DNS Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$pwb1.h	Changed	No
i\$tcpc.h	Changed	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 808 on page 769 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 808. Changes to Library Members (Object Files) for DNS Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CGTHBA	COMX	Changed	C Language	Updated to save host IP address information in IDNSHOSTADDR DNS client cache.
CGTHBN	COMX	Changed	C Language	Updated to save host name information in IDNSHOSTNAME DNS client cache.
C536	COMX	Changed	C Language	Updated to make sure the DNS server uses TCP/IP native stack support.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 809 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 809. Changes to Members (Object Files) for DNS Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CDNF	CDNF	New	C++ Language	Created to periodically refresh the core copy of the /etc/host.txt file used for DNS server processing.
CDNS	CDNS	New	C++ Language	Created to receive DNS address queries and send DNS responses.
CDNSCF	CDNE	New	C++ Language	Created to periodically refresh the core copy of the /etc/hosts file used for DNS client processing.
CDNSCR	CDNQ	New	C++ Language	Created to create IDNSHOSTADDR and IDNSHOSTNAME caches during system restart.
CDNSSC	CDNC	New	C++ Language	Created to issue sipcc() functions to send IP address processor shared table (IPAST) information to other processors.
CDNSSI	CDNI	New	C++ Language	Created to add or delete IP address entries from the IPAST.
CDNSSP	CDNP	New	C++ Language	Created to receive a sipcc() message (from another processor in restart) to send IPAST information to the processor in restart.
CDSSR	CDNR	New	C++ Language	Created to initialize the IPAST during system restart.
CINET4	CLTX	Changed	C Language	Updated to save the server program name in the entry control block (ECB) work area.
CLTQ	CLTN	Changed	Object - Only	Updated to change the length of the recvfrom() source address buffer from 4 to 16.
CLTR	CLTR	Changed	C Language	Updated to issue the serrc_op_ext() function with the SERRC_EXIT argument and to abort system restart if the TCP/IP configuration table is not built.

Table 809. Changes to Members (Object Files) for DNS Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
UDNS	UDNS	New	C++ Language	The DNS server user exit.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 810 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 810. Changes to Copy Members for DNS Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CT15	Control Program	CCCTIN	Not Applicable	Changed	Updated to create the IP address processor shared table (IPAST).
CTT1	Control Program	CCTCP1	Not Applicable	Changed	Updated to set up the IPAST interface for CTX3.
CTT5	Control Program	CCTCP1	Not Applicable	Changed	Updated to set up the IPAST interface for CTX3.
CTTA	Control Program	CCTCP1	Not Applicable	Changed	Updated to set up the IPAST interface for CTX3.
CTX0	Control Program	CCTCP1	Not Applicable	Changed	Updated to set up the IPAST interface for CTX3.
CTX2	Control Program	CCTCP1	Not Applicable	Changed	Updated to set up the IPAST interface for CTX3.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 811 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 811. Changes to Data Macros for DNS Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CK2SN	Changed	No
DLTEC	Changed	No

Table 811. Changes to Data Macros for DNS Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IPWBL	Changed	No
ISTAK	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 812 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 812. Changes to Selected Equate Macros for DNS Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 813 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 813. Changes to SIP Skeleton and Internal Macros for DNS Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 814 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 814. Changes to SIP Stage II Macros for DNS Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 815 on page 772 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 815. Changes to System Macros (IBM Use Only) for DNS Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMDC	Changed	Yes, dump formatter programs ICDF and STPP.

Segments

Table 816 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 816. Changes to Segments for DNS Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CNAB	Assembler	Not Applicable	Changed	Updated to delete IP address entries from the IP address processor shared table (IPAST) when a processor is deactivated.
CTKT	Assembler	Not Applicable	Changed	Updated to issue the CREMC macro during system startup on the CDNF program to create the host name tables used by the DNS server and DNS client code.
CTS7	Assembler	Not Applicable	Changed	Updated to process the new MSG_RTN_LOCAL_IP_ADDR flag for the recvfrom() socket API function.
CTSQ	Assembler	Not Applicable	Changed	Updated to start DNS client restart processing of the CDNQ DLM.
CTSR	Assembler	Not Applicable	Changed	Updated to start DNS server restart processing of the CDNR DLM.
CTSU	Assembler	Not Applicable	Changed	Updated to process the new MSG_RTN_LOCAL_IP_ADDR flag for the recvfrom() socket API function.
CTX3	Assembler	Not Applicable	Changed	Updated to call CDNI when CDLC IP links are activated or deactivated.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 817. Changes to ECB User Exits for DNS Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Determine Internet protocol (IP) address	CDNS	UDNS	New	Created to determine which host and IP address to use for the DNS response.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

Table 818 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 818. Changes to Messages and System Errors for DNS Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
009117	System Error	New
009118	System Error	New
009119	System Error	New
009120	System Error	New
DNSC0001E	Online	New
DNSC0002I	Online	New
DNSC0003E	Online	New
DNSC0004I	Online	New
DNSC0005E	Online	New
DNSC0006E	Online	New
DNSC0007E	Online	New
DNSC0008E	Online	New
DNSC0009E	Online	New
DNSC0010E	Online	New
DNSC0011I	Online	New
DNSS0001E	Online	New
DNSS0002E	Online	New
DNSS0003E	Online	New
DNSS0004I	Online	New
DNSS0005E	Online	New
DNSS0006E	Online	New
DNSS0007E	Online	New
DNSS0008E	Online	New
DNSS0009E	Online	New

Table 818. Changes to Messages and System Errors for DNS Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DNSS0010E	Online	New
DNSS0011E	Online	New
DNSS0012E	Online	New
DNSS0013I	Online	New
DNSS0015E	Online	New
DNSS0016E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 819 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 819. Changes to TPF Publications for DNS Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for DNS support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for DNS support.
<i>TPF Program Development Support Reference</i>	GTPPDR0C	Updated with new dump labels.
<i>TPF System Installation Support Reference</i>	GTPINR0D	Updated with the UDNS user exit.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated with information about server and client processing, and changes to application programming interface (API) functions.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The `recvfrom()` API now supports a new TPF-unique flag called `MSG_RTN_LOCAL_IP`, which passes back the local (TPF) IP address and port associated with a User Datagram Protocol (UDP) message to the application. The remote IP and port are still returned, along with the local IP and port, when the new flag is used. This new flag is only supported for sockets using TCP/IP native stack support, not for sockets using TCP/IP offload support.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to add DNS support to your existing TPF 4.1 system.

1. Install program update tape (PUT) 13.
2. If you plan to use the DNS client cache portion of DNS support, install logical record cache and coupling facility (CF) cache support (APAR PJ27083). You do not need coupling facility (CF) support to use the client cache. See "Logical Record Cache and Coupling Facility (CF) Cache Support (APAR PJ27083)" on page 894 for more information.
3. If you want to create the external host name file used by the DNS client portion of DNS support, create the host name file, `/etc/hosts`, which contains external host names and IP addresses. See *TPF Transmission Control Protocol/Internet Protocol* for more information about host names.
4. If you are using the DNS server portion of DNS support, do the following:
 - a. Be sure TCP/IP native stack support (APAR PJ26683) is installed on your TPF 4.1 system. See "TCP/IP Native Stack Support (APAR PJ26683)" on page 626 for more information.
 - b. Create the host name file, `/etc/host.txt`.
 - c. Code the UDNS user exit if you do not want to use the default round-robin logic. See *TPF System Installation Support Reference* for more information about the UDNS user exit. See *TPF Transmission Control Protocol/Internet Protocol* for more information about coding the user exit.
5. IPL the TPF 4.1 system and cycle to NORM state.
6. If you are using the DNS client cache portion of DNS support, do the following:
 - a. Determine the number of entries that will be in the `IDNSHOSTADDR` and `IDNSHOSTNAME` caches according to how many remote hosts you want to communicate with.
 - b. Enter the `ZCACH` command to change the number of entries in either or both caches. See *TPF Operations* for more information about the `ZCACH` command.
 - c. IPL the TPF 4.1 system.
7. If you want to create the external host name file used by the DNS client portion, load the `/etc/host.txt` file to your TPF 4.1 system.
8. If you are using the DNS server portion of DNS support, do the following:

- a. Load the `/etc/host.txt` file to your TPF 4.1 system.
- b. Enter from the basic subsystem (BSS): **ZINET ADD S-DNS
MODEL-NOWAIT PGM-CDNS PROT-UDP IP-ANY PORT-53 STATE-NORM** to define the DNS server application to the Internet daemon (INETD). A specific IP address may be supplied for the IP parameter. See *TPF Operations* for more information about the ZINET ADD command.
- c. Enter the ZINET START command from the BSS to activate the server application from the INETD. See *TPF Operations* for more information about this command.

Fallback Scenarios

If the migration to DNS support is not successful, you will need to fall back to your previous network environment, correct the problem, and try the conversion again.

To Fallback from the DNS Server Portion of DNS Support

Enter the ZINET STOP command to stop the DNS server. See *TPF Operations* for more information about the ZINET STOP command.

To Fallback From the DNS Client Cache Portion of DNS Support

Enter the ZCACH command to set the size of the IDNSHOSTNAME and IDNSHOSTADDR caches to zero, and IPL the TPF 4.1 system. See *TPF Operations* for more information about the ZCACH command.

Enhancements to TPF Support for VisualAge Client (APAR PJ27383)

The following section discusses the migration considerations for enhancements to TPF Support for VisualAge Client.

Prerequisite APARs

See the APEDIT for APAR PJ27383 for information about prerequisite APARs.

Functional Overview

Enhancements to TPF Support for VisualAge Client include the following items:

- Macro breakpoints
- Deferred line breakpoints
- TPF Performance Execution Trace Analyzer for VisualAge Client support for basic assembler language (BAL) programs
- PRINT NOGEN support for the listing view.

Macro breakpoints are supported from both the TPF C Debugger for VisualAge Client and the TPF Assembler Debugger for VisualAge Client. Macro breakpoints that are entered in the C debugger are in effect for both C and assembler programs. The opposite is also true; macro breakpoints that are entered in the assembler debugger are in effect for both C and assembler programs.

Before program update tape (PUT) 13, the assembler debugger supported address breakpoints that could not be reused from one debugging session to another. This has changed with the availability of *deferred line breakpoints*. You set deferred line breakpoints only once and then they are available to use in subsequent debugging sessions. In addition, when you are tracing one segment, you can set a breakpoint in another segment that has not been loaded but will be entered by the active entry control block (ECB).

Note: The breakpoint changes are for the assembler debugger only and do not affect the C debugger.

Enter/back support for the TPF Performance Execution Trace Analyzer for VisualAge Client gives you the ability to collect performance data about TPF assembler segments as well as C and C++ programs. Performance data indicates the amount of time that was spent in each segment.

Note: A function called by another function that does not contain hooks will not be in the performance analyzer report.

PRINT NOGEN support enables you to generate assembler debugger ADATA files using the PRINT NOGEN commands in an assembler listing. You no longer need to step through the macro expansion or set breakpoints after the macro and press the run button. For example, without PRINT NOGEN support, if the macro branches to an error label and you did not set a breakpoint at that time, the debugging session ends. With this support, the instructions are suppressed from the listing view and you can step through the macro instructions and stop at the next point in the program. If a macro branches to an error label, the debugger stops at that error label.

Architecture

The TPF Assembler Debugger for VisualAge Client backend is changed to enable the Function Breakpoint dialog box and, consequently, macro breakpoints; you enter macro breakpoints by using this dialog box. You can set a macro breakpoint in two different ways:

- Click the **Breakpoint** tab and then click the **Set** function menu item. The **Breakpoint** menu is visible only when the control pane is active and you have selected the **Breakpoint** tab.
- Click the **Source** tab and then click the **Set function breakpoint** menu item. The **Source** menu is visible only when the source pane is active.

Deferred line breakpoints reestablish line breakpoints in assembler programs. There are several ways to set a deferred line breakpoint:

- Point to the address where you want to set a breakpoint and double-click.
- Right-click the address where you want to set a breakpoint and then click **Set breakpoint**.
- Click the address where you want to set a breakpoint, click **Breakpoints** from the **File** bar menu, and click **Set Line**. The corresponding line number is placed in the **Line** box. (If you did not click on the address, enter the line number in the box.) Set additional breakpoints by clicking the **Set** button; if you do not want to set additional breakpoints, click **OK**.
- Click the **Source... File** bar menu item and click **Open new source**. Enter the new source file name and set a line breakpoint on the new source that is displayed by using one of the previous methods.
- Using the Debugger Session Control, right-click an object and click **View**. This displays a new source view; use one of the previous methods to set a line breakpoint.

Enter/back support for the performance analyzer makes each ENTRC macro call to a TPF segment look like an entry to a function call. Similarly, a BACKC macro call from the assembler segment is handled as a return from a function call. In addition, special handling is done for the ENTNC, ENTDC, and SWISC (with TYPE=ENTER specified) macro calls to handle each one as a return from a function call and then to enter a function call. This allows assembler and ISO-C dynamic load modules (DLMs) that were compiled without hooks to be traced in addition to the ISO-C DLMs that were compiled with hooks.

The listing view is created for the assembler debugger using a postprocessing tool on the SYSDATA output from the High Level Assembler (HLASM). The output from this program generates a file that is similar to the listing output from the HLASM. (The exception is that the listing view file always generates the expansion of executable macros.) With Version 3 (or higher) of the HLASM, SYSDATA records are generated to indicate when the PRINT assembler command is coded in the source file.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 820 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 820. Changes to Build Scripts for Enhancements to TPF Support for VisualAge Client

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CPA0BS	DLM	Changed	Updated to add support for assembler segment profiling.
CUDABS	DLL	Changed	Updated to add the CUDAMB, CUDAPV, and CUDXDB members (object files).
CUDNBS	DLM	New	Created to support the macro breakpoint match routine.

Dynamic Load Module (DLM) Stubs: Table 821 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 821. Changes to Dynamic Load Module (DLM) Stubs for Enhancements to TPF Support for VisualAge Client

DLM Stub	New, Changed, or No Longer Supported?
CUDN	New

General Use C/C++ Language Header Files: Table 822 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 822. Changes to General Use C/C++ Language Header Files for Enhancements to TPF Support for VisualAge Client

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	No
c\$eb0eb.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 823 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 823. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Enhancements to TPF Support for VisualAge Client

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$ecb3.h	Changed	No
i\$udbg.hpp	Changed	No

Table 823. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Enhancements to TPF Support for VisualAge Client (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$udcl.hpp	Changed	No
i\$umac.h	New	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 824 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 824. Changes to Library Members (Object Files) for Enhancements to TPF Support for VisualAge Client

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CDBINT	CISO	Changed	Object Code Only	Updated for the TPF Performance Execution Trace Analyzer for VisualAge Client.
CLMINT	CISO	Changed	Assembler	Updated to restructure the C initialization routine.
CTRINT	CISO	Changed	Object Code Only	Updated for the TPF Performance Execution Trace Analyzer for VisualAge Client.
CXXFUN	CISO	Changed	Object Code Only	Updated to release system heap storage.

Link-Edited Modules: Table 825 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 825. Changes to Link-Edited Modules for Enhancements to TPF Support for VisualAge Client

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CDBG	No change — load the new copy.	No change.
CDBS	Changed	Updated to add support for macro breakpoints and for the TPF Performance Execution Trace Analyzer for VisualAge Client to support assembler programs.
CPA0	No change — load the new copy.	No change.
CUD1	Changed	Updated to add a routine to handle macro breakpoints.
CUD2	Changed	Updated to add support for macro breakpoints.
CUDA	Changed	Updated to add the CUDAMB, CUDAPV, and CUDXDB members (object files) as well as to change the CUDA, CUDD, and CUDK members (object files).
CUDN	New	Created to provide support for the macro breakpoint match routine.
TPFDBG	Changed	Updated to provide PRINT NOGEN support.

Members (Object Files): Table 826 on page 781 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 826. Changes to Members (Object Files) for Enhancements to TPF Support for VisualAge Client

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CDBS	CDBS	Changed	C Language	Updated to add support for macro breakpoints and the TPF Performance Execution Trace Analyzer for VisualAge Client.
CUDA	CUDA	Changed	C++ Language	Updated to add support for the IVAListing view.
CUDAMB	CUDA	New	C++ Language	Created to add new macro breakpoint classes.
CUDAPV	CUDA	New	C++ Language	Created to add support for the IVAListing view class and PRINT NOGEN.
CUDB	CUDA	No Change— This member must be reassembled even though it was not changed.	C Language	No changes.
CUDC	CUDA	No Change— This member must be recompiled even though it was not changed.	C Language	No changes.
CUDD	CUDA	Changed	C Language	Updated to add EPDC handling classes.
CUDK	CUDA	Changed	C Language	Updated to add an upper method to class IVAStrng.
CUDN	CUDN	New	C++ Language	Created to add the macro breakpoint match routine.
CUDXDB	CUDA, CUDN	Changed	Assembler	Updated to add SVC and fast-link macro checking.
CUD0	CUD0	No Change — This member must be recompiled even though it was not changed.	C Language	No change.
CUD1	CUD1	Changed	C Language	Updated to add the macro breakpoint event handler.
CUD2	CUD2	Changed	C Language	Updated to add macro breakpoint event handling code, to change EPDC handling for breakpoints, and to provide support for PRINT NOGEN.
CUD3	CUD2	Changed	C Language	Updated to add support for the macro breakpoint change packet and deferred line breakpoints.
CUD4	CUD2	Changed	C Language	Updated to add support for the IVAListing view and deferred line breakpoints.
CUD5	CUD2	Changed	C Language	Updated to add support for the IVAListing view and PRINT NOGEN.
CUD6	CUD2	Changed	C Language	Updated to add support for macro breakpoints (to clear, disable, and enable all breakpoints) and deferred line breakpoints.

Table 826. Changes to Members (Object Files) for Enhancements to TPF Support for VisualAge Client (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CUD7	CUD2	No Change — This member must be recompiled even though it was not changed.	C Language	No change.
CUD8	CUD2	No Change — This member must be recompiled even though it was not changed	C Language	No change.
CUD9	CUD2	No Change — This member must be recompiled even though it was not changed	C Language	No change.
EQA0SBKP	CDBG	Changed	Object Code Only	Updated to add support for macro breakpoints.
EQA0SDBI	CDBG	Changed	Object Code Only	Updated to add support for macro breakpoints.
EQA00DBG	CDBG	Changed	Object Code Only	Updated to add support for macro breakpoints.
EQA00DBH	CDBG	Changed	Object Code Only	Updated to add support for macro breakpoints.
EQA00EVH	CDBG	Changed	Object Code Only	Updated to add support for macro breakpoints.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 827 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 827. Changes to CINFC Tags for Enhancements to TPF Support for VisualAge Client

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMDBB	391	New
CMMGRPC	390	New

Copy Members

Table 828 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 828. Changes to Copy Members for Enhancements to TPF Support for VisualAge Client

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Not Applicable	Changed	Added changes to the comments.
CCEB	Control Program	CCENBK	Not Applicable	Changed	Added support for hooks.
CCED	Control Program	CCENBK	Not Applicable	Changed	Added support for C initialization restructuring.

Table 828. Changes to Copy Members for Enhancements to TPF Support for VisualAge Client (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCMCDC	Assembler	CCMCDC	Not Applicable	Changed	Added the CEDL copy member.
CEDL	Control Program	CCMCDC	Not Applicable	New	Added support for macro breakpoints.
CEDM	Control Program	CCMCDC	Not Applicable	Changed	Added support for macro breakpoints.
CHSZ	Control Program	CCNUCL	Not Applicable	Changed	Added support for the new ECB field initialization.
CICR	Control Program	CCNUCL	Not Applicable	Changed	Added new CINFC tags CMMDBB and CMMGRPC.
CPSE	Control Program	CCCPSE	Not Applicable	Changed	Added support to reset hooks.
CUDR	Control Program	CCVAGE	Not Applicable	Changed	Updated for PRINT NOGEN support.
CUDU	Control Program	CCNUCL	Not Applicable	Changed	Updated for macro breakpoint support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 829 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 829. Changes to Data Macros for Enhancements to TPF Support for VisualAge Client

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ISV0SV	Changed	No
IUDBG	Changed	No
IUMAC	New	No

General Macros: Table 830 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 830. Changes to General Macros for Enhancements to TPF Support for VisualAge Client

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No

Selected Equate Macros: Table 831 on page 784 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 831. Changes to Selected Equate Macros for Enhancements to TPF Support for VisualAge Client

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IEQCE2	Changed	No
IEQCE3	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): There are no changes.

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 832 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 832. Changes to System Macros for Enhancements to TPF Support for VisualAge Client

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CREGPC	New	No
CRESVC	Changed	No
IBMSVC	Changed	No
USRSVC	Changed	No

System Macros (IBM Use Only): Table 833 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 833. Changes to System Macros (IBM Use Only) for Enhancements to TPF Support for VisualAge Client

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
LOCORE	Changed	Yes

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

There are none.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 834 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 834. Changes to TPF Publications for Enhancements to TPF Support for VisualAge Client

Publication Title	Softcopy File Name	Description of Change
<i>TPF Main Supervisor Reference</i>	GTPMSR07	Updated with information about the CREGPC macro, which was added for Enhancements to TPF Support for VisualAge Client.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG202	Updated with migration considerations for Enhancements to TPF Support for VisualAge Client.
<i>TPF System Macros</i>	GTPSYS0D	Updated with information about new and changed macros that were added for Enhancements to TPF Support for VisualAge Client.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install Enhancements to TPF Support for VisualAge Client on your TPF 4.1 system.

1. Update the library system with the contents of program update tape (PUT) 13.

2. Recompile your changed segments.
3. Relink the build scripts.
4. Relink the control program (CP) with a new allocator.
5. Load the new CP and changed segments.
6. IPL your TPF 4.1 system again.

FIFO Special File Support (APAR PJ27214)

The following section discusses the migration considerations for FIFO special file support.

Prerequisite APARs

See the APEDIT for APAR PJ27214 for information about prerequisite APARs.

Functional Overview

FIFO special file support builds on the infrastructure provided previously with TPF Internet server support and open systems infrastructure. See “TPF Internet Server Support (APARs PJ25589 and PJ25703)” on page 504 and “Open Systems Infrastructure (APAR PJ26188)” on page 595 for more information.

TPF Internet server support introduced the Internet daemon and the Trivial File Transfer Protocol (TFTP) server. To support the Internet daemon and Internet server applications, infrastructure was added that provided essential application programming interfaces (APIs), such as fork and signals, that are common in the UNIX environment and heavily used by servers on those platforms. This infrastructure enabled the servers to function, but the lack of more complete system services limited their performance and capabilities. To reduce the limitation, open systems infrastructure improved the infrastructure base with pipes, shared memory, and enhanced signal support. With FIFO special file support, this infrastructure is enhanced further. These enhancements continue to ease porting efforts and encourage development of new applications for the TPF 4.1 system.

FIFO special file support provides the following:

- Support for FIFO special files. A *FIFO special file* is a file that is typically used to send data from one process to another so that the receiving process reads the data in first-in-first-out (FIFO) format. A FIFO special file is also known as a *named pipe*. This support provides a method for independent processes to communicate with each other by using TPF file system functions, such as the read and write functions.
- Enhancements to the select function to allow the use of file descriptors for named pipes.
- A syslog daemon to provide a message logging facility for all application and system processes. Internet server applications and components use the syslog daemon for logging purposes and can also send trace information to the syslog daemon. Messages can be logged to file or to tape. Remote syslog daemons can also log messages to the local syslog daemon through remote sockets.

Architecture

The following describes how FIFO special file support is implemented in the TPF 4.1 system.

FIFO Special Files

The `mkfifo` function creates an i-node in the file system that is identified as a FIFO special file (or named pipe). You can also create a FIFO special file with the `ZFILE mkfifo` command.

When the FIFO special file is accessed using the standard Portable Operating System Interface for Computer Environments (POSIX) file system functions, a

special device driver is started. The device driver provides functions that allow multiple independent processes to write and read concurrently from the FIFO special file.

If a read function is attempted on an empty FIFO special file and no process has the file open for writing, the read function returns a value of 0 to indicate the end of the file. When the buffer for a FIFO special file becomes full, the writer is blocked until enough data is removed from the file with a read function to allow the write function to be completed.

See the *TPF C/C++ Language Support User's Guide* for more information about the `mkfifo` function and device driver changes. See *TPF Operations* for more information about the `ZFILE mkfifo` command.

Select Enhancements

The `select` function enhancements allow you to specify nonsocket file descriptors, socket file descriptors, or a combination of both. If you specify both nonsocket file descriptors and socket file descriptors in a single function call, the socket file descriptors must be using TCP/IP native stack support. See "TCP/IP Native Stack Support (APAR PJ26683)" on page 626 for more information about TCP/IP native stack support.

See the *TPF C/C++ Language Support User's Guide* for more information about the `select` function.

Syslog Daemon

Syslog daemon processing is controlled by a configuration file called `/etc/syslog.conf` in which you define logging rules and output destinations for error messages, authorization violation messages, and trace data. The syslog daemon reads the configuration file when the daemon starts and whenever the hangup signal (SIGHUP) is received. Servers on the local system use FIFO special files to communicate with the syslog daemon. Remote servers use TCP/IP sockets.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about the syslog daemon and the syslog daemon configuration file.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 835 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 835. Changes to Build Scripts for FIFO Special File Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CFIUBS	DLM	Changed	Updated for FIFO special file support.

Table 835. Changes to Build Scripts for FIFO Special File Support (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
COMXBS	DLM	Changed	Updated for FIFO special file support.
CSYLBS	DLM	New	Added for FIFO special file support.
CTXOBS	DLL	New	Added for FIFO special file support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 836 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 836. Changes to General Use C/C++ Language Header Files for FIFO Special File Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
bindas.h	New	Not Applicable
bindns.h	New	Not Applicable
bitype.h	New	Not Applicable
c\$cinfc.h	Changed	No
c\$ddsm.h	Changed	Yes
c\$ddtb.h	Changed	No
c\$fsdd.h	Changed	No
c\$spif.h	Changed	Yes
errno.h	Changed	No
evlib.h	New	Not Applicable
list.h	New	Not Applicable
namcom.h	New	Not Applicable
portaf.h	New	Not Applicable
portbf.h	New	Not Applicable
resdbg.h	New	Not Applicable
resolv.h	New	Not Applicable
stat.h	Changed	No
syslog.h	New	Not Applicable
sys/stat.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 837 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 837. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for FIFO Special File Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
bincon.h	New	Not Applicable
evlibp.h	New	Not Applicable

Table 837. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for FIFO Special File Support (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$cmds.h	Changed	Yes
i\$fsdd.h	Changed	Yes
i\$glue.h	Changed	Yes
i\$node.h	Changed	No
i\$npdd.h	New	Not Applicable
i\$poll.h	New	Not Applicable
i\$pwbl.h	Changed	No
i\$wait.h	New	Not Applicable

Library Interface Scripts: Table 838 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 838. Changes to Library Interface Scripts for FIFO Special File Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	Changed	Updated for FIFO special file support.

Library Members (Object Files): Table 839 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CDDNPI	COMX	New	C Language	Added device drivers for FIFO special file support.
CDDNUL	COMX	Changed	C Language	Updated for FIFO special file support.
CDDPIP	COMX	Changed	C Language	Updated for FIFO special file support.
CDDSOC	COMX	Changed	C Language	Updated for FIFO special file support.
CDDTBL	COMX	Changed	C Language	Updated for FIFO special file support.
CFORKC	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFORKC because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS001	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS001 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS002	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS002 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS003	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS003 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS004	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS004 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS005	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS005 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS006	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS006 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS007	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS007 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS008	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS008 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS009	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS009 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS010	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS010 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS011	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS011 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS012	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS012 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS013	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS013 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS014	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS014 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS015	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS015 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS016	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS016 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS017	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS017 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS018	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS018 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS019	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS019 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS020	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS020 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS021	COMX	Changed	C Language	Updated for FIFO special file support.
CFS022	COMX	Changed	C Language	Updated for FIFO special file support.
CFS023	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS023 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS024	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS024 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS025	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS025 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS026	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS026 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS027	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS027 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS028	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS028 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS029	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS029 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS030	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS030 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS031	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS031 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS032	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS032 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS033	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS033 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS034	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS034 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS035	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS035 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS036	COMX	Changed	C Language	Updated for FIFO special file support.
CFS037	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS037 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS038	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS038 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS101	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS101 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS102	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS102 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS105	COMX	Changed	C Language	Updated for FIFO special file support.
CFS107	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS107 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS108	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS108 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS110	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS110 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS111	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS111 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS115	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS115 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS116	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS116 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS121	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS121 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS123	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS123 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS126	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS126 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS127	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS127 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS130	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS130 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS131	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS131 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS135	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS135 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS139	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS139 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS145	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS145 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS148	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS148 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS149	COMX	Changed	C Language	Updated for FIFO special file support.
CFS150	COMX	Changed	C Language	Updated for FIFO special file support.
CFS152	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS152 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS154	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS154 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS157	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS157 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS160	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS160 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS166	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS166 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS167	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS167 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS168	COMX	Changed	C Language	Updated for FIFO special file support.
CFS169	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS169 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS170	COMX	New	C Language	Added the mkfifo function for FIFO special file support.
CFS180	COMX	New	C Language	Added for FIFO special file support.
CFS181	COMX	New	C Language	Added for FIFO special file support.
CFS304	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS304 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS354	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS354 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS404	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS404 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS454	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS454 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS504	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS504 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS554	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS554 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CFS604	COMX	Not Changed	C Language	No code changes were made, but you must recompile CFS604 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CPIPE	COMX	Changed	C Language	Updated for FIFO special file support.
CSHCTL	COMX	Not Changed	C Language	No code changes were made, but you must recompile CSHCTL because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CSHDET	COMX	Not Changed	C Language	No code changes were made, but you must recompile CSHDET because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CSHGET	COMX	Not Changed	C Language	No code changes were made, but you must recompile CSHGET because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CSHMAT	COMX	Not Changed	C Language	No code changes were made, but you must recompile CSHMAT because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
CSSDLL	CISO	Changed	C Language	Updated to include CTXO in the list of subsystem-shared DLLs for FIFO special file support.
C511	COMX	Not Changed	C Language	No code changes were made, but you must recompile C511 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C512	COMX	Not Changed	C Language	No code changes were made, but you must recompile C512 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C515	COMX	Not Changed	C Language	No code changes were made, but you must recompile C515 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C528	COMX	Not Changed	C Language	No code changes were made, but you must recompile C528 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C529	COMX	Not Changed	C Language	No code changes were made, but you must recompile C529 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C530	COMX	Not Changed	C Language	No code changes were made, but you must recompile C530 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C539	COMX	Not Changed	C Language	No code changes were made, but you must recompile C539 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C540	COMX	Not Changed	C Language	No code changes were made, but you must recompile C540 because of changes to the i\$fsdd.h, i\$glue.h, and c\$spif.h header files.
C549	COMX	Changed	C Language	Updated select function processing for FIFO special file support.
C550	COMX	Changed	C Language	Updated select function processing for FIFO special file support.
UDDIPM	COMX	Changed	C Language	Updated for FIFO special file support.
UDDTBL	COMX	Not Changed	C Language	No code changes were made, but you must recompile UDDTBL because of changes to the i\$fsdd.h, i\$glue.h, c\$spif.h, and c\$ddsm.h header files.

Table 839. Changes to Library Members (Object Files) for FIFO Special File Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
UDDWTC	COMX	Changed	C Language	Updated for FIFO special file support.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 840 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 840. Changes to Members (Object Files) for FIFO Special File Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CASSER	CTXO	New	C Language	Added for FIFO special file support.
CEVTIM	CTXO	New	C Language	Added for FIFO special file support.
CFIA	CFIA	Changed	C Language	Updated for FIFO special file support.
CFIM	CFIM	Not Changed	C Language	No code changes were made, but you must recompile CFIM because of changes to the <code>i\$cmds.h</code> header file.
CFIND3	CFJF	Not Changed	C Language	No code changes were made, but you must recompile CFIND3 because of changes to the <code>i\$cmds.h</code> header file.
CFIU	CFIU	Changed	C Language	Updated for FIFO special file support.
CFJX	CFJX	Not Changed	C Language	No code changes were made, but you must recompile CFJX because of changes to the <code>i\$cmds.h</code> header file.
CINETA	CTXO	New	C Language	Added for FIFO special file support.
CINETN	CTXO	New	C Language	Added for FIFO special file support.
CINET1	CLTV	Changed	C Language	Updated for FIFO special file support.
CINET7	CLTZ	Changed	C Language	Updated for FIFO special file support.
CNA2E	CTXO	New	C Language	Added for FIFO special file support.
CNE2A	CTXO	New	C Language	Added for FIFO special file support.
CNSNAM	CTXO	New	C Language	Added for FIFO special file support.
CNSNET	CTXO	New	C Language	Added for FIFO special file support.
CNSPAR	CTXO	New	C Language	Added for FIFO special file support.
CNSPRN	CTXO	New	C Language	Added for FIFO special file support.
CNSSAD	CTXO	New	C Language	Added for FIFO special file support.
CNSTTL	CTXO	New	C Language	Added for FIFO special file support.
CRESCO	CTXO	New	C Language	Added for FIFO special file support.
CRESDA	CTXO	New	C Language	Added for FIFO special file support.
CRESDB	CTXO	New	C Language	Added for FIFO special file support.
CRESIN	CTXO	New	C Language	Added for FIFO special file support.
CRESMK	CTXO	New	C Language	Added for FIFO special file support.
CRESQR	CTXO	New	C Language	Added for FIFO special file support.
CRESSN	CTXO	New	C Language	Added for FIFO special file support.

Table 840. Changes to Members (Object Files) for FIFO Special File Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CSH07	CFIX	Not Changed	C Language	No code changes were made, but you must recompile CSH07 because of changes to the <code>i\$cmds.h</code> header file.
CSYLGD	CSYL	New	C Language	Added for FIFO special file support.
CSYLOG	CTXO	New	C Language	Added the <code>closelog</code> , <code>openlog</code> , and <code>syslog</code> functions for FIFO special file support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 841 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 841. Changes to CINFC Tags for FIFO Special File Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMNAMPA	287	New

Copy Members

Table 842 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 842. Changes to Copy Members for FIFO Special File Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CICR	Control Program	CCNUCL	Not Applicable	Changed	Updated to initialize the new CINFC tag for FIFO special file support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 843 on page 799 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 843. Changes to Data Macros for FIFO Special File Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IPWBL	Changed	Yes

General Macros: Table 844 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 844. Changes to General Macros for FIFO Special File Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 845 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 845. Changes to SIP Skeleton and Internal Macros for FIFO Special File Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 846 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 846. Changes to SIP Stage II Macros for FIFO Special File Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 847 on page 800 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 847. Changes to Segments for FIFO Special File Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CTS9	Real-Time Assembler	Not Applicable	Not Changed	No code changes were made, but you must reassemble CTS9 because of changes to the IPWBL data macro.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 848 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 848. Changes to Commands for FIFO Special File Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZFILE ls	Changed	Updated to display FIFO special files.
ZFILE mkfifo	New	Added to allow you to make a FIFO special file.

Messages and System Errors

Table 849 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 849. Changes to Messages and System Errors for FIFO Special File Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SYSD0000E	Online	New
SYSD0001E	Online	New
SYSD0002E	Online	New

Table 849. Changes to Messages and System Errors for FIFO Special File Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SYSD0003E	Online	New
SYSD0004E	Online	New
SYSD0005E	Online	New
SYSD0006I	Online	New
SYSD0007I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

FIFO special files cause an increase in the use of system heap storage. Use the ZCTKA DISPLAY and the ZCTKA ALTER commands to display and change the size of system heap storage, respectively. See *TPF Operations* for more information about these commands.

A FIFO special file buffer consists of 2 system heap frames; multiply the number of FIFO special file buffers used by your applications by 2 to estimate the number of system heap frames needed for FIFO special file buffers. See the CORREQ macro in *TPF System Generation* for more information about calculating the number of frames required for your TPF 4.1 system.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 850 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 850. Changes to TPF Publications for FIFO Special File Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0C	Updated with information about the syslog daemon for FIFO special file support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0D	Updated with information about the functions that were added and changed for FIFO special file support.
<i>TPF Concepts and Structures</i>	GTPCON0A	Updated with information about special files and the syslog daemon for FIFO special file support.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary for FIFO special file support.

Table 850. Changes to TPF Publications for FIFO Special File Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for FIFO special file support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for FIFO special file support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for FIFO special file support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated with information about the syslog daemon for FIFO special file support. The select function information was moved to the <i>TPF C/C++ Language Support User's Guide</i> .

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

A number of API functions were added or changed for FIFO special file support:

- The `mkfifo` function was added to create a FIFO special file.
- The `open`, `rename`, and `unlink` functions were updated with a new error return related to FIFO special file processing.
- The `select` function was updated to provide support for file descriptors other than socket file descriptors.
- The `TPF_FSDD_OPEN` device driver was updated with a new parameter. In addition, there are two new device drivers: `TPF_FSDD_POLL` and `TPF_FSDD_POLL_CLEAN`.

Note: You may need to change any user-defined device drivers to accommodate these changes. See the *TPF C/C++ Language Support User's Guide* for more information about user-defined device drivers.

- The `openlog`, `closelog`, and `syslog` functions were added to allow you to use the logging facilities of the syslog daemon with your TPF application programs. See *TPF Transmission Control Protocol/Internet Protocol* for more information about the syslog daemon.

See the *TPF C/C++ Language Support User's Guide* for more information about the new and changed functions for FIFO special file support.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

After you install FIFO special file support on your TPF 4.1 system, do the following to verify that a FIFO special file can be created:

1. Enter **ZFILE mkfifo myPipe** to create a FIFO special file called myPipe.
2. Enter **ZFILE ls -l -F** to verify that the file was created.
3. Enter **ZFILE echo "Hi" >myPipe** to write to the file.
4. Enter **ZFILE cat myPipe** to display the contents of the file.

5. Enter **ZFILE rm myPipe** to remove the file.

See *TPF Operations* for more information about the ZFILE commands. See “Migration Scenarios” for information about installing FIFO special file support.

Migration Scenarios

Use the following procedure to install FIFO special file support on your TPF 4.1 system.

1. Install program update tape (PUT) 13, which contains APAR PJ27214 for FIFO special file support.
2. Update any existing user-defined device drivers as needed to conform to the changes made for FIFO special file support. See the *TPF C/C++ Language Support User's Guide* for more information about adding user-defined device drivers.
3. Install the following:
 - C/C++ language header files listed in Table 836 on page 789 and Table 837 on page 789
 - Copy members listed in Table 842 on page 798
 - Macros found in “Macros” on page 798.
4. Run the LIBI offline program for all changed library interface scripts listed in Table 838 on page 790.
5. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
6. Assemble the SIP stage I deck to create a SIP stage II deck.
7. Run SIP stage II.
8. Run the CBLD program for the build scripts listed in Table 835 on page 788.
9. Reassemble or recompile the following:
 - Library members listed in Table 839 on page 790
 - DLM and DLL members listed in Table 840 on page 797
 - CSECTs listed in Table 842 on page 798
 - Segments listed in Table 847 on page 800.
10. Link-edit the DLMs/DLLs that are listed in Table 840 on page 797.
11. IPL your TPF 4.1 system.
12. Enter the following from the basic subsystem (BSS) to add the syslog daemon server entry to the Internet daemon configuration file (IDCF):
ZINET ADD S-SYSLOGD PGM-CSYL MODEL-DAEMON ACT-acttype
STATE-state USER-ROOT XPARAM-args
See *TPF Transmission Control Protocol/Internet Protocol* for more information about adding the syslog daemon server entry and specific values for the XPARAM parameter. See *TPF Operations* for more information about the ZINET ADD command.
13. Cycle the TPF 4.1 system to CRAS state or above.
14. Enter **ZINET START S-SYSLOGD** to start the syslog daemon.
15. Modify the syslog daemon configuration file, as needed, with any additional logging rules that you want to use.

Note: The syslog daemon configuration file is set up initially to log all messages to the `/dev/null` file.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about updating the syslog daemon configuration file.

16. See “Installation Validation” on page 802 for information about how to verify that a FIFO special file can be created.

File System Tools (APAR PJ27277)

The following section discusses the migration considerations for file system tools.

Prerequisite APARs

See the APEDIT for APAR PJ27277 for information about prerequisite APARs.

Functional Overview

File system tools expands the support provided with TPF Internet server support ("TPF Internet Server Support (APARs PJ25589 and PJ25703)" on page 504) by making it easier to port and create new applications and scripting languages on the TPF 4.1 system. Specifically, file system tools gives you the ability to do the following:

- Activate scripts and TPF segments from the command line
- Pass data from one ZFILE command to another by using a vertical bar (|) as a pipe
- Use ZFILE commands to support Web hosting and scripting
- Emulate additional Portable Operating System Interface for Computer Environments (POSIX) functions to process file system files with more than one level of redirection
- Preserve the meaning of special characters by using a quoting mechanism in the ZFILE commands.

Note: Practical Extraction and Report Language (Perl) is an example of a scripting language that you can use on the TPF 4.1 system. Information about Perl is available at:

<http://www.perl.com>

Activating Scripts and Segments from the Command Line

The ZFILE command allows you to run scripts and TPF segments from the command line. The hash-bang symbol (#!) must be on the first line of the script file and indicates that what follows is either the file system file containing the script you want to activate or the 4-character name of the segment you want to activate.

- To run a TPF segment, the first line of the script file must contain #!xxxx, where xxxx is the 4-character segment name.
- To run a script written in a scripting language, the first line of the script file must contain a reference to a TPF segment name. For example, the first line of a Perl script might contain #!/usr/local/perl/perl. This indicates that there is a file named perl contained in the /usr/local/perl directory that contains #!xxxx, where xxxx is the TPF segment for Perl.

See *TPF Operations* for more information about the ZFILE command.

Pipe Support

A vertical bar (|), or pipe, is used to connect ZFILE commands. Two or more commands can be connected by placing a vertical bar between each of the commands to form a pipeline. The pipe passes the standard output (stdout) from the first command to the second command as standard input (stdin). This implementation of pipes is limited to ZFILE commands. See *TPF Operations* for more information about pipe support that is specific to each ZFILE command.

ZFILE Commands

The family of ZFILE commands is expanded to support web hosting and

scripting languages. In addition, the 11 new ZFILE command as provide you with better control over the file system. See *TPF Operations* for information about ZFILE commands.

tpf_fork Enhancements

The tpf_fork function has been enhanced to allow you to specify how to pass a string of data. The tpf_fork function creates a child process on a specified I-stream by inheriting the environment list, file descriptors, user IDs, working directories, and file mode creation masks of the parent process. Enhancements to tpf_fork allow you to create applications that emulate the execl, execlp, execv, and execvp POSIX functions. See the *TPF C/C++ Language Support User's Guide* for more specific information about tpf_fork enhancements.

Quoting Mechanisms

The ZFILE commands have been enhanced through the implementation of three quoting mechanisms. The escape character (\), single quotes (' '), and double quotes (" ") provide you with the ability to preserve the literal meaning of certain characters rather than the special meaning that the character would take on otherwise. See *TPF Operations* for more information about the ZFILE commands and the use of quoting mechanisms.

Architecture

The ability to port and create new applications and scripting languages is enhanced through the implementation of the ZFILE parser, or the CFIX dynamic load module (DLM), and the enhancements made to the tpf_fork function.

CFIX

The CFIX DLM was developed as a shell to parse the ZFILE commands prior to activating the appropriate file system utility. In addition, file system utilities are now invoked uniformly by ZFILE commands, calls from tpf_fork, and scripting languages. The CFIX DLM provides the processing behind script and segment activation from the command line, using a vertical bar (|) as a pipe, and using quoting mechanisms to escape the special meaning of specific characters.

tpf_fork

The tpf_fork function has been enhanced to pass application-defined environment variables to the child process as well as strings of data passed as arguments through the argv parameter to the main function of the child process. Data passed to the argv parameter can be grouped with quotes to override the default behavior of the tpf_fork function. Typically, this means that a call to tpf_fork will include data to direct the behavior or to provide input for the child process, which has been parsed into single words and passed in the argv parameter array. For example when a user enters ZFILE rm -r testdir on the command line, the ZFILE parser (CFIX) will issue a tpf_fork function call to enter the rm file system utility (segment CFID) with the following parameters passed to the main function of CFID:

```
argv[0] = rm
argv[1] = -r
argv[2] = testdir
```

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about C/C++ language.

Build Scripts: Table 851 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 851. Changes to Build Scripts for File System Tools

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CFIMBS	DLM	Changed	Removed CGLOBB40, which is no longer required by the CFIM member (object file).
CFIPBS	DLM	Changed	Removed I\$MSG40 and added CGETOP40.
CFIRBS	DLM	Changed	Removed I\$MSG40, which is no longer needed.
CFIVBS	DLM	Changed	Removed I\$MSG40, which is no longer needed.
CFIXBS	DLM	New	Build script for the processing of ZFILE commands by the ZFILE parser.
CFJABS	DLM	New	Build script for the ZFILE tr command.
CFJEBS	DLM	New	Build script for the ZFILE export and ZFILE unset commands.
CFJFBS	DLM	New	Build script for the ZFILE find command.
CFJGBS	DLM	New	Build script for the ZFILE grep command.
CFJHBS	DLM	New	Build script for the ZFILE hex command.
CFJPBS	DLM	New	Build script for the ZFILE ps command.
CFJSBS	DLM	New	Build script for the ZFILE sed command.
CFJTBS	DLM	New	Build script for the ZFILE tee command.
CFJXBS	DLM	New	Build script for the ZFILE xargs command.
CISOBS	DLM	Changed	Extended C environment support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 852 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 852. Changes to General Use C/C++ Language Header Files for File System Tools

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
param.h	Changed	No
stdlib.h	Changed	No
sysapi.h	Changed	Yes. Recompile programs that call the tpf_fork function.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 853 on page 808 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 853. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for File System Tools

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$proc.h	Changed	No
cenvir.h	New	No
i\$argv.h	New	No
i\$cmds.h	New	No
I\$Dir.hpp	Changed	No
I\$Env.hpp	Changed	No
I\$File.hpp	Changed	No
i\$find.h	New	No
i\$hex.h	New	No
I\$Msg.hpp	No Longer Supported	No
i\$ps.h	New	No
i\$sed.h	New	No
i\$sfct.h	New	No
i\$sh00.h	New	No
i\$sh01.h	New	No
i\$sh02.h	New	No
i\$sh04.h	New	No
i\$sh05.h	New	No
i\$sh06.h	New	No
i\$sh07.h	New	No
i\$sh08.h	New	No
i\$sh09.h	New	No
i\$sh10.h	New	No
i\$sh11.h	New	No
i\$sh12.h	New	No
i\$sh13.h	New	No
i\$sh15.h	New	No
i\$sh16.h	New	No
i\$sh17.h	New	No
i\$sh18.h	New	No
i\$sh19.h	New	No
i\$sh20.h	New	No
i\$sh22.h	New	No
i\$sh23.h	New	No
i\$sh24.h	New	No
i\$sh25.h	New	No
i\$str.h	New	No
I\$ZF.h	Changed	No

Library Interface Scripts: Table 854 on page 809 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 854. Changes to Library Interface Scripts for File System Tools

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CISOXV	Changed	Extended C environment support.

Library Members (Object Files): Table 855 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 855. Changes to Library Members (Object Files) for File System Tools

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CENVIR	CISO	New	C Language	Enhanced environment variables.
CFORKA	COMX	Changed	Assembler	Enhanced main function support.
CFORKC	COMX	Changed	C Language	Enhanced main function support.
CLMINT	CISO	Changed	Assembler	Enhanced environment variables.
CPRSMA	CISO	Changed	C Language	Enhanced main function support.
CPWGR0	COMX	Changed	C Language	Modified by file system tools.
CSETNV	CISO	Changed	Assembler	Enhanced environment variables.
CUNSTV	CISO	Changed	Assembler	Enhanced environment variables.

Link-Edited Modules: Table 856 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 856. Changes to Link-Edited Modules for File System Tools

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CISO	Changed	Added support for new ZFILE commands.
COMX	Changed	Added support for new ZFILE commands.

Members (Object Files): Table 857 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 857. Changes to Members (Object Files) for File System Tools

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CBOT	CBOT	Changed	C Language	Added additional default directories.
CFIM	CFIM	Changed	C Language	Moved a majority of ZFILE command processing to the CFIX DLM.
CFIND1	CFJF	New	C Language	Created for the entry point of the ZFILE find command.
CFIND2	CFJF	New	C Language	Created for processing of the ZFILE find command.

Table 857. Changes to Members (Object Files) for File System Tools (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFIND3	CFJF	New	C Language	Created for the command routines of the ZFILE find command.
CFIND4	CFJF	New	C Language	Created for format processing of the ZFILE find command.
CFIND5	CFJF	New	C Language	Created for miscellaneous functions of the ZFILE find command.
CFIND6	CFJF	New	C Language	Created for operator processing of the ZFILE find command.
CFIND7	CFJF	New	C Language	Created for option processing of the ZFILE find command.
CFIND8	CFJF	New	C Language	Created for file mode processing of the ZFILE find command.
CFIND9	CFJF	New	C Language	Created for file mode display of the ZFILE find command.
CFIP	CFIP	Changed	C++ Language	Updated for environment variables.
CFIR	CFIR	Changed	C++ Language	Updated for environment variables.
CFIS	CFIS	Changed	C++ Language	Updated for environment variables.
CFIV	CFIV	Changed	C++ Language	Updated for environment variables.
CFJE	CFJE	New	C++ Language	Created for the ZFILE export command.
CFJG	CFJG	New	C Language	Created for the ZFILE grep command.
CFJT	CFJT	New	C Language	Created for the ZFILE tr command.
CFJX	CFJX	New	C Language	Created for ZFILE xargs processing in the ZFILE xargs command.
CHEX01	CFJH	New	C Language	Created for the ZFILE hex command entry point.
CHEX02	CFJH	New	C Language	Created for ZFILE hex command data conversion.
CHEX03	CFJH	New	C Language	Created for the ZFILE hex command display.
CHEX04	CFJH	New	C Language	Created for ZFILE hex command input message processing.
CHEX05	CFJH	New	C Language	Created for ZFILE hex command format processing.
CPS01	CFJP	New	C Language	Created for the ZFILE ps command entry point.
CPS02	CFJP	New	C Language	Created for ZFILE ps command field name processing.
CPS03	CFJP	New	C Language	Created for the ZFILE ps command display.
CSED01	CFJS	New	C Language	Created for the ZFILE sed command entry point.
CSED02	CFJS	New	C Language	Created for command parsing of the ZFILE sed command command line.
CSED03	CFJS	New	C Language	Created for miscellaneous processing of the ZFILE sed command.
CSED04	CFJS	New	C Language	Created for ZFILE sed command input message processing.
CSH01	CFIX	New	C Language	Created for the ZFILE parser entry point.
CSH02	CFIX	New	C Language	Created for alias processing in the ZFILE parser.

Table 857. Changes to Members (Object Files) for File System Tools (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CSH03	CFIX	New	C Language	Created for arithmetic processing in the ZFILE parser.
CSH04	CFIX	New	C Language	Created for arithmetic expression parsing in the ZFILE parser.
CSH05	CFIX	New	C Language	Created for built-in command processing in the ZFILE parser.
CSH06	CFIX	New	C Language	Created for error processing in the ZFILE parser.
CSH07	CFIX	New	C Language	Created for top-level execution routines in the ZFILE parser.
CSH08	CFIX	New	C Language	Created for running commands in the ZFILE parser.
CSH09	CFIX	New	C Language	Created for argument evaluation in the ZFILE parser.
CSH10	CFIX	New	C Language	Created for initialization of the ZFILE parser.
CSH11	CFIX	New	C Language	Created for input routines in the ZFILE parser.
CSH12	CFIX	New	C Language	Created for job control in the ZFILE parser.
CSH13	CFIX	New	C Language	Created for memory functions in the ZFILE parser.
CSH14	CFIX	New	C Language	Created for running miscellaneous built-in ZFILE parser commands.
CSH15	CFIX	New	C Language	Created for string functions in the ZFILE parser.
CSH16	CFIX	New	C Language	Created for parsed ZFILE parser command routines.
CSH17	CFIX	New	C Language	Created for option processing in the ZFILE parser.
CSH18	CFIX	New	C Language	Created for output routines in the ZFILE parser.
CSH19	CFIX	New	C Language	Created for parser code in the ZFILE parser.
CSH20	CFIX	New	C Language	Created for redirection in the ZFILE parser.
CSH21	CFIX	New	C Language	Created for ZFILE parser diagnostics.
CSH22	CFIX	New	C Language	Created for syntax tables in the ZFILE parser.
CSH24	CFIX	New	C Language	Created for signal handling in the ZFILE parser.
CSH25	CFIX	New	C Language	Created for variable table routines in the ZFILE parser.
CTR001	CFJA	New	C Language	Created for the ZFILE tr command.
CTR002	CFJA	New	C Language	Created for the ZFILE tr command.
I\$DIR	CFIP, CFIR, CFIS, CFIV	Changed	C++ Language	Updated for environment variables.
I\$ENV	CFIR, CFIS, CFJE	Changed	C++ Language	Updated for environment variables.
I\$FILE	CFIR, CFIS, CFJE	Changed	C++ Language	Updated for environment variables.
I\$MSG	CFIP, CFIR, CFIV	No Longer Supported	C++ Language	Removed and replaced by CGETOP40.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 858 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 858. Changes to Copy Members for File System Tools

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCE4	Control Program	CCIISC	Not Applicable	Changed	Updated to handle tpf_fork changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 859 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 859. Changes to Data Macros for File System Tools

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDARGV	New	No
IDENV	Changed	Yes
IPROC	Changed	No

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 860 on page 813 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 860. Changes to SIP Skeleton and Internal Macros for File System Tools

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 861 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 861. Changes to SIP Stage II Macros for File System Tools

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 862 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 862. Changes to System Macros for File System Tools

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IBMSVC	Changed	Yes

System Macros (IBM Use Only): Table 863 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 863. Changes to System Macros (IBM Use Only) for File System Tools

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$FORKC	Changed	Yes

Segments

Table 864 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 864. Changes to Segments for File System Tools

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCIISC	CSECT	Not Applicable	Not Applicable	No changes were made but it must be reassembled because of updates to the tpf_fork function.
CCNUCL	CSECT	Not Applicable	Not Applicable	No changes were made but it must be reassembled because of updates to the tpf_fork function.

Table 864. Changes to Segments for File System Tools (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCMCDC	CSECT	Not Applicable	Not Applicable	No changes were made but it must be reassembled because of updates to the tpf_fork function.
CFIQ	C Language	CFIQ	Not Applicable	No changes were made but it must be recompiled because of updates to the tpf_fork function.
CFTP3	C Language	CFTP	Not Applicable	No changes were made but it must be recompiled because of updates to the tpf_fork function.
CINET3	C Language	CLTW	Not Applicable	No changes were made but it must be recompiled because of updates to the tpf_fork function.
CINET4	C Language	CLTX	Not Applicable	No changes were made but it must be recompiled because of updates to the tpf_fork function.
CINET7	C Language	CLTZ	Not Applicable	No changes were made but it must be recompiled because of updates to the tpf_fork function.
CTKS	Real-Time Assembler	Not Applicable	Not Applicable	No changes were made but it must be reassembled because of updates to the tpf_fork function.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 865 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 865. Changes to Commands for File System Tools

Command	New, Changed, or No Longer Supported?	Description of Change
ZFILE	New	Created to activate a TPF segment or script.
ZFILE cat	Changed	Updated to reflect pipe and quoting mechanisms.
ZFILE cd	Changed	Updated to reflect quoting mechanisms.
ZFILE chmod	Changed	Updated to reflect quoting mechanisms.
ZFILE chown	Changed	Updated to reflect quoting mechanisms.
ZFILE cp	Changed	Updated to reflect quoting mechanisms.
ZFILE dd	Changed	Updated to reflect quoting mechanisms.

Table 865. Changes to Commands for File System Tools (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZFILE echo	Changed	Updated to reflect pipe and quoting mechanisms; updated the example.
ZFILE export	New	Created to create and display ZFILE environment variables.
ZFILE find	New	Created to find files.
ZFILE grep	New	Created to search a file for a specified pattern.
ZFILE head	Changed	Updated to reflect pipe and quoting mechanisms.
ZFILE hex	New	Created to display the contents of a file.
ZFILE kill	Changed	Updated to reflect quoting mechanisms.
ZFILE ln	Changed	Updated to reflect quoting mechanisms.
ZFILE ls	Changed	Updated to reflect pipe and quoting mechanisms.
ZFILE mkdir	Changed	Updated to reflect quoting mechanisms.
ZFILE mknod	Changed	Updated to reflect quoting mechanisms.
ZFILE mv	Changed	Updated to reflect quoting mechanisms.
ZFILE ps	New	Created to display process information.
ZFILE pwd	Changed	Updated to reflect quoting mechanisms.
ZFILE rm	Changed	Updated to reflect quoting mechanisms.
ZFILE rmdir	Changed	Updated to reflect quoting mechanisms.
ZFILE sed	New	Created to edit files in a noninteractive stream.
ZFILE tail	Changed	Updated to reflect pipe and quoting mechanisms.
ZFILE tee	New	Created to duplicate the output stream.
ZFILE touch	Changed	Updated to reflect quoting mechanisms.
ZFILE tr	New	Created to translate or delete characters.
ZFILE unset	New	Created to unset the values of ZFILE environment variables.
ZFILE xargs	New	Created to construct an argument list and run a command.

Messages and System Errors

There are no changes.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 866 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 866. Changes to TPF Publications for File System Tools

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0C	Updated to reflect appropriate use of the vertical bar () as a pipe.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0D	Updated with new <code>tpf_fork</code> information.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for file system tools.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for file system tools.
<i>TPF System Macros</i>	GTPSYS0D	Updated with new parameters in the <code>\$FORKC</code> macro.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The `tpf_fork` function has been enhanced to allow you to specify how you want to pass a string of data. See the *TPF C/C++ Language Support User's Guide* for more specific information about `tpf_fork` enhancements.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To add file system tools to your existing TPF 4.1 system, do the following:

1. Install program update tape (PUT) 13.
2. Run the LIBI offline program for all changed library interface scripts listed in Table 854 on page 809.
3. Run the CBLD program for the build scripts listed in Table 855 on page 809, Table 858 on page 812, and Table 859 on page 812.
4. Verify that the following are installed:
 - Header files listed in Table 852 on page 807
 - Copy members listed in Table 858 on page 812
 - Macros listed in Table 859 on page 812.
5. Reassemble or recompile the following:
 - DLM members listed in Table 857 on page 809

- CSECTS listed in Table 858 on page 812
 - Segments listed in Table 864 on page 813.
6. Link-edit the DLM/DLLs listed in Table 857 on page 809 and Table 858 on page 812.
 7. Load the updated object code to your TPF 4.1 system.
 8. Ensure that the TPF 4.1 system is in NORM state before running any application programs.

Infrastructure for 32-Way Loosely Coupled Processor Support (APAR PJ27387)

The following section discusses the migration considerations for infrastructure for 32-way loosely coupled processor support.

Prerequisite APARs

See the APEDIT for APAR PJ27387 for information about prerequisite APARs.

Functional Overview

Infrastructure for 32-way loosely coupled processor support provides structural changes needed to support the future growth of application workload beyond the maximum of 8 loosely coupled processors. This support includes:

- Enhancements to the internal event facility (IEF) so that application processors can track communication responses from as many as 32 loosely coupled processors.
- Changes to the communication control record structure and content so that you can add as many as 32 loosely coupled processors to future configurations without requiring the reorganization of communication control record structures.
- Enhancements to the processor resource ownership table (PROT) and E-type loaders to accommodate additional loosely coupled processors..

Note: Program update tape (PUT) 13 does not remove the constraint of a maximum of 8 loosely coupled processors. Additional functions are required to complete 32-way loosely coupled processor support.

Architecture

The following sections discuss the architecture for the modifications included in the infrastructure for 32-way loosely coupled processor support:

Internal Event Facility (IEF)

Applications use mask (MSK) type events with interprocessor communications (IPC) to track communication responses from other processors in a loosely coupled complex. This mask is constrained to 16 bits, representing the processor ordinal number bit positions.

IEF enhancements remove this constraint by providing an event mechanism called the list-type event. The application processor uses the list-type event to track communication responses from as many as 32 loosely coupled processors.

The IEF application programming interface (API) functions are changed to support the list-type event mechanism. These APIs allow you to create or modify a list of data items. The APIs provide the ability to create, query, wait, and post the list-type event.

The following data is included in the list-type event:

- Count of list items, 2 bytes
- List item size, 2 bytes
- List items, each contain the following:
 - Flag field defining the item (posted, posted with error, not found), 1 byte
 - Error code (set from error posting), 1 byte
 - Return value area (user dependent), 4 bytes

- List item data, minimum 1 byte.

POSTC macro processing updates the list data by posting the event list item. Using the item data as a key, items from the POSTC macro list are posted to the corresponding items in the event list. When all items are posted, the event is marked completed. When an item is posted with an error, the supplied error code is moved into the error field of the posted item. Unlike other error posting, error posting to lists does not cause the event to be completed unless all items in the list are posted. A gross error indicator is set in EVNBKE if any of the items in the list are error posted. You must interrogate the returned list to determine which items in the list have errors. If the event times out, the data list is passed back. You must interrogate the data list to determine which items have not been posted.

The GENLC macro produces data lists that are used for events. See *TPF General Macros* for more information about the GENLC macro.

Communications

Some TPF communication functions, such as Airlines Line Control/Synchronous Link Control (ALC/SLC), Systems Network Architecture (SNA) networking, and the TPF message router store their control information in fixed file records. These records are allocated as processor shared records and are logically associated with individual processors in a loosely coupled complex using an every-*n*th-ordinal numbering scheme. This structure requires that you reorganize these shared file records whenever additional processors are added to the loosely coupled complex.

With infrastructure for 32-way loosely coupled processor support, processor communication fixed file records are defined in the FACE table (FCTB) as processor unique. This allows you to define and build records for new processors in the FCTB without disturbing existing processor communication records.

The following are the tables that are affected by this change:

- For SNA networks:
 - Resource Vector Tables 1 and 2 (RVT)
 - Subarea Address Table (SAT)
 - System Recovery Table (SRT)
 - Session Control Blocks (SCB) 1 and 2
 - Conversation Control Block (CCB).
- For Emulator Program (EP) ALC/SLC networks, TCP/IP networks, or SNA, the Terminal Control Table (WGTA).
- For the TPF Message Router, the routing control application table (RCAT).

Infrastructure for 32-way loosely coupled processor support expands existing fields in the node control block (NCB), RCAT initialization record (RCIT), and root dynamic load record (IDSDLR).

The FACE table generator (FCTBG) program and header are changed to add validation for the processor unique record types (#RV1RU, #RV2RU, #SATRU, #SRTRU, #SC1RU, #SC2RU, #CCBRU, #WGTRU, and #RCATU). Validation for the processor shared record types (#RV1RI, #RV2RI, #SATRI, #SRTRI, #SC1RI, #SC2RI, #CCBRI, #WGTRI, and #RCATR) is removed. You must generate a FACE table (FCTB) containing the processor unique fixed file record types.

Processor Resource Ownership Table

The processor resource ownership table (PROT) has been expanded to use additional #PRORI ordinals for tapes and utilities. Selected E-type loader segments have been modified to remove the 8-way loosely coupled constraint.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 867 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 867. Changes to Build Scripts for Infrastructure for 32-Way Loosely Coupled Processor Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
COMXBS	DLM	Changed	Changed the <code>tpf_sawnc()</code> function to a general purpose API.
CTALBS	DLM	Changed	Added the <code>tpf_genlrc()</code> and <code>tpf_sawnc()</code> library functions.

Dynamic Load Module (DLM) Stubs: Table 868 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 868. Changes to Dynamic Load Module (DLM) Stubs for Infrastructure for 32-Way Loosely Coupled Processor Support

DLM Stub	New, Changed, or No Longer Supported?
CEL2	Changed
CLEG	Changed

General Use C/C++ Language Header Files: Table 869 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 869. Changes to General Use C/C++ Language Header Files for Infrastructure for 32-Way Loosely Coupled Processor Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
<code>c\$fvaa0.h</code>	Changed	Yes

Table 869. Changes to General Use C/C++ Language Header Files for Infrastructure for 32-Way Loosely Coupled Processor Support (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
tpfapi.h	Changed	Yes – You must recompile any members of the COMX library (source file) that call the tpf_sawnc function and link edit the COMX library again.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 870 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 870. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Infrastructure for 32-Way Loosely Coupled Processor Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$fsdd.h	Changed	Yes

Library Interface Scripts: Table 871 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 871. Changes to Library Interface Scripts for Infrastructure for 32-Way Loosely Coupled Processor Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Added library vectors for the tpf_genlc() and tpf_sawnc() C functions.

Library Members (Object Files): Table 872 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 872. Changes to Library Members (Object Files) for Infrastructure for 32-Way Loosely Coupled Processor Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CEVNQC	CTAL	Changed	Assembler	Added list-type event support to the evnqc function.
CEVNTC	CTAL	Changed	Assembler	Added list-type event support to the evntc function.
CEVNWC	CTAL	Changed	Assembler	Added list-type event support to the evnwc function.
CGENLC	CTAL	New	Assembler	Added support for the tpf_genlc function.
CPOSTC	CTAL	Changed	Assembler	Added list-type event support to the postc function.
CSAWNC	CTAL	Changed	Assembler	Added list-type event support to the tpf_sawnc function.

Link-Edited Modules: There are no changes.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: Table 873 summarizes changes to stubs that are object code only (OCO) only. This information is presented in alphabetic order by the name of the OCO stub.

Table 873. Changes to OCO Stubs for Infrastructure for 32-Way Loosely Coupled Processor Support

Object Code Only (OCO) Stub	New, Changed, or No Longer Supported?
@@GENLC	New

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 874 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 874. Changes to Copy Members for Infrastructure for 32-Way Loosely Coupled Processor Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Not Applicable	Changed	Added the GENLC macro to the control program directory.
CCEB	Control Program	CCENBK	Not Applicable	Changed	Externalized the POSTC interface with the POSTC macro.
CIEF	Control Program	CCCIEF	Not Applicable	Changed	Added macro support for the GENLC macro service and list-type events.
CJIV	Control Program	CCRCSC	Not Applicable	Changed	Externalized the POSTC interface with the POSTC macro.
CPSF40	Control Program	CCCPSF	Not Applicable	Changed	Added the new fixed file record types.

Fixed File Records

Table 875 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 875. Changes to Fixed File Records for Infrastructure for 32-Way Loosely Coupled Processor Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#CCBRU	New	Added the processor unique fixed file record type.
#PRORI	Changed	Added 3 ordinals for a total of 8 ordinals.
#RCATU	New	Added the processor unique fixed file record type.
#RV1RU	New	Added the processor unique fixed file record type.
#RV2RU	New	Added the processor unique fixed file record type.
#SATRU	New	Added the processor unique fixed file record type.
#SC1RU	New	Added the processor unique fixed file record type.
#SC2RU	New	Added the processor unique fixed file record type.
#SRTRU	New	Added the processor unique fixed file record type.
#WGTRU	New	Added the processor unique fixed file record type.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 876 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 876. Changes to Data Macros for Infrastructure for 32-Way Loosely Coupled Processor Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
ICCB	Changed	No
IDSCLR	Changed	No
IDSEVN	Changed	Yes
ISCB	Changed	No
NC0CB	Changed	No
RC0AT	Changed	No
RV1VT	Changed	No
RV2VT	Changed	No
SA0AT	Changed	No
SR0RT	Changed	No
WG0TA	Changed	No

General Macros: Table 877 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 877. Changes to General Macros for Infrastructure for 32-Way Loosely Coupled Processor Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CRESC	Changed	No
EVNTC	Changed	No
EVNQC	Changed	No
EVNWC	Changed	No
POSTC	Changed	No
SAWNC	Changed; moved from <i>TPF System Macros</i>	No
GENLC	New	No

Selected Equate Macros: Table 878 on page 824 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 878. Changes to Selected Equate Macros for Infrastructure for 32-Way Loosely Coupled Processor Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 879 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 879. Changes to SIP Skeleton and Internal Macros for Infrastructure for 32-Way Loosely Coupled Processor Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
GENR	Changed
SPGLB	Changed
SPPGML	Changed
SPRIAT	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 880 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 880. Changes to SIP Stage II Macros for Infrastructure for 32-Way Loosely Coupled Processor Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 881 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 881. Changes to System Macros for Loaders Enhancement for TPF Assembler Debugger

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SAWNC	No Longer Supported; moved to <i>TPF General Macros</i>	No

System Macros (IBM Use Only): Table 882 on page 825 summarizes system macro changes that are for IBM use only. This information is presented in

alphabetic order by the name of the system macro.

Table 882. Changes to System Macros (IBM Use Only) for Infrastructure for 32-Way Loosely Coupled Processor Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
IBMSVC	Changed	Yes

Segments

Table 883 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 883. Changes to Segments for Infrastructure for 32-Way Loosely Coupled Processor Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
ACPL	Core Image Restart Assembler	Not Applicable	Changed	Replaced the hardcoded 8 loosely coupled processor limit with SIP variable.
ALDR	Offline Assembler	ALDR	Changed	Expanded the PROT table for 32-way loosely coupled processors.
CDL1	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CDL7	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CDLB	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CGT2	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CGT5	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CGT8	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CGT9	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CHKA	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CHKB	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CHKC	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CHKD	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CHKR	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CNPG	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CNPH	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CNPJ	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CNPK	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CNPL	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CNPM	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.

Table 883. Changes to Segments for Infrastructure for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CNPP	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CNPQ	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CONN	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
COTB	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
COTU	Real-Time Assembler	Not Applicable	Changed	Used additional PROT ordinals.
CSG1	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSG3	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSG4	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSG5	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSG6	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSG8	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSGA	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSGL	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSPA	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSPB	Real-Time Assembler	Not Applicable	Changed	Added processor unique fixed file record types.
CSS8	Real-Time Assembler	Not Applicable	New	Added the interprocessor communications (IPC) send/receive program for record cache support.
DCR2	Offline	DCRS	Changed	Added system error number equates to the cross-reference list.
FTER00	Offline C Language	FCTBG	Changed	Added processor unique fixed file record types.
FTVA02	Offline C Language	FCTBG	Changed	Added processor unique fixed file record types.
FTVA03	Offline C Language	FCTB	Changed	Added processor unique fixed file record types.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes

Messages and System Errors

Table 884 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 884. Changes to Messages and System Errors for Infrastructure for 32-Way Loosely Coupled Processor Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0009E7	System Error	Changed
000E12	System Error	New
000E13	System Error	New
000E14	System Error	New
FCTB0101E	Offline	Changed
NOPL0048E	Online	No Longer Supported
NOPL0049E	Online	No Longer Supported
NOPL0148E	Online	New
NOPL0149E	Online	New
RTLP0003E	Online	No Longer Supported
RTLP0005E	Online	No Longer Supported
RTLP0033E	Online	New
RTLP0055E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

You must run the FACE table generator (FCTBG) to rebuild the FACE table. See "Migration Scenarios" on page 829 and *TPF System Generation* for more information.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 885 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 885. Changes to TPF Publications for Infrastructure for 32-Way Loosely Coupled Processor Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Data Communications Reference</i>	GTPSNR07	Replaced shared processor fixed file record types #CCBRI, #SC1RI, and #SC2RI with processor unique record types #CCBRU, #SC1RU, and #SC2RU.
<i>TPF ACF/SNA Network Generation</i>	GTPACF0C	Updated the considerations for defining fixed file records for SNA structures.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0D	Added the EVENT_LOT parameter to the evntc, evnqc, evnwc, and postc C functions, and added tpf_genlc and tpf_sawnc as new C functions.
<i>TPF Data Communications Services Reference</i>	GTPDCR04	Updated the message routing package with new and changed fixed file record types (FACE IDs).
<i>TPF General Macros</i>	GTPGEN0C	Added the LIST parameter to the EVNTC, EVNQC, EVNWC, and POSTC macros, and added the LINFND parameter to the POSTC macro. Added the GENLC macro. Added the SAWNC macro from <i>TPF System Macros</i> and added the LIST parameter.
<i>TPF Main Supervisor Reference</i>	GTPMSR07	Added new fixed file record types. Updated the descriptions of the #PRORI and #IDOTX fixed file records with the increased number of ordinals.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, or no longer supported for the infrastructure for 32-way loosely coupled processor support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with the migration considerations for the infrastructure for 32-way loosely coupled processor support.
<i>TPF System Generation</i>	GTPSYG0D	Updated with information about the commands that were added or changed for infrastructure for 32-way loosely coupled processor support.
<i>TPF System Macros</i>	GTPSYS0D	Moved the SAWNC macro to <i>TPF General Macros</i> .

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Support for list-type events has been added to the following general macros:

- EVNTC
- EVNQC
- EVNWC
- POSTC
- SAWNC.

The LINFND parameter was added to the POSTC macro.

Added the GENLC macro to *TPF General Macros*.

See *TPF General Macros* for more information.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

Because the new #PRORI ordinals are not used until the existing records are filled to capacity, enter the ZDADD command to verify that ordinals 5, 6, and 7 are included in the FACE table. See *TPF Operations* for more information about the ZDADD command.

Migration Scenarios

Use the following procedure to install infrastructure for 32-way loosely coupled processor support:

1. Install program update tape (PUT) 13 on your TPF 4.1 system.
2. Update the SIP RAMFIL macro input statements to the FACE table generator (FCTBG):
 - a. Update the statement for FACE type #PRORI fixed file record to define 8 ordinals.

Note: If you have code that uses the #PRORI fixed file record to search ordinals, you must use the forward chain pointer to ensure that all ordinals are scanned. The forward chain pointer is defined in the PR1OT DSECT.
 - b. Specify the following record types in the RECID parameter:
 - #RV1RU
 - #RV2RU
 - #SATRU
 - #SRTRU
 - #SC1RU
 - #SC2RU
 - #CCBRU
 - #WGTRU
 - #RCATU.
 - c. Ensure that the subsystem users (SSUs), processors, and I-streams correspond correctly with the fixed file record types in the USER parameter. Refer to Table 875 on page 822 for the fixed file record types.

See *TPF System Generation* for more information about the RAMFIL macro.

3. Run the FCTBG to create a new FACE table.
4. Assemble the SIP stage I deck to create a SIP stage II deck.
5. Run the system allocator program (SALO), using the IBMPAL and SPPGML additions for the newly created segments, to create an updated program allocation table (IPAT) and a system allocator table (SAL).
6. Run SIP stage II.

7. Migrate communications support to each processor of a loosely coupled complex one processor at a time by IPLing each processor from an image containing the PUT 13 code and FACE table definitions. Rebuild the communication records as follows:
 - For SNA, enter the ZNOPL BUILD command.
 - For WGTA, enter ZDWGT command with the BUILD parameter specified.
 - For RCAT, load the RCIT program records.

Note: Failure to load the RCIT program records could result in severe system errors during restart.

See *TPF Operations* for more information about the ZNOPL and ZDWGT commands.

When you have IPLed all processors in the complex from an image containing the PUT 13 code and FACE table definitions and the communication records have been rebuilt as specified in this step, you have completed the complex-wide migration to the new structures.

Fallback Scenario

You can restore a loosely coupled processor to the TPF 4.1 image that was in use before PUT 13 was installed by IPLing the processor from the previous image and rebuilding the processor shared records as follows:

- For SNA, enter the ZNOPL BUILD command to perform a fresh load.
- For WGTA, enter the ZDWGT command with the BUILD parameter specified.
- For RCAT, load the RCIT program records.

Fallback to the previous TPF 4.1 image is completed when all processors in the complex that were migrated to the new TPF 4.1 image have been restored.

To migrate to the TPF 4.1 PUT 13 again, IPL each processor in the complex with the PUT 13 image and rebuild the processor unique control records by using the procedure specified in step 7 of the migration scenario.

Integrated Online Pool Maintenance and Recoup Support (APAR PJ27469)

The following section discusses the migration considerations for integrated online pool maintenance and recoup support.

Prerequisite APARs

See the APEDIT for APAR PJ27469 for information about prerequisite APARs. In addition, TPF Database Facility (TPPDF) APAR PQ42097, which is available with TPDFD PUT 15, is a corequisite APAR.

Functional Overview

Integrated online pool maintenance and recoup support enhances the recoup, pool directory update (PDU), pool generation, pool allocation, and pool deactivation utilities in a TPF 4.1 system environment by doing the following:

- Eliminating most offline processing
- Eliminating recoup and pool general files
- Increasing performance and data integrity
- Allowing all phases of recoup to be run in NORM state
- Providing multiprocessor and multi-I-stream capability
- Providing online historical data
- Providing recoup and PDU fallback capability.

Architecture

The following section discusses the architecture used for integrated online pool maintenance and recoup support.

Pool Release Control Structures

Integrated online pool maintenance and recoup support uses a fixed structure that allows released file addresses to be added to an online structure. The controller of the online process is a data record that contains a field named @BUSED, which is a 64-bit mask field that is used to control the online database. Each bit represents an ordinal number of the released pool address records. The anchor to these released pool address records is a set of 65 fixed records with a record ID of FC33. The number of records was determined by the maximum number of processors that can be used to run online pool maintenance (8), and each processor having 8 fixed FC33 records with forward chains. The 65th record is the 1052-state released pool addresses (FC33) record. This record is used only when releases are issued in 1052 state. Each of these FC33 fixed records and their chained records contain a beginning time stamp, ending time stamp, and the CPU ID of the owning processor. Each record contains file addresses of CA (released pool) records which contain the actual released file address data. Each time an RTA tape is switched, @BUSED is updated to indicate to which set of FC33 records released file addresses are written.

CA records replace C8 records which contained actual file addresses of released files. CA records have been changed to contain ordinal numbers of released file addresses and no longer the actual file addresses. Each time an application releases a file, that file address is converted to an ordinal number and is added to the CA records.

Multigroup Chain Chase Processing

The purpose of multigroup chain chase processing is to significantly reduce chain chase processing time. Multigroup chain chase processing allows you to chain chase as many as eight databases simultaneously on a processor. When chain chase processing has started for the last fixed record ordinal of a database, chain chase processing can start on another database. This is how multigroup chain chase processing is designed for both TPF and TPF Database Facility (TPPDF) recoup. Each database has its own timeout values, ID counters, and broken chain counters.

Chain Chase Algorithms

Chain chase algorithms have been rewritten to reduce chain chase processing time. If there is a soft IPL during chain chase processing, recoup now restarts where it left off. The number of ECBs that a processor can run with has been raised to 999 and the LODIC macro is used throughout recoup to prevent working storage depletion. To reduce the workload on the main I-stream, chain chase processing runs on all I-streams.

Multiprocessor Chain Chasing

For loosely coupled environments, running multiprocessor chain chase processing can significantly reduce the time it takes to run recoup phase 1; however, the incremental benefit of multiprocessor chain chase processing decreases with more processors because of a contention for direct access storage devices (DASD). Multiprocessor chain chase processing introduces the concept of primary and secondary processors.

The primary processor, which is defined in the PROT table as the owner of the pool function, is the one where recoup is started and rolled in. The primary recoup processor cannot be moved. It must remain the primary processor throughout the recoup run. The primary processor ensures that all TPF and TPDF record IDs have completed chain chase processing. If not, the primary processor will do so in lieu of the other processors.

Note: Because the primary processor is the last processor to complete TPF and TPDF chain chase processing, put the longest running TPF record IDs on the primary processor.

Secondary processors are only used for chain chase processing and can start chain chasing TPDF structures while other processors chain chase TPF structures. Secondary processors can be started, stopped, exited, restarted, or leveled by entering a command from the primary processor.

- *Stopped* refers to stopping chain chase processing on a processor. All chain chase processing that is completed on the processor is used in the recoup run.
- *Exited* is the same as stopped except all chain chase processing that is completed on the processor is not used in the recoup run and must be redone by another processor.
- *Leveled* refers to increasing or decreasing the number of ECBs that can run recoup on a processor to increase its performance.

Note: The primary processor cannot be stopped or exited, but it can be restarted or leveled.

Each processor performing chain chase processing has its own recoup keypoint, core and file copies of chain chase ID counts, RCP tape, and its own VFA-resident pseudo directories. All processors share the broken chain database, descriptors, and database definitions (DBDEFs), and run multigroup chain chase processing. All

tables that are necessary for chain chasing (such as the long term directory reference table (#LTDRT), which is used to convert file addresses to #SONRI directory ordinals) are kept in memory for faster access and throughput.

Phase 3 Merged Directories and Records

When chain chase processing (recoup phase 1) is completed on all processors, the primary processor starts recoup phase 2 processing. Because there are multiple sets of pseudo directories (one for each processor), they must be merged together to form one common pseudo directory for recoup phase 3. The ID counts records for each processor are also totaled to form one set of ID counts. The final ID counts are added to a historical database where counts for as many as 10 recoup runs can be stored.

Note: Throughout recoup processing, integrity checking is performed to ensure that VFA-resident pseudo directories are accurate.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with integrated online pool maintenance and recoup support, you must establish the required operating environment. The following section describes hardware and software requirements specific to integrated online pool maintenance and recoup support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

Although it is not required to run recoup, the TPF Database Facility (TPFDF) product is needed for some recoup enhancements that were added by integrated online pool maintenance and recoup support.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 886 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 886. Changes to Build Scripts for Integrated Online Pool Maintenance and Recoup Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
BAM6BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BEWABS	DLM	New	Created for integrated online pool maintenance and recoup support.

Table 886. Changes to Build Scripts for Integrated Online Pool Maintenance and Recoup Support (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
BJ00BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BJ01BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BJ02BS	DLL	New	Created for integrated online pool maintenance and recoup support.
BJ03BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BJ04BS	DLL	New	Created for integrated online pool maintenance and recoup support.
BJ09BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BJ10BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BJ12BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BOF1BS	DLM	New	Created for integrated online pool maintenance and recoup support.
BRR1BS	DLM	New	Created for integrated online pool maintenance and recoup support.
CJ13BS	DLM	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
CJ17BS	DLM	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.

Dynamic Load Module (DLM) Stubs: Table 887 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 887. Changes to Dynamic Load Module (DLM) Stubs for Integrated Online Pool Maintenance and Recoup Support

DLM Stub	New, Changed, or No Longer Supported?
BCPY (Assembler)	New
BGAA	New
BGAB	New
BGAC	New
BGAG	New
BGAJ	New
BGAK	New
BGAM	New
BGA2	New
BGA3	New
BGA7	New
BGA8	New
BJ09	New
BJ10	New
BJ11 (Assembler)	New
BLOD (Assembler)	New

Table 887. Changes to Dynamic Load Module (DLM) Stubs for Integrated Online Pool Maintenance and Recoup Support (continued)

DLM Stub	New, Changed, or No Longer Supported?
BOF2 (Assembler)	New
BRB3 (Assembler)	New
BRCB (Assembler)	New
BRPE (Assembler)	Changed
BRV8 (Assembler)	New
BRV9 (Assembler)	New
BR0I (Assembler)	New
B1A0 (Assembler)	New
B1A8 (Assembler)	New

General Use C/C++ Language Header Files: Table 888 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 888. Changes to General Use C/C++ Language Header Files for Integrated Online Pool Maintenance and Recoup Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	Changed	No
c\$globz.h	Changed	No
c\$syseq.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 889 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 889. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Integrated Online Pool Maintenance and Recoup Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$bk0rp.h	Changed	No
c\$b10rp.h	New	No
c\$brkc.h	New	No
c\$fva0.h	Changed	No
c\$ibmhdr.h	New	No
c\$prml.h	New	No
c\$recoup.h	New	No
c\$si3ct.h	New	No
c\$srck1p.h	New	No
c\$srhh1p.h	New	No
c\$to2r.h	Changed	No
i\$breq.h	New	No
i\$dscr.h	New	No
i\$grp.h	New	No

Table 889. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Integrated Online Pool Maintenance and Recoup Support (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$part.h	New	No
i\$recp.h	New	No
i\$rsct.h	New	No
mphdr.h	New	No
mpsipcc.h	New	No

Link-Edited Modules: Table 890 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 890. Changes to Link-Edited Modules for Integrated Online Pool Maintenance and Recoup Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
DYOPM	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.

Members (Object Files): Table 891 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 891. Changes to Members (Object Files) for Integrated Online Pool Maintenance and Recoup Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
BAM6	BAM6	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BEWA	BEWA	New	C Language	Created for integrated online pool maintenance and recoup support.
BEWB	BEWA	New	C Language	Created for integrated online pool maintenance and recoup support.
BEWC	BEWA	New	C Language	Created for integrated online pool maintenance and recoup support.
BEWD	BEWA	New	C Language	Created for integrated online pool maintenance and recoup support.
BEWE	BEWA	New	C Language	Created for integrated online pool maintenance and recoup support.
BEWF	BEWA	New	C Language	Created for integrated online pool maintenance and recoup support.
BEWG	BEWA	New	C Language	Created for integrated online pool maintenance and recoup support.
BJ00	BJ00	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BJ01	BJ01	New	C++ Language	Created for integrated online pool maintenance and recoup support.

Table 891. Changes to Members (Object Files) for Integrated Online Pool Maintenance and Recoup Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
BJ02	BJ02	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BJ03	BJ03	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BJ04	BJ04	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BJ09	BJ09	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BJ10	BJ10	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BJ12	BJ10	New	C++ Language	Created for integrated online pool maintenance and recoup support.
BOFI	BOF1	New	C Language	Created for integrated online pool maintenance and recoup support.
BOF1	BOF1	New	C Language	Created for integrated online pool maintenance and recoup support.
BRR1	BRR1	New	C Language	Created for integrated online pool maintenance and recoup support.
BRR2	BRR1	New	C Language	Created for integrated online pool maintenance and recoup support.
BRR3	BRR1	New	C Language	Created for integrated online pool maintenance and recoup support.
BRR4	BRR1	New	C Language	Created for integrated online pool maintenance and recoup support.
BRR5	BRR1	New	C Language	Created for integrated online pool maintenance and recoup support.
BRR6	BRR1	New	C Language	Created for integrated online pool maintenance and recoup support.
CJ13	CJ13	No Longer Supported	C Language	Deleted for integrated online pool maintenance and recoup support.
CJ14	CJ13, CJ17	No Longer Supported	C Language	Deleted for integrated online pool maintenance and recoup support.
CJ17	CJ17	No Longer Supported	C Language	Deleted for integrated online pool maintenance and recoup support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 892 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 892. Changes to CINFC Tags for Integrated Online Pool Maintenance and Recoup Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMRCID	295	New
CMMRCPK	296	New

Table 892. Changes to CINFC Tags for Integrated Online Pool Maintenance and Recoup Support (continued)

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMLTDRT	297	New
CMPOLMTN	298	New

Copy Members

Table 893 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 893. Changes to Copy Members for Integrated Online Pool Maintenance and Recoup Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CICR	Control Program	CCNUCL	Not Applicable	Changed	Updated for integrated online pool maintenance and recoup support.
CJ341	Real-Time Assembler	CJ005	CJ00	Changed	Updated for integrated online pool maintenance and recoup support.
CJ521	Real-Time Assembler	CJ004	CJ00	Changed	Updated for integrated online pool maintenance and recoup support.
CPSF	Control Program	CCCPSF	Not Applicable	Changed	Updated for integrated online pool maintenance and recoup support.
CT10	Control Program	CCCTIN	Not Applicable	Changed	Updated for integrated online pool maintenance and recoup support.
GRFS	Control Program	CCSONP	Not Applicable	Changed	Updated for integrated online pool maintenance and recoup support.

Fixed File Records

Table 894 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 894. Changes to Fixed File Records for Integrated Online Pool Maintenance and Recoup Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#BKDSV	New	Created for integrated online pool maintenance and recoup support.
#BKD4K	New	Created for integrated online pool maintenance and recoup support.
#BREATBL	New	Created for integrated online pool maintenance and recoup support.
#BRHIST	New	Created for integrated online pool maintenance and recoup support.
#BRIDCOR	New	Created for integrated online pool maintenance and recoup support.
#BRIDDEA	New	Created for integrated online pool maintenance and recoup support.
#BRIDSAV	New	Created for integrated online pool maintenance and recoup support.
#BRIDTBL	New	Created for integrated online pool maintenance and recoup support.
#BRIDTOT	New	Created for integrated online pool maintenance and recoup support.
#BRLOTBL	New	Created for integrated online pool maintenance and recoup support.

Table 894. Changes to Fixed File Records for Integrated Online Pool Maintenance and Recoup Support (continued)

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#GR0ZSR	Changed	Created for integrated online pool maintenance and recoup support.
#GR34SR	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
#MPRECP	New	Created for integrated online pool maintenance and recoup support.
#PSTCUR	New	Created for integrated online pool maintenance and recoup support.
#PSTNEW	New	Created for integrated online pool maintenance and recoup support.
#RC8RFS	New	Created for integrated online pool maintenance and recoup support.
#RGSTAT	New	Created for integrated online pool maintenance and recoup support.
#SONCP	New	Created for integrated online pool maintenance and recoup support.
#SONDE	New	Created for integrated online pool maintenance and recoup support.
#SONROLL	New	Created for integrated online pool maintenance and recoup support.
#SONRPE	New	Created for integrated online pool maintenance and recoup support.
#SONRPM	New	Created for integrated online pool maintenance and recoup support.
#SONSP	New	Created for integrated online pool maintenance and recoup support.
#SONSV	New	Created for integrated online pool maintenance and recoup support.
#SONUP	New	Created for integrated online pool maintenance and recoup support.
#SRHH1P	New	Created for integrated online pool maintenance and recoup support.
#SRMP1A	New	Created for integrated online pool maintenance and recoup support.
#SRM31A	New	Created for integrated online pool maintenance and recoup support.
#SRM41A	New	Created for integrated online pool maintenance and recoup support.
#SRM51A	New	Created for integrated online pool maintenance and recoup support.
#SRM61A	New	Created for integrated online pool maintenance and recoup support.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 895 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 895. Changes to Data Macros for Integrated Online Pool Maintenance and Recoup Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
BC0SA	Changed	No
BCPBC	New	No
BK0DF	Changed	No
BK0LC	New	No
BK0RP	Changed	No
BK0UX	Changed	No
BK1RP	Changed	No
BL0RF	New	No
BL0RP	Changed	No
BMGLP	Changed	No
BMGLQ	Changed	No
BR0ID	New	No
BR1ID	New	No
C404C	New	No
C50C5	New	No
CY\$CR	Changed	No
CY1KR	Changed	No
CY2KT	Changed	No
CY5GT	Changed	No
CY5PA	New	No
CY6TR	Changed	No
CY7PL	New	No
CY8WB	New	No
E80E8	New	No
GL0BP	Changed	No
GL0BQ	Changed	No
I80I8	New	No
I82I8	New	No
ICYCWB	Changed	No
IDY9AR	Changed	No
IRECBK	Changed	No
L80L8	New	No
LTDRT	New	No
MPRECP	New	No
NC2EC	New	No
RECOUP	New	No
SR54BA	New	No
SRCK1P	New	No
SRHH1P	New	No
SRM31A	New	No

Table 895. Changes to Data Macros for Integrated Online Pool Maintenance and Recoup Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
SRM41A	New	No
SRM51A	New	No
SRM61A	New	No
SYSET	Changed	No
ZR0ZR	New	No

General Macros: Table 896 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 896. Changes to General Macros for Integrated Online Pool Maintenance and Recoup Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CINFC	Changed	No
GLOBZ	Changed	No

Selected Equate Macros: Table 897 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 897. Changes to Selected Equate Macros for Integrated Online Pool Maintenance and Recoup Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BRPEQ	Changed	No
CZ1SE	Changed	No
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 898 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 898. Changes to SIP Skeleton and Internal Macros for Integrated Online Pool Maintenance and Recoup Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
GENR	Changed
SPPGML	Changed
SPRIAT	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 899 on page 842 summarizes system initialization program (SIP) Stage I macro and

statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

See “System Initialization Program (SIP) and System Generation Changes” on page 877 for a description of other system generation changes you must make.

Table 899. Changes to SIP Stage I Macros and Statements for Integrated Online Pool Maintenance and Recoup Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 900 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 900. Changes to SIP Stage II Macros for Integrated Online Pool Maintenance and Recoup Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 901 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 901. Changes to System Macros for Integrated Online Pool Maintenance and Recoup Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
BBEWP	Changed	No
BBPDH	New	No
BBWRT	Changed	No
BCRUS	Changed	No
BFIND	Changed	No
BRPRO	New	No
BRSTR	Changed	No
BSAVE	Changed	No
BSYNC	New	No
GROUP	Changed	No
INDEX	Changed	No
PFSWC	Changed	No

System Macros (IBM Use Only): There are no changes.

Segments

Table 902 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BAM0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BAM1	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BAM2	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
BAM3	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BAM5	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BCAI	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BCC0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BCC1	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BCC2	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BCC3	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BCC5	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCD0	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCP0	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCP1	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCP2	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCP3	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCP5	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCP6	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCPE	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCPI	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCPU	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCPY	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BCPZ	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BDBE	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BDBP	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BEWP	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BHWP	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
BJ11	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BKA0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKA1	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BKB0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKC0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKC1	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKD0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKD7	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKD9	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDB	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDF	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDG	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDH	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDI	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDIND	Offline Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
BKDJ	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDK	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDL	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDM	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDN	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDO	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BKDP	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDQ	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDR	Offline Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
BKDS	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDT	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDW	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BKDX	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKDY	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BKP0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKP3	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKP4	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKP5	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BKPA	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BLOD	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BLOG	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BLOH	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BMD0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BMD1	Real-Time Assembler	Not Applicable	Changed	Created for integrated online pool maintenance and recoup support.
BOF0	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOF2	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOF3	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOF4	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOF5	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOF6	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOF7	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BOF8	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOF9	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFA	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFB	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFC	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFD	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFE	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFF	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFG	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFH	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFJ	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFK	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BOFM	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BPDH	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BPM0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BPM1	Real-Time Assembler	Not Applicable	Changed	Created for integrated online pool maintenance and recoup support.
BR0I	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BR0T	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BR0U	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BR0V	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRB2	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRB3	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRB4	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRCM	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
BRCP	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BRCQ	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRCS	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRFA	Offline Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRFM	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRID	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRIE	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRMK	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRPA	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRPB	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRPC	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
BRPE	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRPI	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRPK	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRPT	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRPX	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRS0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRSH	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRSI	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRTD	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRT0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRTF	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRTQ	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRTR	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRTS	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRTT	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BRTU	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRTV	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRU2	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRUB	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRUC	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRUD	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV0	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV1	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV2	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV3	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV4	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV5	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV6	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV7	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV8	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRV9	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRYA	Real-Time Assembler	Not Applicable	Changed	Created for integrated online pool maintenance and recoup support.
BRYD	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRYE	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRYG	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRYL	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRYM	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRYN	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BRYO	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BRYQ	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BRYU	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BS0C	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BSSC	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BSSU	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BSSW	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BSSX	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BWRA	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
BWRF	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
BWRT	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
B0BK	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B0P0	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B0P3	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B0P5	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B0P6	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B0PA	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B0PE	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B0SH	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1A0	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1A4	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1A5	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1A6	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1A7	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1A8	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1A9	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1AA	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
B1AF	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
B1BK	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
CJ12	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
CJ15	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
CJ16	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
CNAH	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CSAH	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CSAI	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CTKO	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CTKT	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CVAB	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CVFE	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYA0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYA9	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYAA	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYAB	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYAC	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYAE	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYAN	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYB0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYC0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYC1	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYC2	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYC3	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYD0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYD1	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYD2	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYF0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYF1	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYF2	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYF4	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYF6	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYF9	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
CYGR	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
CYH0	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYD0	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD1	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD2	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD3	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD4	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD5	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD6	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD7	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD8	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYD9	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYDA	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYDC	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYDE	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYDG	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYDI	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.

Table 902. Changes to Segments for Integrated Online Pool Maintenance and Recoup Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
DYDL	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYDN	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYDO	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYDP	Real-Time Assembler	Not Applicable	New	Created for integrated online pool maintenance and recoup support.
DYDQ	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYDS	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYDU	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYDX	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
DYDY	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
DYDZ	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
DYOM	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
DYO0	Offline PL/I	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
DYO1	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
DYO4	Offline PL/I	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
DYO6	Offline PL/I	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
DYO7	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
FTVA02	C Language	FCTBG	Changed	Changed for integrated online pool maintenance and recoup support.
FTVA03	C Language	FCTBG	Changed	Changed for integrated online pool maintenance and recoup support.
GLBL	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
UBKA	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
UBRP	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
UBRS	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.
UBWR	Real-Time Assembler	Not Applicable	Changed	Changed for integrated online pool maintenance and recoup support.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 903 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 903. Changes to SYSEQ Tags for Integrated Online Pool Maintenance and Recoup Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#GR33SRF	0	No Longer Supported
#GR33SRL	#GR33SRF	No Longer Supported
#IRSSDFF	3	No Longer Supported
#IRSSDFL	#IRSSDFF	No Longer Supported

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 904 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 904. Changes to Commands for Integrated Online Pool Maintenance and Recoup Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZDUPD	Changed	Changed for integrated online pool maintenance and recoup support.
ZPOOL DISPLAY	New	Created for integrated online pool maintenance and recoup support.
ZPOOL GENERATION	New	Created for integrated online pool maintenance and recoup support.
ZPOOL INIT	New	Created for integrated online pool maintenance and recoup support.
ZRBKD	New	Created for integrated online pool maintenance and recoup support.
ZRDIR CAPTURE	New	Created for integrated online pool maintenance and recoup support.
ZRDIR START RESTORE	New	Created for integrated online pool maintenance and recoup support.
ZRECP ABORT	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP ADD	New	Created for integrated online pool maintenance and recoup support.
ZRECP CONTINUE	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP DEL	New	Created for integrated online pool maintenance and recoup support.

Table 904. Changes to Commands for Integrated Online Pool Maintenance and Recoup Support (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZRECP DISPLAY	New	Created for integrated online pool maintenance and recoup support.
ZRECP ELOG	New	Created for integrated online pool maintenance and recoup support.
ZRECP EXIT	New	Created for integrated online pool maintenance and recoup support.
ZRECP FLUSH	New	Created for integrated online pool maintenance and recoup support.
ZRECP IGNORE	New	Created for integrated online pool maintenance and recoup support.
ZRECP LEVEL	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP LOAD	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
ZRECP MIGRATE	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
ZRECP NOREBUILD	New	Created for integrated online pool maintenance and recoup support.
ZRECP OFLMR	New	Created for integrated online pool maintenance and recoup support.
ZRECP ONEL	New	Created for integrated online pool maintenance and recoup support.
ZRECP PRIM	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
ZRECP PROCEED	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP PROFILE	New	Created for integrated online pool maintenance and recoup support.
ZRECP PROTECT	New	Created for integrated online pool maintenance and recoup support.
ZRECP REBUILD	New	Created for integrated online pool maintenance and recoup support.
ZRECP RECALL	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP RERUN	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP RESTART	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP RESUME	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP RETRY	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP SEL	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP SETUP	New	Created for integrated online pool maintenance and recoup support.
ZRECP SKIP	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP START	Changed	Changed for integrated online pool maintenance and recoup support.
ZRECP STATUS	Changed	Changed for integrated online pool maintenance and recoup support.

Table 904. Changes to Commands for Integrated Online Pool Maintenance and Recoup Support (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZRECP STOP	New	Created for integrated online pool maintenance and recoup support.
ZRECP TO2	No Longer Supported	Deleted by integrated online pool maintenance and recoup support.
ZRECP VERIFY	New	Created for integrated online pool maintenance and recoup support.
ZRFPC	Changed	Changed for integrated online pool maintenance and recoup support.
ZRPDU ABORT	New	Created for integrated online pool maintenance and recoup support.
ZRPDU CREATE	New	Created for integrated online pool maintenance and recoup support.
ZRPDU DISP	New	Created for integrated online pool maintenance and recoup support.
ZRPDU OFLMR	New	Created for integrated online pool maintenance and recoup support.
ZRPDU PURGE	New	Created for integrated online pool maintenance and recoup support.
ZRPDU STATUS	New	Created for integrated online pool maintenance and recoup support.
ZRREC BACKUP	New	Created for integrated online pool maintenance and recoup support.
ZRREC RESET	New	Created for integrated online pool maintenance and recoup support.
ZRREC SWITCH	New	Created for integrated online pool maintenance and recoup support.
ZSDEA	Changed	Changed for integrated online pool maintenance and recoup support.

Messages and System Errors

Table 905 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
041006	System Error	Changed
041008	System Error	New
041009	System Error	New
04100A	System Error	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
04100C	System Error	New
04100E	System Error	New
04100F	System Error	New
041010	System Error	New
041011	System Error	New
041012	System Error	New
041013	System Error	New
041107	System Error	New
04110C	System Error	Changed
04110D	System Error	Changed
041113	System Error	Changed
041120	System Error	New
041122	System Error	New
041124	System Error	New
041200	System Error	New
041201	System Error	New
041202	System Error	New
041203	System Error	New
041204	System Error	New
041205	System Error	New
041206	System Error	New
041207	System Error	New
041208	System Error	New
041209	System Error	New
04120A	System Error	New
04120B	System Error	New
04120C	System Error	New
04120D	System Error	New
04120E	System Error	New
04120F	System Error	New
041210	System Error	New
041211	System Error	New
041212	System Error	New
041213	System Error	New
041214	System Error	New
041215	System Error	New
041216	System Error	New
041217	System Error	New
041218	System Error	New
041219	System Error	New
04121A	System Error	New
04121B	System Error	New
04121C	System Error	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
04121D	System Error	New
04121E	System Error	New
0412F0	System Error	New
0412F1	System Error	New
0412F2	System Error	New
0412F3	System Error	New
0412F4	System Error	New
0412F4	System Error	New
042000	System Error	New
042001	System Error	New
042002	System Error	New
044500	System Error	New
888001	System Error	New
888002	System Error	New
888003	System Error	New
888004	System Error	New
888005	System Error	New
888006	System Error	New
BCAI0001A	Online	Changed
BCAI0002A	Online	New
BCAI0003A	Online	New
BCAI0007E	Online	New
BCAI0008E	Online	New
BCAI0009E	Online	New
BCC00000A	Online	New
BCPE0001E	Online	New
BCPE0003E	Online	New
BCPE0004I	Online	New
BCPE0006I	Online	New
BCPI0001E	Online	New
BCPI0002E	Online	New
BCPU0002W	Online	New
BCPY0001I	Online	New
BCPY0002I	Online	New
BCPY0003E	Online	New
BCPZ0001E	Online	New
BCPZ0004E	Online	New
BCPZ0006E	Online	New
BCPZ0007E	Online	New
BCPZ0008E	Online	New
BCPZ0009E	Online	New
BCP00003I	Online	New
BCP00004I	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BCP00005I	Online	New
BCP00006I	Online	New
BCP00007I	Online	New
BCP00008I	Online	New
BCP00009W	Online	New
BCP00010I	Online	New
BCP00011I	Online	New
BCP00012I	Online	New
BCP00013I	Online	New
BCP00014I	Online	New
BCP00015I	Online	New
BCP00016I	Online	New
BCP00017A	Online	New
BCP00018I	Online	New
BCP00019A	Online	New
BCP00020I	Online	New
BCP00021I	Online	New
BCP00022I	Online	New
BCP00023I	Online	New
BCP00024I	Online	New
BCP00025A	Online	New
BCP00026I	Online	New
BCP00027I	Online	New
BCP00028I	Online	New
BCP00029I	Online	New
BCP00030E	Online	New
BCP00031I	Online	New
BCP00032I	Online	New
BCP00033W	Online	New
BCP00034I	Online	New
BCP00035I	Online	New
BCP00036I	Online	New
BCP00038I	Online	New
BCP00039I	Online	New
BCP00040I	Online	New
BCP00041I	Online	New
BCP00042I	Online	New
BCP00043I	Online	New
BCP00044I	Online	New
BCP00045I	Online	New
BCP00046I	Online	New
BCP00047I	Online	New
BCP00048I	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BCP00049I	Online	New
BCP00050E	Online	New
BCP00051I	Online	New
BCP00052A	Online	New
BCP00053I	Online	New
BCP00054I	Online	New
BCP00055I	Online	New
BCP10001E	Online	New
BCP10001I	Online	New
BCP10002E	Online	New
BCP10003E	Online	New
BCP10004E	Online	New
BCP10005E	Online	New
BCP10006E	Online	New
BCP10007E	Online	New
BCP10008E	Online	New
BCP10009E	Online	New
BCP10010E	Online	New
BCP10013E	Online	New
BCP10014I	Online	New
BCP10015I	Online	New
BCP20001E	Online	New
BCP20002E	Online	New
BCP20003E	Online	New
BCP20004E	Online	New
BCP20005E	Online	New
BCP20008I	Online	New
BCP30001E	Online	New
BCP30002E	Online	New
BCP60001E	Online	New
BCP60002E	Online	New
BAK00010E	Online	New
BAK10001E	Online	New
BAK10002A	Online	New
BAK10003A	Online	New
BAK10004W	Online	New
BKC10013W	Online	New
BKC10014E	Online	New
BKP60001I	Online	New
BKP60002I	Online	New
BLOG0001W	Online	New
BLOG0002I	Online	New
BLOG0003E	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BLOG0004W	Online	New
BLOG0005W	Online	New
BLOG0006I	Online	New
BLOG0007I	Online	New
BLOG0008W	Online	New
BLOH0001W	Online	New
BMD10002E	Online	New
BOFA0001I	Online	New
BOFA0002E	Online	New
BOFA0003E	Online	New
BOFA0004E	Online	New
BOFA0005E	Online	New
BOFA0006I	Online	New
BOFA0007I	Online	New
BOFA0008W	Online	New
BOFA0009W	Online	New
BOFA0010E	Online	New
BOFA0011I	Online	New
BOFA0012E	Online	New
BOFA0013W	Online	New
BOFA0014E	Online	New
BOFA0015E	Online	New
BOFA0016E	Online	New
BOFA0017E	Online	New
BOFB0001I	Online	New
BOFB0002I	Online	New
BOFB0003I	Online	New
BOFB0004I	Online	New
BOFB0005I	Online	New
BOFB0006I	Online	New
BOFB0007I	Online	New
BOFB0008E	Online	New
BOFB0010I	Online	New
BOFB0011E	Online	New
BOFB0012E	Online	New
BOFB0013E	Online	New
BOFB0014E	Online	New
BOFB0015E	Online	New
BOFB0016E	Online	New
BOFB0017E	Online	New
BOFD0002I	Online	New
BOFD0080E	Online	New
BOFD0081E	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BOFD0089E	Online	New
BOFE0002E	Online	New
BOFF0001E	Online	New
BOFF0002E	Online	New
BOFF0003E	Online	New
BOFF0004E	Online	New
BOFF0010I	Online	New
BOFF0011I	Online	New
BOFH0001I	Online	New
BOFH0002I	Online	New
BOFH0003I	Online	New
BOFH0004I	Online	New
BOFI0001I	Online	New
BOFI0007I	Online	New
BOFI0009I	Online	New
BOFI0010I	Online	New
BOFI0020E	Online	New
BOFI0021E	Online	New
BOFI0022E	Online	New
BOFI0023E	Online	New
BOFI0024I	Online	New
BOFI0025I	Online	New
BOFJ0005E	Online	New
BOFJ0006E	Online	New
BOFK0001I	Online	New
BOFK0003I	Online	New
BOFK0004E	Online	New
BOFK0005E	Online	New
BOFK0006E	Online	New
BOFK0007E	Online	New
BOFM0001A	Online	New
BOF00002I	Online	New
BOF10001I	Online	New
BOF10010I	Online	New
BOF20001I	Online	New
BOF20002I	Online	New
BOF30001E	Online	New
BOF30002E	Online	New
BOF30003E	Online	New
BOF30004E	Online	New
BOF30005E	Online	New
BOF30006E	Online	New
BOF40001E	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BOF40002E	Online	New
BOF40003E	Online	New
BOF40004E	Online	New
BOF40005E	Online	New
BOF40006E	Online	New
BOF40007A	Online	New
BOF40010I	Online	New
BOF40011I	Online	New
BOF40015I	Online	New
BOF40016I	Online	New
BOF70013W	Online	New
BOF80002I	Online	New
BOF80003I	Online	New
BOF90001I	Online	New
BOF90002W	Online	New
BRB20001W	Online	New
BRB20002W	Online	New
BRB20003W	Online	New
BRB20004W	Online	New
BRB20005W	Online	New
BRB20006W	Online	New
BRB20007W	Online	New
BRB20008W	Online	New
BRB20009W	Online	New
BRB20010I	Online	New
BRB30001I	Online	New
BRB30002I	Online	New
BRB30003W	Online	New
BRB30004W	Online	New
BRB30005W	Online	New
BRB30006W	Online	New
BRB30007E	Online	New
BRB40000I	Online	New
BRB40001E	Online	New
BRB40002E	Online	New
BRB40002I	Online	New
BRB40005E	Online	New
BRB40006E	Online	New
BRCP0001E	Online	New
BRCP0002E	Online	New
BRCP0003E	Online	New
BRCP0004E	Online	New
BRCP0005E	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BRCP0007I	Online	New
BRCP0008E	Online	New
BRCP0009E	Online	New
BRCP0010E	Online	New
BRCP0011E	Online	New
BRCP0012E	Online	New
BRCP0014A	Online	New
BRCP0015E	Online	New
BRCP0016I	Online	New
BRCP0017E	Online	New
BRCP0018E	Online	New
BRCP0019E	Online	New
BRCP0320I	Online	New
BRCP0321I	Online	New
BRCP0322I	Online	New
BRCP0323I	Online	New
BRCP0324I	Online	New
BRCP0325I	Online	New
BRCP0327I	Online	New
BRCR0001I	Online	New
BRCR0002I	Online	New
BRID0003I	Online	New
BRID0004I	Online	New
BRID0005E	Online	New
BRID0006E	Online	New
BRID0007E	Online	New
BRID0008E	Online	New
BRID0009E	Online	New
BRIE0002I	Online	New
BRIE0005E	Online	New
BRIE0006E	Online	New
BRIE0007E	Online	New
BRPT0001W	Online	New
BRPT0002W	Online	New
BRPT0003W	Online	New
BRTD00001I	Online	New
BRTD00002I	Online	New
BRTD00003I	Online	New
BRTD00004I	Online	New
BRTO0055E	Online	New
BRTV0002I	Online	New
BRUB0001E	Online	New
BRUB0002E	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BRUB0003E	Online	New
BRUB0004E	Online	New
BRUB0010E	Online	New
BRUC0006I	Online	New
BRUC0007W	Online	New
BRUC0008W	Online	New
BRUC0009W	Online	New
BRV00001I	Online	New
BRV00002E	Online	New
BRV00003E	Online	New
BRV00004E	Online	New
BRV00010W	Online	New
BRV00011W	Online	New
BRV10000I	Online	New
BRV10001I	Online	New
BRV10002E	Online	New
BRV10003E	Online	New
BRV10004E	Online	New
BRV10005E	Online	New
BRV10006E	Online	New
BRV10007E	Online	New
BRV20000I	Online	New
BRV20001I	Online	New
BRV20002I	Online	New
BRV20003I	Online	New
BRV20009E	Online	New
BRV20010W	Online	New
BRV30005E	Online	New
BRV30006E	Online	New
BRV30007E	Online	New
BRV30008E	Online	New
BRV30009E	Online	New
BRV30010E	Online	New
BRV30011E	Online	New
BRV30012E	Online	New
BRV30013E	Online	New
BRV50001I	Online	New
BRV50002I	Online	New
BRV50005E	Online	New
BRV50006E	Online	New
BRV50007E	Online	New
BRV50008E	Online	New
BRV50009E	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BRV50012E	Online	New
BRV50013E	Online	New
BRV50014E	Online	New
BRV50015E	Online	New
BRV50098E	Online	New
BRV60001I	Online	New
BRV60002I	Online	New
BRV60003I	Online	New
BRV60004W	Online	New
BRV60005I	Online	New
BRV60006I	Online	New
BRV60007W	Online	New
BRV60008E	Online	New
BRV60009E	Online	New
BRV60010E	Online	New
BRV60011E	Online	New
BRV60012E	Online	New
BRV60013I	Online	New
BRV60014I	Online	New
BRV80000E	Online	New
BRV80001I	Online	New
BRV80002I	Online	New
BRV80003I	Online	New
BRV80004I	Online	New
BRV80005E	Online	New
BRV80006E	Online	New
BRV90001E	Online	New
BRV90002E	Online	New
BRV90004E	Online	New
BRV90004I	Online	New
BRV90005E	Online	New
BRV90006E	Online	New
BRV90008E	Online	New
BRVD0001I	Online	New
BRVD0002I	Online	New
BRYL0013W	Online	New
BRYN0001E	Online	New
BWRA0001I	Online	New
BWRA0400I	Online	New
BWRA0401I	Online	New
BWRA0402I	Online	New
BWRA0403I	Online	New
BWRF0001I	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BWRF0002I	Online	New
BWRF0007E	Online	New
BWRF0008E	Online	New
BWRF0009E	Online	New
B0P00001E	Online	New
B0P00002E	Online	New
B0P00003I	Online	New
B0P00004I	Online	New
B0P00005E	Online	New
B1AA0004I	Online	New
B1AA0011E	Online	New
B1AA0012E	Online	New
B1AA0013E	Online	New
B1AA0014E	Online	New
B1A50001I	Online	New
B1A50002E	Online	New
B1A50003E	Online	New
B1A50003I	Online	New
B1A50004I	Online	New
B1A50005I	Online	New
B1A50006I	Online	New
B1A50007W	Online	New
B1A50008W	Online	New
B1A50009E	Online	New
B1A50010W	Online	New
B1A50011E	Online	New
B1A50012T	Online	New
B1A50012W	Online	New
B1A50015E	Online	New
B1A50016E	Online	New
B1A50017I	Online	New
B1A50018I	Online	New
B1A50019W	Online	New
B1A80004I	Online	New
B1A80011E	Online	New
B1A80012E	Online	New
B1A80013E	Online	New
B1A80014E	Online	New
B1A80016E	Online	New
B1A80017E	Online	New
B1A80018E	Online	New
B1A90001I	Online	New
B1A90002I	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
B1A90006I	Online	New
B1A90007W	Online	New
B1A90009W	Online	New
B1A90011E	Online	New
B1A90011S	Online	New
CYC00005W	Online	New
CYGR0001T	Online	New
CYC00006W	Online	New
CYF90001T	Online	New
DYDA0001I	Online	New
DYDE0000I	Online	New
DYDE0001E	Online	New
DYDE0002E	Online	New
DYDE0001E	Online	New
DYDI0002W	Online	New
DYDI0006I	Online	New
DYDI0008I	Online	New
DYDI0081E	Online	New
DYDI0082E	Online	New
DYDI0083E	Online	New
DYDI0084E	Online	New
DYDI0085E	Online	New
DYDI0088E	Online	New
DYDI0092E	Online	New
DYDI0093A	Online	New
DYDI0094E	Online	New
DYDI0095E	Online	New
DYDI0096E	Online	New
DYDI0097E	Online	New
DYDI0098I	Online	New
DYDI0099E	Online	New
DYDN0001E	Online	New
DYDN0002E	Online	New
DYDO0001I	Online	New
DYDO0002I	Online	New
DYDO0003E	Online	New
DYDO0004I	Online	New
DYDO0005E	Online	New
DYDO0006E	Online	New
DYDU0006I	Online	Changed
DYDU0079E	Online	New
DYDU0093A	Online	New
DYDU0098I	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DYDU0099E	Online	Changed
DYD10001T	Online	New
DYD10002T	Online	New
DYD10003T	Online	New
DYD10004T	Online	New
DYD10005E	Online	New
DYD10006T	Online	New
DYD10007T	Online	New
DYD10008T	Online	New
DYD10009T	Online	New
DYD10010T	Online	New
DYD10011T	Online	New
DYD10012T	Online	New
DYD30001A	Online	New
DYD30001I	Online	New
DYD30001T	Online	New
DYD30002A	Online	New
DYD30002E	Online	New
DYD30005E	Online	New
DYD30007E	Online	New
DYD30008E	Online	New
DYD30009E	Online	New
DYD30010E	Online	New
DYD30016E	Online	New
DYD30017E	Online	New
DYD30018E	Online	New
DYD30019E	Online	New
DYD30020E	Online	New
DYD30022E	Online	New
DYD30023E	Online	New
DYD30027E	Online	New
DYD30037E	Online	New
DYD40001E	Online	New
DYD40001I	Online	New
DYD40002E	Online	New
DYD40003E	Online	New
DYD40004E	Online	New
DYD40005E	Online	New
DYD40006E	Online	New
DYD40007E	Online	New
DYD40008T	Online	New
DYD40009T	Online	New
DYD40010T	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DYD40011T	Online	New
DYD40012T	Online	New
DYD40022I	Online	New
DYD50001T	Online	New
DYD50002T	Online	New
DYD50005T	Online	New
DYD50006T	Online	New
DYD50007T	Online	New
DYD50008T	Online	New
DYD50009T	Online	New
DYD50010T	Online	New
DYD50011T	Online	New
DYD50012T	Online	New
DYD50013T	Online	New
DYD50014T	Online	New
DYD50015T	Online	New
DYD50016T	Online	New
DYD50017T	Online	New
DYD50018T	Online	New
DYD50019T	Online	New
DYD50020T	Online	New
DYD50021T	Online	New
DYD50022T	Online	New
DYD50023T	Online	New
DYD50024T	Online	New
DYD50025T	Online	New
DYD50026T	Online	New
DYD60001E	Online	New
DYD60002I	Online	New
DYD60003E	Online	New
DYD60004E	Online	New
DYD60005E	Online	New
DYD60006E	Online	New
DYD60007E	Online	New
DYD80001T	Online	New
DYD80002T	Online	New
DYD80003T	Online	New
DYD80004T	Online	New
DYD80005T	Online	New
DYD80006T	Online	New
DYD80008T	Online	New
DYD80009T	Online	New
DYD80010T	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DYD80011T	Online	New
DYD80012T	Online	New
DYD80013T	Online	New
DYD80014T	Online	New
DYD80015T	Online	New
DYD80016T	Online	New
DYD80017T	Online	New
DYD80018T	Online	New
DYD80019T	Online	New
DYD80020T	Online	New
DYD80021T	Online	New
DYD90001T	Online	New
DYD90002T	Online	New
DYD90003T	Online	New
DYD90004T	Online	New
DYD90005T	Online	New
DYD90006T	Online	New
DYD90007T	Online	New
DYD90008T	Online	New
DYD90009E	Online	New
DYD90010E	Online	New
DYD90011E	Online	New
DYD90012E	Online	New
DYD90014E	Online	New
RECP0000A	Online	New
RECP0000E	Online	New
RECP0000I	Online	New
RECP0000T	Online	New
RECP0000W	Online	New
RECP0001E	Online	New
RECP0001W	Online	New
RECP0003I	Online	New
RECP0005W	Online	New
RECP0007W	Online	New
RECP000AA	Online	No Longer Supported
RECP000CA	Online	No Longer Supported
RECP0010E	Online	New
RECP0016I	Online	Changed
RECP0018I	Online	Changed
RECP0020A	Online	Changed
RECP0026I	Online	Changed
RECP002AA	Online	No Longer Supported
RECP002EA	Online	Changed

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP0032A	Online	Changed
RECP0038I	Online	New
RECP003CA	Online	Changed
RECP003EA	Online	Changed
RECP0042T	Online	No Longer Supported
RECP0044A	Online	No Longer Supported
RECP0048A	Online	Changed
RECP004CA	Online	New
RECP004CT	Online	No Longer Supported
RECP0068I	Online	New
RECP0078I	Online	Changed
RECP0079E	Online	New
RECP007AE	Online	No Longer Supported
RECP007CE	Online	No Longer Supported
RECP0080I	Online	Changed
RECP0082A	Online	No Longer Supported
RECP0082I	Online	New
RECP0086A	Online	Changed
RECP0088A	Online	No Longer Supported
RECP0088I	Online	New
RECP008AA	Online	Changed
RECP0090T	Online	No Longer Supported
RECP0092A	Online	No Longer Supported
RECP0094T	Online	No Longer Supported
RECP0096T	Online	No Longer Supported
RECP0096I	Online	New
RECP0098T	Online	No Longer Supported
RECP0098E	Online	New
RECP0099W	Online	New
RECP009AE	Online	New
RECP009CE	Online	New
RECP009EE	Online	New
RECP00A0E	Online	New
RECP00A2I	Online	New
RECP00A4I	Online	New
RECP00A6I	Online	New
RECP00A8I	Online	New
RECP00AAE	Online	New
RECP00ACE	Online	New
RECP00AEA	Online	New
RECP00B0T	Online	New
RECP00B2W	Online	New
RECP00B4A	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP00B6I	Online	New
RECP00B8I	Online	New
RECP00BAI	Online	New
RECP00BCI	Online	New
RECP00BEI	Online	New
RECP00C0I	Online	New
RECP00C2I	Online	New
RECP00C4I	Online	New
RECP00C6I	Online	New
RECP00C8E	Online	New
RECP00CAE	Online	New
RECP00CCW	Online	New
RECP00CEI	Online	New
RECP00D0I	Online	New
RECP00D2I	Online	New
RECP00D4I	Online	New
RECP00D6E	Online	New
RECP00DAE	Online	New
RECP00DCI	Online	New
RECP00DEI	Online	New
RECP00E0I	Online	New
RECP00E2E	Online	New
RECP00E4I	Online	New
RECP00E6I	Online	New
RECP00E8E	Online	New
RECP00EAA	Online	New
RECP00ECT	Online	New
RECP00EEW	Online	New
RECP00F0I	Online	New
RECP00F2I	Online	New
RECP00F4I	Online	New
RECP00F6I	Online	New
RECP00F8I	Online	New
RECP00FAI	Online	New
RECP00FCI	Online	New
RECP00FEI	Online	New
RECP0201I	Online	No Longer Supported
RECP0202I	Online	No Longer Supported
RECP0203I	Online	No Longer Supported
RECP0204I	Online	No Longer Supported
RECP0205I	Online	No Longer Supported
RECP0206I	Online	No Longer Supported
RECP0207I	Online	No Longer Supported

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP0208I	Online	No Longer Supported
RECP0209I	Online	No Longer Supported
RECP0210I	Online	No Longer Supported
RECP0211I	Online	No Longer Supported
RECP0213I	Online	No Longer Supported
RECP0214I	Online	No Longer Supported
RECP0215I	Online	No Longer Supported
RECP0250W	Online	No Longer Supported
RECP0251E	Online	No Longer Supported
RECP0252E	Online	No Longer Supported
RECP0253E	Online	No Longer Supported
RECP0254E	Online	No Longer Supported
RECP0255E	Online	No Longer Supported
RECP0256E	Online	No Longer Supported
RECP0257E	Online	No Longer Supported
RECP0258E	Online	No Longer Supported
RECP0259E	Online	No Longer Supported
RECP0260E	Online	No Longer Supported
RECP0262E	Online	No Longer Supported
RECP0263E	Online	No Longer Supported
RECP0264E	Online	No Longer Supported
RECP0271E	Online	No Longer Supported
RECP0272E	Online	No Longer Supported
RECP0273E	Online	No Longer Supported
RECP0274E	Online	No Longer Supported
RECP0275E	Online	No Longer Supported
RECP0276E	Online	No Longer Supported
RECP0277E	Online	No Longer Supported
RECP0278E	Online	No Longer Supported
RECP0279E	Online	No Longer Supported
RECP0282E	Online	No Longer Supported
RECP0283E	Online	No Longer Supported
RECP0284E	Online	No Longer Supported
RECP0285E	Online	No Longer Supported
RECP0286E	Online	No Longer Supported
RECP0287E	Online	No Longer Supported
RECP0288E	Online	No Longer Supported
RECP0289E	Online	No Longer Supported
RECP0290E	Online	No Longer Supported
RECP0291E	Online	No Longer Supported
RECP0292E	Online	No Longer Supported
RECP0294E	Online	No Longer Supported
RECP0295E	Online	No Longer Supported

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP0296E	Online	No Longer Supported
RECP0297E	Online	No Longer Supported
RECP0298E	Online	No Longer Supported
RECP0299E	Online	No Longer Supported
RECP0300I	Online	New
RECP0300E	Online	New
RECP0301E	Online	New
RECP0301I	Online	New
RECP0302E	Online	New
RECP0303W	Online	New
RECP0304W	Online	New
RECP0305W	Online	New
RECP0306W	Online	New
RECP0307A	Online	New
RECP0308I	Online	New
RECP0361E	Online	New
RECP0362I	Online	New
RECP0363I	Online	New
RECP0364E	Online	New
RECP0365E	Online	New
RECP0366E	Online	New
RECP0371E	Online	New
RECP0372E	Online	New
RECP0373E	Online	New
RECP0374E	Online	New
RECP0375E	Online	New
RECP0376E	Online	New
RECP0377I	Online	New
RECP0378E	Online	New
RECP0379I	Online	New
RECP0381E	Online	New
RECP0382E	Online	New
RECP0383E	Online	New
RECP0384E	Online	New
RECP0385E	Online	New
RECP0386E	Online	New
RECP0387E	Online	New
RECP0388E	Online	New
RECP0391E	Online	New
RECP0392E	Online	New
RECP0393E	Online	New
RECP0394E	Online	New
RECP0395I	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP0396E	Online	New
RECP0400E	Online	New
RECP0401E	Online	New
RECP0402E	Online	New
RECP0404I	Online	New
RECP0410I	Online	New
RECP0411E	Online	New
RECP0412E	Online	New
RECP0415E	Online	New
RECP0416E	Online	New
RECP0421I	Online	New
RECP0422I	Online	New
RECP0423E	Online	New
RECP0424E	Online	New
RECP0425E	Online	New
RECP0426E	Online	New
RECP0427E	Online	New
RECP0428E	Online	New
RECP0431I	Online	New
RECP0432I	Online	New
RECP0500E	Online	New
RECP0501E	Online	New
RECP0502E	Online	New
RECP0503E	Online	New
RECP0504I	Online	New
RECP0520I	Online	New
RECP0521I	Online	New
RECP0522I	Online	New
RECP0523I	Online	New
RECP0524I	Online	New
RECP0531I	Online	New
RECP0533I	Online	New
RECP0601I	Online	New
RECP0602I	Online	New
RECP0603I	Online	New
RECP0604I	Online	New
RECP0605I	Online	New
RECP0606I	Online	New
RECP0650E	Online	New
RECP0651E	Online	New
RECP0652E	Online	New
RECP0653E	Online	New
RECP0654E	Online	New

Table 905. Changes to Messages and System Errors for Integrated Online Pool Maintenance and Recoup Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP0655E	Online	New
RECP0656E	Online	New
RECP0657E	Online	New
RECP0658E	Online	New
RECP0659E	Online	New
RECP0660E	Online	New
RECP0661E	Online	New
RECP0662E	Online	New
RECP0663E	Online	New
RECP0664E	Online	New
RECP0665E	Online	New
RECP0666E	Online	New
RECP0667E	Online	New
RECP0701I	Online	New
RECP0702I	Online	New
RECP0706I	Online	New
RECP0708I	Online	New
RECP0771E	Online	New
RECP0772E	Online	New
RECP0773E	Online	New
RECP0774E	Online	New
RECP0775E	Online	New
RECP0776E	Online	New
RECP0777E	Online	New
RECP0778E	Online	New
RECP0779E	Online	New
RECP0782E	Online	New
RECP0784E	Online	New
RECP0785E	Online	New
RECP0786E	Online	New
RECP0787E	Online	New
RECP0788E	Online	New
RECP0789E	Online	New
RECP0790E	Online	New
RFPC0128T	Online	New
RFPC0255T	Online	New
SISN0006T	Online	New
UBKD0003I	Online	New
ZRPD0003I	Online	New
ZRPD0004I	Online	New
ZRPD0005I	Online	New
ZRPD0006I	Online	New
ZRPD0007I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 906 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 906. Changes to TPF Publications for Integrated Online Pool Maintenance and Recoup Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Concepts and Structures</i>	GTPCON0A	Updated with new conceptual information about integrated online pool maintenance and recoup support.
<i>TPF Database Reference</i>	GTPDBR0B	Updated with new conceptual and procedural information for integrated online pool maintenance and recoup support.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for integrated online pool maintenance and recoup support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for integrated online pool maintenance and recoup support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for integrated online pool maintenance and recoup support.
<i>TPF Programming Standards</i>	GTPPSM09	Updated with conventions for recoup structure names.
<i>TPF System Generation</i>	GTPSYC0D	Updated with changed system generation information for integrated online pool maintenance and recoup support.
<i>TPF System Installation Support Reference</i>	GTPINS0D	Deleted recoup global information.
<i>TPF System Macros</i>	GTPSYS0D	Updated with information about new and changed system macros for integrated online pool maintenance and recoup support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To install and use integrated online pool maintenance and recoup support, do the following:

1. Ensure that pool expansion (PXP) pool migration has been done. See “Pool Expansion (PXP) Support (APAR PJ17912)” on page 89 for more information.
2. Ensure that no deactivation or reallocation processing is running on the TPF 4.1 system to which you are installing program update tape (PUT) 13.
3. Install PUT 13.
4. Install APAR PJ27354 on all processors in the TPF 4.1 system.
5. Reassemble or recompile the following:
 - CSECTS listed in Table 893 on page 838
 - Segments listed in Table 902 on page 843.
 - Offline segment BRFA.
6. Link-edit the dynamic load modules (DLMs) listed in Table 886 on page 833 and offline segment BRFA.
7. Reapply any customer modifications that had previously been made to the GL0BP and GL0BQ segments.
8. Update descriptors as follows:
 - a. Update descriptors using the new GROUP and INDEX macros.

Notes:

- 1) New parameters have been added to the GROUP and INDEX macros.
 - 2) The default for the CREATE parameter on the INDEX macro has been changed from CREATE=NO to CREATE=YES.
 - b. Assemble all descriptors, including those shipped by IBM.
9. Do the following on all subsystems:
 - a. If you have the TPF Database Facility (TPPDF) product installed and do not have at least 11 ordinals of record type #IDFC4 allocated to your TPF system, update the RAMFIL macro for #IDFC4 in the SIP stage 1 deck.
 - b. Define the fixed file records listed in Table 894 on page 838 using the RAMFIL macro statements in the SIP stage 1 deck. See *TPF System Generation* for more information.
 - c. Run the FACE table generator (FCTBG) to create the new FACE table.
 - d. Run the system allocator program (SALO) using IBMPAL additions for newly created segments to create an updated IBM program allocation table (IPAT) and system allocator (SAL) table.
 10. Link-edit the control program (CP).
 11. IBM suggests that you run recoup and pool directory update (PDU), and capture all critical data before loading and IPLing the TPF 4.1 system with the integrated online pool maintenance and recoup support changes.

12. Load the FACE table, IPAT, CP, the dynamic load modules (DLMs) listed in Table 891 on page 836, and the programs listed in Table 902 on page 843 to each subsystem.
13. Make sure that recoup or PDU is not running on the TPF 4.1 system.
14. IPL the TPF 4.1 system.
15. Cycle the TPF 4.1 system to 1052 state.
16. Initialize recoup records by entering the following on all subsystems:
 - **ZPOOL INIT PDU**
 - **ZPOOL INIT RECOUP**
 - **ZPOOL INIT LTDRT**
17. Enter **ZRREC RESET** to reset the FC33 records.
18. Enter **ZRFPC** to verify the integrity of the pools.
19. Enter **ZPOOL GENERATION INIT** to build the current pool segment table (#PSTCUR) and the new pool segment table (#PSTNEW).
20. Enter **ZRFPC** to verify the integrity of the pools.
21. Cycle the TPF 4.1 system to NORM state.
22. Load updated descriptors as follows on all subsystems:
 - a. Load the descriptors to the TPF 4.1 system program area.
 - b. Enter **ZRBKD INIT CTL** to initialize the BKD load control record (BK0LC).
 - c. Enter **ZRBKD DUMM ALL** to create dummy recoup descriptors.
 - d. For each descriptor container used for recoup processing, enter **ZRBKD MOVE *progrname* Nordnum**, where *progrname* is the name and version of the descriptor container and *ordnum* is an ordinal number (from 0 to 99) that represents the order in which descriptor containers are processed during chain chase processing.
 - e. Enter **ZRBKD DISP ALL** to verify that the descriptors were loaded correctly.
23. On each subsystem, enter **ZIFIL RGSTAT/FC3C/00/00/100/NNN/N** to initialize RGSTAT records.
24. On each subsystem, enter **ZAREC LRGSTAT.0 0 0000** to set the first RGSTAT record (ordinal 0) to zero.
25. If TPF collection support (TPFCS) has not been initialized on your TPF 4.1 system, enter **ZOODB INIT** to initialize TPFCS before running recoup for the first time.
26. Enter **ZRECP SETUP** once on each subsystem in which you run recoup.
27. If you are using the TPFDF product, enter the ZUDFM INIT command on all subsystems to initialize the following TPFDF record IDs:
 - Fddb
 - Fddc
 - Fddd
 - Fdde
 - Fddf
 - Fde0
 - Fde1
 - Fdf4.
28. Enter the ZRECP PROFILE command to display your recoup run-time options and to change any recoup settings that you want to change.

29. Ensure that the ADR tape is defined for input and output on all subsystems. Enter the ZTLBL command to modify any tape definitions that need to be changed.

Loaders Enhancement for the TPF Assembler Debugger for VisualAge Client (APAR PJ27422)

The following section discusses the migration considerations for the loaders enhancement for the TPF Assembler Debugger for VisualAge Client (referred to as loaders enhancement for TPF Assembler Debugger in the remainder of this section).

Prerequisite APARs

See the APEDIT for APAR PJ27422 for information about prerequisite APARs.

Functional Overview

The loaders enhancement for TPF Assembler Debugger gives you the ability to load ADATA files used by the assembler debugger rather than using Trivial File Transfer Protocol (TFTP) to transfer ADATA files to the online TPF 4.1 system. The loaders enhancement for TPF Assembler Debugger provides the following benefits:

- Eliminates the need to remember and specify the path and name of the ADATA file in the hierarchical file system (HFS). The assembler debugger finds and uses the ADATA file that is loaded by the TPF loader.
- E-type loader (OLDR) support for ADATA files allows the assembler debugger to automatically use the correct ADATA file for any version of a program.
- Provides a foundation for changes to the assembler debugger that enable tracing in a multiple database function (MDBF) environment by loading ADATA files to a specific subsystem.

Architecture

With the loaders enhancement for TPF Assembler Debugger, ADATA files are loaded to the online TPF 4.1 system with real-time programs. When loaded with programs by the E-type loader, ADATA files are first written to #OLDn records. If a loadset containing programs with ADATA files is accepted, ADATA files are written to a new program-base unique fixed file record type (#APRGn). #APRGn records are allocated to a given program and remain allocated to that program even if a new version of that program is loaded without ADATA files. The auxiliary loader (initiated by the ZTPLD command) also writes ADATA files to #APRGn records. Loadsets that include programs with ADATA files can be accepted even if #APRGn records are not allocated, in which case ADATA files are discarded during the accept process. This allows ADATA file support to be immediately used without requiring new records to be allocated.

The size of the online program allocation table (PAT) entry has been increased to add new fields related to the ADATA files. This requires reassembly of programs that use the PAT entry size to step through the table or to calculate an offset into the table.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 907 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 907. Changes to Build Scripts for Loaders Enhancement for TPF Assembler Debugger

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CELABS	DLM	Changed	Updated for commentary changes only.
CILOBS	DLM	New	Added to file adata.
CILXBS	DLM	New	Added to build adata.
COLOBS	DLM	Changed	Updated to add crlz_accept_3_overlay_adata.

Dynamic Load Module (DLM) Stubs: Table 908 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 908. Changes to Dynamic Load Module (DLM) Stubs for Loaders Enhancement for TPF Assembler Debugger

DLM Stub	New, Changed, or No Longer Supported?
CILO	New
CILX	New

General Use C/C++ Language Header Files: Table 909 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 909. Changes to General Use C/C++ Language Header Files for Loaders Enhancement for TPF Assembler Debugger

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$fva0.h	Changed	Yes
c\$icolr.h	Changed	Yes
c\$idse1d.h	Changed	Yes
c\$idse1v.h	Changed	Yes
c\$idsepd.h	Changed	Yes
c\$idsl1dr.h	Changed	Yes
c\$idsmxp.h	Changed	Yes
c\$idso1d.h	Changed	No
c\$idspat.h	Changed	Yes
c\$idsp1rg.h	Changed	Yes
c\$idspvr.h	Changed	Yes
c\$idstxt.h	Changed	No
c\$tp1dr.h	Changed	Yes

Table 909. Changes to General Use C/C++ Language Header Files for Loaders Enhancement for TPF Assembler Debugger (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
zimageq.h	Changed	No
zimagmsg.h	Changed	No
ztpld.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 910 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 910. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Loaders Enhancement for TPF Assembler Debugger

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$udcl.hpp	Changed	Yes

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 911 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 911. Changes to Members (Object Files) for Loaders Enhancement for TPF Assembler Debugger

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CEL8	CEL8	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CELL	CELA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CIKD	CIMA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CIKE	CIMU	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CIL0	CILA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CIL1	CILA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CIL6	CILA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CIL7	CILA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CILA	CILA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.

Table 911. Changes to Members (Object Files) for Loaders Enhancement for TPF Assembler Debugger (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CILB	CILB	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CILC	CILA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CILE	CILE	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CILF	CILF	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CILG	CILG	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CILH	CILH	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CILO	CILO	New	C Language	Created for Loaders Enhancement for TPF Assembler Debugger.
CILX	CILX	New	C Language	Created for Loaders Enhancement for TPF Assembler Debugger.
CLDJ	CEL2	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CLDZ	CELA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CLEM	CLEM	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CLEW	CLEW	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
COL2	COL1	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
COLM	COLM	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
COLO	COLO	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
COLP	COLH	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
COLV	COLV	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CRLB	CRLB	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CRLD	CELA	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CRLX	COLM	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CRLZ	COLO	Changed	C Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CUD2	CUD2	Changed	C++ Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CUD4	CUD2	Changed	C++ Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CUD5	CUD2	Changed	C++ Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CUDA	CUDA	Changed	C++ Language	Updated for Loaders Enhancement for TPF Assembler Debugger.
CUDAPV	CUDA	Changed	C++ Language	Updated for Loaders Enhancement for TPF Assembler Debugger.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 912 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 912. Changes to Copy Members for Loaders Enhancement for TPF Assembler Debugger

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEG	Control Program	CCENBK	Not Applicable	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger.

Fixed File Records

Table 913 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 913. Changes to Fixed File Records for Loaders Enhancement for TPF Assembler Debugger

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#APRGn	New	Added for Loaders Enhancement for TPF Assembler Debugger.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 914 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 914. Changes to Data Macros for Loaders Enhancement for TPF Assembler Debugger

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
IDSMXP	Changed	No
IDSPAT	Changed	No
IDSPRG	Changed	No
IDSPVR	Changed	No
TPLDR	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 915 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 915. Changes to Selected Equate Macros for Loaders Enhancement for TPF Assembler Debugger

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 916 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 916. Changes to SIP Skeleton and Internal Macros for Loaders Enhancement for TPF Assembler Debugger

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 917 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 917. Changes to SIP Stage II Macros for Loaders Enhancement for TPF Assembler Debugger

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 918 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 918. Changes to System Macros for Loaders Enhancement for TPF Assembler Debugger

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMDC	Changed	Yes

System Macros (IBM Use Only): There are no changes.

Segments

Table 919 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 919. Changes to Segments for Loaders Enhancement for TPF Assembler Debugger

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
ACPL	Real-Time Assembler	N/A	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
ALDR	Offline Assembler	TPFLDR	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
CVA6	BAL	N/A	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
CVAW	BAL	N/A	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
COLR	Offline Assembler	TPFLDR	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
FTVA03	Offline C Language	FCTBG	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
OLDR	Offline C Language	TPFLDR	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
TLDR	Offline Assembler	TPFLDR	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger
TLDRMN	Offline C Language	TPFLDR	Changed	Updated for Loaders Enhancement for TPF Assembler Debugger

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 920. Changes to ECB User Exits for Loaders Enhancement for TPF Assembler Debugger

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Extra Program Record Report	ACPL, CRLX, CIL1	UELI	Changed	Updated to add new parameters to the user exit interface for #APRGn record information.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 921 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 921. Changes to Commands for Loaders Enhancement for TPF Assembler Debugger

Command	New, Changed, or No Longer Supported?	Description of Change
ZIMAG COPY	Changed	Updated to copy #APRGn records, if allocated, when the PROG parameter is specified.
ZDPAT	Changed	Updated to display ADATA file address information.

Messages and System Errors

Table 922 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 922. Changes to Messages and System Errors for Loaders Enhancement for TPF Assembler Debugger

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000000000	Offline	New
000000000	Offline	New
000000000	Offline	New
094320	System Error	New
ALDR0401T	Offline	New
CILC0119W	Online	New
CILE0115W	Online	New
CILG0111E	Online	New
CILG0112E	Online	New
CILO0113E	Online	New
CILO0114W	Online	New
CILO0117W	Online	New
CILO0118W	Online	New
CILO0120E	Online	New
CILX0116W	Online	New
CILX0117W	Online	New
CIL60121W	Online	New
IMAG0084E	Online	New

Table 922. Changes to Messages and System Errors for Loaders Enhancement for TPF Assembler Debugger (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OLDR0091T	Offline	New
OLDR0092W	Offline	New
OLDR0093W	Offline	New
OLDR0094W	Offline	New
OLDR0095W	Offline	New
OLDR3227W	Online	New
OLDR3228W	Online	New
OLDR3229W	Online	New
TLDR0402T	Offline	New
TPFL1001I	Offline	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

The size of the online program allocation table (PAT) entry has increased from 96 bytes to 112 bytes, which is an increase of 17 %. This affects the file copy and the core copy of the PAT, so the number of #CIMRn records used by the PAT will increase as well as the amount of core memory used to hold the PAT.

If you plan to make use of loaders enhancement for TPF Assembler Debugger for debugging, you may need to allocate additional fixed file records as follows:

- To load ADATA files with programs using the E-type loader (OLDR), increase the number of #OLDn records.
- To load or accept base versions of programs with ADATA files, you must allocate #APRGn records.

See *TPF System Generation* for information about how to determine how many additional #OLDn records or how many new #APRGn records to allocate.

If you do not allocate #APRGn records, you can still use OLDR to load programs with ADATA files. Furthermore, loadsets containing programs with ADATA files can be accepted even if #APRGn records are not allocated. As programs with ADATA files are accepted, ADATA files will simply be discarded.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

See the help information provided with the TPF Assembler Debugger for VisualAge Client for information about loading ADATA files. If you are not loading ADATA files, there are no changes to the load process.

Online System Load Changes

See the help information provided with the TPF Assembler Debugger for VisualAge Client for information about loading ADATA files. If you are not loading ADATA files, there are no changes to the online system load process.

Publication Changes

Table 923 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 923. Changes to TPF Publications for Loaders Enhancement for TPF Assembler Debugger

Publication Title	Softcopy File Name	Description of Change
<i>TPF System Installation Support Reference</i>	GTPINR0D	Updated with information about the ADATAIN card, the #APRGn record clear card, and the UELI user exit for Loaders Enhancement for TPF Assembler Debugger.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for Loaders Enhancement for TPF Assembler Debugger.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for Loaders Enhancement for TPF Assembler Debugger.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for Loaders Enhancement for TPF Assembler Debugger.
<i>TPF System Generation</i>	GTPSYG0C	Updated with information about the #APRGn fixed file records that were added for Loaders Enhancement for TPF Assembler Debugger.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

You must consider the following when using the loaders enhancement for TPF Assembler Debugger:

1. Install loaders enhancement for TPF Assembler Debugger (APAR PJ27422) to the TPF 4.1 system.
2. Determine whether you need to allocate additional fixed file records. ADATA files can be loaded by using either OLDR or the auxiliary loader (TLDR). ADATA files loaded by using TLDR reside in new fixed file record type #APRGn. ADATA files loaded using OLDR reside in #OLDn fixed file records. When a loadset containing a program with an ADATA file is accepted, the ADATA file is written to #APRGn records if they are allocated. If #APRGn records are not allocated, the ADATA file is discarded but the loadset is accepted anyway. To determine if you need to allocate additional fixed file records, do one of the following:

- If you want to load ADATA files with base versions of programs, it will then be necessary to allocate #APRGn fixed file records. It may also be necessary to allocate additional #OLDn fixed file records. See *TPF System Generation* for guidelines on how many fixed file records to allocate for ADATA files.
 - If you want to load ADATA files with OLDR, it may be necessary to allocate additional #OLDn fixed file records. See *TPF System Generation* for guidelines on how many fixed file records to allocate for ADATA files.
 - If you do not want to load ADATA files by using TPFLDR, additional fixed file records are not needed.
3. Reassemble and recompile all required programs. This includes:
- All programs changed by loaders enhancement for TPF Assembler Debugger.
 - All programs listed in the following table:

Name of Program to Reassemble or Recompile	Name of Load Module to Relink
CCCTIN40	CPSO
CCVAGE40	CPSO
CDPLT	CDPL
CELL	CELA
CELP	CELP
CIL2	CILA
CIL3	CILA
CIL4	CILA
CIL5	CILA
CLIB	N/A
CLDG	CELA
CLDH	CELA
CLDL	CEL2
CLDM	CEL2
CLDO	CLDO
CLDW	CELA
CLDY	CELA
CLE2	CELA
CLEL	CEL2
CLEJ	CLEJ
CLEV	CEL2
CLEX	COLH
CLEY	CEL2
COL3	COL3
COL4	COL4
COL5	COL5
COLC	COLC
COLK	COLH
COLN	COLH
COLQ	COLQ
COLW	COLW
CRLF	CELA

Name of Program to Reassemble or Recompile	Name of Load Module to Relink
CRLK	CELA
CRLM	CELA
CRLS	CLEL
CRLV	COLH
CRLX	COLM
CUDC	CUDA
CUDXDB	CDBSBS, CDBPBS, CRL1BS, COLHBS, CLDFBS
CVA8	Not Applicable
CYB2	CYB2
JCD4	Not Applicable
LEDT	TPFLDR
NLDT	TPFLDR
QMPA	Not Applicable

- All applications containing code that references the size of a program allocation table (PAT) entry. It can be extremely difficult to identify all code that references the size of a PAT entry, so it is recommended that the following applications be reassembled or recompiled:
 - All assembler code that includes the IDSPAT or IDSXTP.
 - All C language code that includes the c\$idspat.h header file or the c\$idsxtp.h header file.

Note: This applies only to customer application code. TPF system code that references the size of the PAT entry are listed in the preceding table.

4. Create a new system allocator (SALO) by using the modified version of IBMPAL.
5. Recompile and run SALO to create an updated online allocator (IPAT) and offline allocator.
6. Relink all load modules that include programs that were reassembled or recompiled previously. For TPF code, the load modules to be relinked are listed in the preceding table.
7. Relink the control program.
8. Relink TPFLDR.
9. Define a load deck for TLDR that includes the following:
 - All programs that were rebuilt in the previous steps
 - The control program
 - The updated IPAT
 - The face table (FCTB), if additional fixed file records are required.

Note: Do not attempt to load ADATA files at this time.

10. Run TLDR.
11. Perform a load to a target image.
12. Enable the target image.
13. IPL the TPF 4.1 system and choose the target image as the active image.
14. Repeat step 10 through step 13 to load changed programs to other images.
15. If you plan to load ADATA files by using TLDR or if you plan to accept programs with ADATA files into the program base using OLDR, you then need to do the following:

- a. Define a load deck for TLDR that includes the LOADER APRG CLEAR card and any other component or real-time program. See *TPF System Installation Support Reference* for additional information about the LOADER APRG CLEAR card.
 - b. Run TLDR from an image that has a new FCTB that allocates #APRGn records.
 - c. Perform a load to each image where you will want to load ADATA files.
16. Repeat this procedure for all subsystems in a multiple database function (MDBF) environment.

Logical Record Cache and Coupling Facility (CF) Cache Support (APAR PJ27083)

The following section discusses the migration considerations for logical record cache and coupling facility (CF) cache support.

Prerequisite APARs

See the APEDIT for APAR PJ27083 for information about prerequisite APARs.

Functional Overview

Logical record cache and CF cache support further exploits CF support and CF record lock support, which were provided on program update tape (PUT) 9 and 11 respectively. See “File System Support (APAR PJ25089)” on page 370, “Coupling Facility (CF) Support (APAR PJ25781)” on page 450, and “Coupling Facility (CF) Record Lock Support (APAR PJ26707)” on page 646 for more information about CF support and CF record lock support.

Logical Record Cache Support

A *logical record cache* provides you with high-speed access to data that enables you to develop data sharing programs with improved performance. With logical record cache support, you can use the logical record cache for the following:

- For data consistency, which ensures the validity of the data that is shared
- To keep track of data that resides in the local cache and in permanent storage.

With logical record cache support you can create processor shared caches and processor unique caches. You can access and manage logical record caches by using the ZCACH command. See *TPF Operations* for more information about the ZCACH command.

The following C functions are now available for your use:

C Function	Description
<code>deleteCache</code>	Deletes a logical record cache from the processor.
<code>deleteCacheEntry</code>	Deletes a cache entry.
<code>flushCache</code>	Flushes the contents of the cache.
<code>newCache</code>	Creates a new logical record cache.
<code>readCacheEntry</code>	Reads a cache entry.
<code>updateCacheEntry</code>	Adds a new cache entry or updates an existing cache entry.

See the *TPF C/C++ Language Support User's Guide* for more information about these C functions.

Additionally, file system support has been updated to use processor shared caches in order to operate in a loosely coupled complex. See “File System Support (APAR PJ25089)” on page 370 for more information about file system support.

CF Cache Support

CF cache support supports processor shared caches. A *CF cache structure* is a named piece of storage on the CF that allows multisystem applications to share information and allows high-performance sharing of frequently referenced data. The

TPF 4.1 system supports directory-only CF cache structures. Data is not stored in a directory-only CF cache structure. You can manage CF cache structures by using the ZCFCH command.

In addition, the ZMCFT DISPLAY command has been enhanced to include an indicator about the type of CF structure (either a CF list structure or a CF cache structure) being displayed. See *TPF Operations* for more information about the ZCFCH and ZMCFT DISPLAY commands.

Architecture

To operate logical record caches in a loosely coupled complex, the CF cache architecture is used to maintain the consistency of data in the local caches.

Operating Environment Requirements and Planning Information

See the *S/390 Processor Resource/Systems Manager Planning Guide* for information about CF planning and operating environment requirements.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 924 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 924. Changes to Build Scripts for Logical Record Cache and CF Cache Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CACHBS	DLM	New	Created by logical record cache and CF cache support for the ZCACH command.
CBOTBS	DLM	Changed	Updated by logical record cache and CF cache support to remove the cache module.
CFCHBS	DLM	New	Created by logical record cache and CF cache support for the ZCFCH command.
CFINBS	DLM	Changed	Updated by logical record cache and CF cache support to remove the cache module.
CFZFBS	DLM	Changed	Updated by logical record cache and CF cache support to remove the cache module.
CFZIBS	DLM	Changed	Updated by logical record cache and CF cache support to remove the cache module.
COMXBS	DLM	Changed	Updated by logical record cache and CF cache support to add the CF cache module.
JCI1BS	DLM	Changed	Updated by logical record cache and CF cache support to remove the CF cache module.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 925 on page 896 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 925. Changes to General Use C/C++ Language Header Files for Logical Record Cache and CF Cache Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cach.h	Changed	Yes
c\$cfaa.h	Changed	Yes
c\$cfc.b.h	Changed	No
c\$cfc.o.h	Changed	Yes
c\$cfeq.h	Changed	No
c\$cfsb.h	Changed	No
c\$cfvb.h	Changed	No
c\$cf2e.h	Changed	No
c\$fp.i.h	Changed	No
c\$syseq.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 926 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 926. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Logical Record Cache and CF Cache Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$cach.h	New	No
i\$cfch.h	New	No

Library Interface Scripts: Table 927 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 927. Changes to Library Interface Scripts for Logical Record Cache and CF Cache Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
COMXXV	Changed	Updated by logical record cache and CF cache support to add cache functions.

Library Members (Object Files): Table 928 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 928. Changes to Library Members (Object Files) for Logical Record Cache and CF Cache Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CACHE	COMXBS	Changed	Assembler	Updated for logical record cache and CF cache support.
CFCA	COMXBS	New	C Language	Added for logical record cache and CF cache support.

Table 928. Changes to Library Members (Object Files) for Logical Record Cache and CF Cache Support (continued)

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFS028	COMXBS	Changed	C Language	Updated by logical record cache and CF cache support to add the cache parameter list.
CFS108	COMXBS	Changed	C Language	Updated by logical record cache and CF cache support to add the cache parameter list.
CFS130	COMXBS	Changed	C Language	Updated by logical record cache and CF cache support to add the cache parameter list.
CFS131	COMXBS	Changed	C Language	Updated by logical record cache and CF cache support to add the cache parameter list.
CFS157	COMXBS	Changed	C Language	Updated by logical record cache and CF cache support to add the cache parameter list.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 929 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 929. Changes to Members (Object Files) for Logical Record Cache and CF Cache Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CACH	CACH	New	C Language	Added support for the ZCACH command.
CFCH	CFCH	New	C Language	Added support for the ZCFCH command.
CFCNC	CFLZ	Changed	C Language	Updated by logical record cache and CF cache support to add support for CF cache structures.
CFDSC	CFLY	Changed	C Language	Updated by logical record cache and CF cache support for changed header field names.
CFLDEL	CFLK	Changed	C Language	Updated by logical record cache and CF cache support to add support for CF cache structures.
CFLIPD	CFLG	Changed	C Language	Updated by logical record cache and CF cache support to add support for CF cache structures.
CFL	CFLG, CFLK	Changed	C Language	Updated by logical record cache and CF cache support to add support for CF cache structures.
CFMCLE	CFLN	Changed	C Language	Updated by logical record cache and CF cache support to add support for CF cache structures.
CFMDIS	CFLN	Changed	C Language	Updated by logical record cache and CF cache support to add support for CF cache structures in the display information.

Table 929. Changes to Members (Object Files) for Logical Record Cache and CF Cache Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CFMENA	CFLN	Changed	C Language	Updated by logical record cache and CF cache support for changed header field names.
CFRST2	CFLS	Changed	C Language	Updated by logical record cache and CF cache support to add support for CF cache structures.
CFSBFD	CFLZ	Changed	C Language	Updated by logical record cache and CF cache support to preserve the storage protection key.
CFSBFL	CFLY, CFLZ	Changed	C Language	Updated by logical record cache and CF cache support for changed header field names.
CFSTBE	CFLP	Changed	C Language	Updated by logical record cache and CF cache support for an additional header field.
JCI1	JCII	Changed	C Language	Updated by logical record cache and CF cache support to add caching.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 930 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 930. Changes to Copy Members for Logical Record Cache and CF Cache Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CDC1	Control Program	CCDCOL	Not Applicable	Changed	Updated by logical record cache and CF cache support to support CF cache structures.
CFCC	Control Program	CCCFCC	Not Applicable	Changed	Updated by logical record cache and CF cache support to support CF cache structures.
CFCM	Control Program	CCCFCC	Not Applicable	Changed	Updated by logical record cache and CF cache support to support CF cache structures.
CFCR	Control Program	CCCFCC	Not Applicable	Changed	Updated by logical record cache and CF cache support to support CF cache structures.
CFCS	Control Program	CCCFCC	Not Applicable	Changed	Updated by logical record cache and CF cache support for changed data macro field names.
CFL2	Control Program	CCCFLC	Not Applicable	Changed	Updated by logical record cache and CF cache support to add an external entry.

Fixed File Records

Table 931 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 931. Changes to Fixed File Records for Logical Record Cache and CF Cache Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMM4	Changed	Updated by logical record cache and CF cache support to assign cache control record ordinal 166.
#IBMMP4	Changed	Updated by logical record cache and CF cache support to assign cache control record ordinal 19.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 932 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 932. Changes to Data Macros for Logical Record Cache and CF Cache Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
DC0DC	Changed	Yes
ICACH	Changed	Yes
ICFAA	Changed	Yes
ICFCB	Changed	No
ICFCO	Changed	Yes
ICFEQ	Changed	No
ICFMB	Changed	No
ICFSB	Changed	No
ICFVB	Changed	No
IFAPI	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 933 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 933. Changes to Selected Equate Macros for Logical Record Cache and CF Cache Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 934 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 934. Changes to SIP Skeleton and Internal Macros for Logical Record Cache and CF Cache Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 935 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 935. Changes to SIP Stage II Macros for Logical Record Cache and CF Cache Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 936 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 936. Changes to System Macros for Logical Record Cache and CF Cache Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFCONC	Changed	No
CFDISC	Changed	No

System Macros (IBM Use Only): Table 937 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 937. Changes to System Macros (IBM Use Only) for Logical Record Cache and CF Cache Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFRQC	Changed	No

Segments

Table 938 on page 901 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 938. Changes to Segments for Logical Record Cache and CF Cache Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CFZF	Real-Time Assembler	Not Applicable	Changed	Updated by logical record cache and CF cache support.
CLM6	Real-Time Assembler	Not Applicable	Changed	Updated by logical record cache and CF cache support for changed data macro field names.
CNAH	Real-Time Assembler	Not Applicable	Changed	Updated by logical record cache and CF cache support to detach CF connections.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated by logical record cache and CF cache support to add the ZCACH and ZCFCH commands.
JCD1	Real-Time Assembler	Not Applicable	Changed	Updated by logical record cache and CF cache support for caching.
JCS0	Real-Time Assembler	Not Applicable	Changed	Updated by logical record cache and CF cache support for caching.
JRA1	Offline PL/I	DATAREAD	Changed	Updated by logical record cache and CF cache support to update the data reduction reports.
JRA2	Offline PL/I	DATAREAD	Changed	Updated by logical record cache and CF cache support to update the data reduction reports.
JRS3	Offline PL/I	DATAREAD	Changed	Updated by logical record cache and CF cache support to update the data reduction reports.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 939 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 939. Changes to SYSEQ Tags for Logical Record Cache and CF Cache Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#CFCACHE	166	New
#TPFCACHE	19	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 940 on page 902 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 940. Changes to Commands for Logical Record Cache and CF Cache Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZCACH	New	Created by logical record cache and CF cache support to manage logical record caches.
ZCFCH	New	Created by logical record cache and CF cache support to manage CF cache structures.
ZMCFT DISPLAY	Changed	Updated by logical record cache and CF cache support to include an indicator about the type of CF structure (a CF list structure or a CF cache structure) being displayed.

Messages and System Errors

Table 941 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 941. Changes to Messages and System Errors for Logical Record Cache and CF Cache Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
00460B	System Error	Changed
004628	System Error	Changed
007547	System Error	No Longer Supported
007549	System Error	No Longer Supported
00754A	System Error	New
CACH0001I	Online	New
CACH0002I	Online	New
CACH0003E	Online	New
CACH0004I	Online	New
CACH0005I	Online	New
CACH0006I	Online	New
CACH0008E	Online	New
CACH0009E	Online	New
CACH0010E	Online	New
CACH0011E	Online	New
CACH0013E	Online	New
CACH0016I	Online	New
CACH0017I	Online	New
CACH0018E	Online	New

Table 941. Changes to Messages and System Errors for Logical Record Cache and CF Cache Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CACH0019I	Online	New
CACH0020I	Online	New
CACH0022I	Online	New
CACH0023I	Online	New
CACH0024E	Online	New
CACH0025E	Online	New
CACH0026I	Online	New
CACH0027E	Online	New
CACH0032W	Online	New
CACH0034W	Online	New
CFCA0002E	Online	New
CFCA0003E	Online	New
CFCA0004E	Online	New
CFCA0006E	Online	New
CFCH0001I	Online	New
CFCH0002I	Online	New
CFCH0003E	Online	New
CFCH0005I	Online	New
CFCH0008E	Online	New
CFCH0009E	Online	New
CFCH0010E	Online	New
CFCH0011E	Online	New
CFCH0016I	Online	New
CFCH0017I	Online	New
CFCH0018E	Online	New
CFLK0046E	Online	New
MCFT0046I	Online	No Longer Supported
MCFT0047I	Online	New
RHLD0027I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 942 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 942. Changes to TPF Publications for Logical Record Cache and CF Cache Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0D	Updated with information about the new C functions for logical record cache and CF cache support.
<i>TPF Concepts and Structures</i>	GTPCON0A	Updated with information about logical record cache and CF cache support.
<i>TPF Database Reference</i>	GTPDBR0B	Updated with information about logical record cache and CF cache support.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for logical record cache and CF cache support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for logical record cache and CF cache support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for logical record cache and CF cache support.
<i>TPF Programming Standards</i>	GTPPSM09	Updated with information about naming conventions for logical record cache and CF cache support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPPR0C	Updated with changes for data collection and reduction reports for logical record cache and CF cache support.
<i>TPF System Generation</i>	GTPSYG0D	Updated to include system generation information for logical record cache and CF cache support.
<i>TPF System Macros</i>	GTPSYS0D	Updated the CFCONC and CFDISC macros logical record cache and CF cache support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Logical record cache support provides several new C functions:

- deleteCache
- deleteCacheEntry
- flushCache
- newCache
- readCacheEntry
- updateCacheEntry.

See the *TPF C/C++ Language Support User's Guide* for more information about these C functions and updates to the `tpf_cfconc` C function.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install logical record cache and CF cache support on your TPF 4.1 system.

1. Install program update tape (PUT) 13, which contains APAR PJ27083, on your TPF 4.1 system.
2. Install the following:
 - C/C++ language header files listed in Table 925 on page 896 and Table 926 on page 896
 - Copy members listed in Table 930 on page 898
 - Macros found in Macros on page 899.
3. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
4. Update the record ID attribute table (RIAT) as appropriate. See *TPF System Generation* for more information about the RIAT.
5. Do one of the following:
 - If cache control record ordinal 166 is not defined in the #IBMM4 fixed file record and cache control record ordinal 19 is not defined in the #IBMMP4 fixed file record, continue with step 6.
 - If the ordinals are defined already, continue with step 8.
6. Update the SIP RAMFIL macro input statements to the FACE table generator (FCTBG) by specifying the #IBMM4 fixed file record type with 166 ordinals defined and the #IBMMP4 fixed file record type with 19 ordinals defined. See *TPF System Generation* for more information about the RAMFIL macro.
7. Run the FCTBG to create a new FACE table.
8. Run stubs and module build from VisualAge TPF for Windows NT for all library interface scripts listed in Table 927 on page 896.
9. Reassemble or recompile the following:
 - Library members listed in Table 928 on page 896
 - DLM members listed in Table 929 on page 897
 - CSECTs listed in Table 930 on page 898
 - Segments listed in Table 938 on page 901.
10. Reassemble or recompile the following segments. These segments were not modified by logical record cache and CF cache support, but must be reassembled or recompiled because there were logical record cache and CF cache support modifications made to macros, data macros (DSECTs), or header files used by these segments.

CBOT	CCENBK
CDCR	CFIN
CFLA	CFLIPA
CFLO	CFS111

CFS152	CFZI
JCD0	JCD2
JCD3	JCD4
JCD6	JCD0
JCM0	JCP0

11. Link-edit the build scripts (DLMs) listed in Table 924 on page 895.
12. Link-edit the following build scripts (DLMs):
 - CDCP
 - CFLA.
13. Link-edit the control program (CP).
14. Define a load deck for the auxiliary loader (TLDR) that includes the following:
 - Updated programs
 - Updated CP
 - Updated IPAT
 - Updated RIAT
 - Updated FACE table, if necessary.
15. Run TLDR.
16. IPL the TPF 4.1 system.
17. Re-IPL all processors in the processor configuration. Logical record cache and CF cache support is now installed on your TPF 4.1 system.

Fallback and Coexistence

If you have defined processor shared caches on a TPF 4.1 system with logical record cache and CF cache support installed, you must delete these caches or change them to be processor unique caches before falling back to a TPF 4.1 system that does not have logical record cache and CF cache support installed. Otherwise, errors like the 005006 system error may occur.

Note: With logical record cache and CF cache support the TPF 4.1 system performs an interprocessor communication (IPC) to all active processors in the complex so that the cache is created or changed at that point in time on all active processors. Previously, the cache was created or changed only on the processor from which the create or change was initiated.

If your complex has a mix of processors running with or without logical record cache and CF cache support installed and you have processor shared caches defined, errors like the 005006 system error may occur on the processors running TPF 4.1 systems without logical record cache and CF cache support installed. Define processor shared caches only when all processors in the complex are running a TPF 4.1 system with logical record cache and CF cache support installed.

OSA-Express Support (APAR PJ27333)

The following section discusses the migration considerations for Open Systems Adapter (OSA)-Express support.

Prerequisite APARs

See the APEDIT for APAR PJ27333 for information about prerequisite APARs.

Functional Overview

An Open Systems Adapter (OSA) is integrated hardware (the OSA-Express card) that combines the functions of an IBM System/390 (S/390) input/output (I/O) channel with the functions of a network port to provide direct connectivity between IBM S/390 applications and remote Transmission Control Protocol/Internet Protocol (TCP/IP) applications on the attached networks. OSA-Express is the third generation of OSA and provides the following enhancements:

- You can dynamically configure an OSA-Express card by using the ZOSAE command to manage OSA-Express connections.
- The queued direct I/O (QDIO) protocol is used to communicate between the TPF 4.1 system and an OSA-Express card by sharing memory and eliminating the need for real I/O operations (channel programs) for data transfer between them. The load on your I/O processor is reduced, path lengths in the TPF 4.1 system are reduced, and throughput is increased.
- OSA-Express support enables the TPF 4.1 system to connect to high bandwidth TCP/IP networks such as Gigabit Ethernet (GbE or GENET).
- OSA-Express support provides virtual IP address (VIPA) support to eliminate single points of failure in a TCP/IP network.
- Movable virtual IP address (VIPA) support provides the ability to balance TCP/IP workloads across processors in the same loosely coupled complex by using the ZVIPA command.

In the TPF 4.1 system, there is one unique, real Internet Protocol (IP) address for each OSA-Express connection. In addition there can be VIPAs associated with the TPF 4.1 system across an OSA-Express connection. A real IP address is tied to a fixed connection and to a specific physical network; however, a VIPA can be moved from one connection to another and from one physical network to another. If an OSA-Express card fails or the switch or router connected to the card fails, any TPF VIPAs assigned to that card automatically swing to the alternate OSA-Express connection if one is defined and is active. This enables sockets to remain active and eliminates single points of failure in network-attached hardware.

There are two types of VIPAs: static and movable. A given *static* VIPA always resides on one specific TPF processor in the loosely coupled complex and can swing from one OSA-Express connection to another, but always on the same TPF processor. Static VIPAs are used to access processor unique TPF applications.

A *movable* VIPA is also active on one TPF processor at a time, but the VIPA can be moved from one processor to another in the complex. Movable VIPAs are used to access processor shared applications and allow you to load balance TCP/IP traffic in the complex. If you move a VIPA from one processor to another, all existing sockets using that VIPA will fail; when the remote clients reconnect to that VIPA, new sockets will be established on the new processor where that VIPA is now active. By moving a VIPA, you move all traffic for the remote users connected to

that VIPA from one processor to another. The moving of a VIPA can occur automatically when a TPF processor fails, or can be done manually by using the ZVIPA command.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about OSA-Express support. See *TPF Operations* for more information about the ZOSAE and ZVIPA commands.

Architecture

The QDIO link layer is the code in the TPF 4.1 system that enables the TPF 4.1 system to communicate with the OSA-Express card. The OSA-Express card enables the TPF 4.1 system to connect to high bandwidth TCP/IP networks, specifically GENET networks. Each OSA-Express card has a single port that connects to one GENET network.

OSA-Express cards are supported by IBM S/390 G5 servers or higher. Each IBM G5 server can have a maximum of 12 OSA-Express cards. A host can connect to multiple OSA-Express cards, and each OSA-Express card supports 240 symbolic device addresses (SDAs).

The Internet Protocol (IP) addresses of the host are registered with the OSA-Express card when they are connected. Each OSA-Express card supports a maximum of 512 IP addresses for all the hosts sharing a card. The TPF 4.1 system has one unique real IP address for each OSA-Express connection, and the IP address must be in the subnet of the GENET network in which the OSA-Express card is connected.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about OSA-Express support.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with OSA-Express support, you must establish the required operating environment. The following section describes hardware and software requirements specific to OSA-Express support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Processors: The following section discusses processors.

An IBM System/390 G5 processor or higher is required.

Communication Devices: The following section discusses communication devices.

The OSA-Express card is supported. Previous generations of OSA are not supported.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating System for TCP/IP: The following are required for OSA-Express support with TCP/IP:

- To run the TPF 4.1 system under VM with the OSA-Express card, you need IBM VM/ESA 2.4 or above.
- You need OSA-Express microcode level 4.08 or later.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 943 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 943. Changes to Build Scripts for OSA-Express Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CRIABS	DLM	New	Routing Information Protocol (RIP) server support.
CRIPBS	DLM	New	Routing Information Protocol (RIP) server support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 944 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 944. Changes to General Use C/C++ Language Header Files for OSA-Express Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$ck2sn.h	Changed	No
c\$syseq.h	Changed	No
i\$pwbl.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: Table 945 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 945. Changes to Link-Edited Modules for OSA-Express Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CPS0	Changed	Added the CCOSAE CSECT.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: Table 954 on page 912 summarizes changes to stubs that are object code only (OCO) only. This information is presented in alphabetic order by the name of the OCO stub.

Table 946. Changes to OCO Stubs for OSA-Express Support

Object Code Only (OCO) Stub	New, Changed, or No Longer Supported?
CRIB	New

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 947 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 947. Changes to Copy Members for OSA-Express Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CEDT	Control Program	CCCPSSE	Not Applicable	Changed	Updated to disable program controlled interruptions (PCIs) during dump processing.
CLHL	Control Program	CCCLHR	Not Applicable	Changed	Updated to run OSA-Express polling.
CPSF	Control Program	CCCPSF	Not Applicable	Changed	Updated processing to break active OSA-Express links.
CTI2	Control Program	CCTCP2	Not Applicable	Changed	Updated for OSA-Express support.
CTI4	Control Program	CCTCP2	Not Applicable	Changed	Updated RAW opzero to process ICMP redirects and PING responses from OSA-Express gateways.
CTME	Control Program	CCNUCL	Not Applicable	Changed	Updated for OSA-Express polling.
CTSM	Control Program	CCTCP3	Not Applicable	Changed	Updated the return socket block routine for OSA-Express Internet Protocol (IP) addresses.
CTSS	Control Program	CCTCP3	Not Applicable	Changed	Updated Internet Protocol (IP) scan to process OSA-Express gateways.
CTTO	Control Program	CCTCP1	Not Applicable	Changed	Updated output message processing for OSA-Express support.

Table 947. Changes to Copy Members for OSA-Express Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CTT6	Control Program	CCTCP1	Not Applicable	Changed	Updated Internet Protocol (IP) trace for OSA-Express support.
CT15	Control Program	CCCTIN	Not Applicable	Changed	Updated to carve OSA-Express tables.

Fixed File Records

Table 948 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 948. Changes to Fixed File Records for OSA-Express Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMMP4	Changed	Updated with ordinal numbers 13 – 17 for the OSA configuration record.
#OSIT	New	New processor shared fixed file record for the OSA shared IP address table.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 949 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the SNA communication macro or statement.

Table 949. Changes to Communication Macros and Statements for OSA-Express Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
SNAKEY	Changed	Yes

Data Macros: Table 950 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 950. Changes to Data Macros for OSA-Express Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
CFMDC	Changed	No
CK2SN	Changed	No
IOSAB	New	Not Applicable
IOSCR	New	Not Applicable
IOSIT	New	Not Applicable
IPMTE	Changed	No
IPWBL	Changed	No
ISOCK	Changed	See "Migration Scenarios" on page 921.
ISTAK	Changed	No

General Macros: There are no changes.

Selected Equate Macros: Table 951 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 951. Changes to Selected Equate Macros for OSA-Express Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZ1SE	Changed	No
SYSEQ	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 952 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 952. Changes to SIP Skeleton and Internal Macros for OSA-Express Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: Table 953 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck

See “System Initialization Program (SIP) and System Generation Changes” on page 920 for a description of other system generation changes you must make.

Table 953. Changes to SIP Stage I Macros and Statements for OSA-Express Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed

System Initialization Program (SIP) Stage II Macros: Table 954 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 954. Changes to SIP Stage II Macros for OSA-Express Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 955 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 955. Changes to System Macros (IBM Use Only) for OSA-Express Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
DLTEC	Changed	Yes
IPSDC	Changed	No

Segments

Table 956 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 956. Changes to Segments for OSA-Express Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCOSAE	Object Code Only	CPS0	New	Created for OSA-Express activation and data flow.
CMVO	Real-Time Assembler	Not Applicable	New	Created for OSIT find or file subroutine processing.
CMVP	Real-Time Assembler	Not Applicable	New	Created for VIPA timer-initiated processing.
CMVQ	Real-Time Assembler	Not Applicable	New	Created for VIPA receive request processing.
CMVR	Real-Time Assembler	Not Applicable	New	Created for movable VIPA restart processing.
CMVS	Real-Time Assembler	Not Applicable	New	Created for VIPA send request processing.
CMVT	Real-Time Assembler	Not Applicable	New	Created for processor deactivation processing.
CMVV	Real-Time Assembler	Not Applicable	New	Created for start move VIPA processing.
CMVW	Real-Time Assembler	Not Applicable	New	Created to release the VIPAs on a given processor.
CMVX	Real-Time Assembler	Not Applicable	New	Created to process a released VIPA.
CMV1	Real-Time Assembler	Not Applicable	New	Created for ZVIPA error processing and to process the ZVIPA command with the MOVE parameter.
CMV2	Real-Time Assembler	Not Applicable	New	Created to process the ZVIPA command with the DISPLAY parameter.
CMV3	Real-Time Assembler	Not Applicable	New	Created to process the ZVIPA command with the SUMMARY parameter.
COED	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the DISPLAY parameter.
COEF	Real-Time Assembler	Not Applicable	New	Created to file the OSA configuration record.
COEM	Real-Time Assembler	Not Applicable	New	Created for error message processing.
COER	Real-Time Assembler	Not Applicable	New	Created for processing OSA restart.
COES	Object Code Only	Not Applicable	New	Created to build QDIO structures.

Table 956. Changes to Segments for OSA-Express Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
COE1	Real-Time Assembler	Not Applicable	New	Created for the ZOSAE command parser.
COE2	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the DEFINE, MODIFY, or DELETE parameter.
COE3	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the ADD and VIPA parameters.
COE4	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the REMOVE and VIPA parameters.
COE5	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the SWING parameter.
COE6	Real-Time Assembler	Not Applicable	New	Created to process the ZTTCP command with the ACT or INACT parameter specified for OSA-Express connections.
COE7	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the DEFINE or MODIFY parameter.
COE8	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the DEFINE or MODIFY parameter.
COE9	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the DEFINE or MODIFY parameter.
COE9	Real-Time Assembler	Not Applicable	New	Created to process the ZOSAE command with the DEFINE or MODIFY parameter.
CPLKMP	CSECT	Not Applicable	Changed	Updated to add the new CSECT CCOSAE to the CP link map.
CRIA	C Language	Not Applicable	New	Created for the Routing Information Protocol (RIP) server.
CRIB	Real-Time Assembler	Not Applicable	New	Created for the Routing Information Protocol (RIP) server.
CRIC	Real-Time Assembler	Not Applicable	New	Created for the Routing Information Protocol (RIP) client.
CRIP	C Language	Not Applicable	New	Created for the Routing Information Protocol (RIP) server.
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated with the new ZNKEY command parameter.
CTFA	Real-Time Assembler	Not Applicable	Changed	Updated to display the next hop and round-trip time fields to the ZSOCK command display.
CTFE	Real-Time Assembler	Not Applicable	Changed	Updated to display the next hop and round-trip time fields to the ZSOCK command display.
CTF1	Real-Time Assembler	Not Applicable	Changed	Updated the parser with new parameters to the ZTTCP command.
CTF2	Real-Time Assembler	Not Applicable	Changed	Updated the ZTTCP DEFINE command to search for duplicate IP addresses.
CTF3	Real-Time Assembler	Not Applicable	Changed	Updated the ZTTCP TRACE command for OSA-Express support.
CTF4	Real-Time Assembler	Not Applicable	Changed	Updated the ZTTCP ACTIVATE and ZTTCP INACTIVATE commands to handle OSA-Express connections.
CTF5	Real-Time Assembler	Not Applicable	Changed	Updated the ZTTCP DISPLAY command for OSA-Express support.
CTF7	Real-Time Assembler	Not Applicable	New	Updated the ZTTCP DISPLAY command for OSA-Express support.

Table 956. Changes to Segments for OSA-Express Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated the cycle-up scheduler to start the Routing Information Protocol (RIP) server, RIP client, and movable VIPA timer-initiated processing.
CTSI	Real-Time Assembler	Not Applicable	Changed	Updated the <code>ioctl</code> function to include OSA IP addresses on some calls.
CTSJ	Real-Time Assembler	Not Applicable	Changed	Updated the <code>gethostid</code> function to search the OSA IP addresses.
CTSR	Real-Time Assembler	Not Applicable	Changed	Added hooks in TCP/IP native stack support restart to call OSA restart.
CTSW	Real-Time Assembler	Not Applicable	Changed	Updated the socket sweeper to process OSA-Express connections and IP addresses.
CTSZ	Real-Time Assembler	Not Applicable	Changed	IP routing table entries.
CTS0	Real-Time Assembler	Not Applicable	Changed	Updated the socket function for OSA-Express support.
CTS1	Real-Time Assembler	Not Applicable	Changed	Updated the <code>bind</code> function to support binding to an OSA IP address.
CTS2	Real-Time Assembler	Not Applicable	Changed	Updated the <code>connect</code> function for OSA-Express support.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated to add the ZOSAE and ZVIPA commands.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 957 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 957. Changes to SYSEQ Tags for OSA-Express Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#OSADEF	X'0D'	New
#OSAIPF	X'0E'	New
#OSA IPL	X'11'	New

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 958. Changes to ECB User Exits for OSA-Express Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
VIPA processor deactivation	CMVR and CMVT	UVIP	New	Allows you to specify if you have to move a movable VIPA and to where you have to move it if a processor outage occurs.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 959 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 959. Changes to Commands for OSA-Express Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZNKEY	Changed	Added the MAXOSA parameter for OSA-Express support.
ZOSAE	New	Created to manage OSA-Express support.
ZSOCK	Changed	Updated to display OSA-Express values in the formatted socket display.
ZTTCP ACTIVATE	Changed	Updated to activate OSA-Express connections.
ZTTCP CHANGE	Changed	Updated to change the default IP address to an OSA-Express IP address.
ZTTCP DISPLAY	Changed	Updated to display OSA-Express connections.
ZTTCP INACTIVATE	Changed	Updated to deactivate OSA-Express connections.
ZTTCP TRACE	Changed	Updated to trace OSA-Express connections and OSA-Express IP addresses.
ZVIPA	New	Displays OSA-Express IP information, summarizes system and OSA-Express IP address statistics, and moves a movable VIPA from one processor to another processor in the same loosely coupled complex.

Messages and System Errors

Table 960 on page 917 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 960. Changes to Messages and System Errors for OSA-Express Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007850	System Error	New
007851	System Error	New
007852	System Error	New
007853	System Error	New
007854	System Error	New
007855	System Error	New
007856	System Error	New
007857	System Error	New
007858	System Error	New
007859	System Error	New
00785A	System Error	New
00785B	System Error	New
0078E0	System Error	New
0078E1	System Error	New
CMVR0001I	Online	New
CMVR0002I	Online	New
CMVR0003W	Online	New
OSAE0001I	Online	New
OSAE0002I	Online	New
OSAE0003I	Online	New
OSAE0004I	Online	New
OSAE0005I	Online	New
OSAE0006I	Online	New
OSAE0007I	Online	New
OSAE0012I	Online	New
OSAE0020E	Online	New
OSAE0021E	Online	New
OSAE0022E	Online	New
OSAE0024E	Online	New
OSAE0025E	Online	New
OSAE0026E	Online	New
OSAE0028E	Online	New
OSAE0029E	Online	New
OSAE0031E	Online	New
OSAE0032E	Online	New
OSAE0033E	Online	New
OSAE0034E	Online	New
OSAE0035E	Online	New
OSAE0036E	Online	New
OSAE0037E	Online	New
OSAE0038E	Online	New
OSAE0039E	Online	New
OSAE0040E	Online	New
OSAE0041E	Online	New

Table 960. Changes to Messages and System Errors for OSA-Express Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OSAE0042E	Online	New
OSAE0043E	Online	New
OSAE0044E	Online	New
OSAE0045E	Online	New
OSAE0046E	Online	New
OSAE0047E	Online	New
OSAE0048E	Online	New
OSAE0049E	Online	New
OSAE0050E	Online	New
OSAE0051E	Online	New
OSAE0052E	Online	New
OSAE0053E	Online	New
OSAE0054E	Online	New
OSAE0055E	Online	New
OSAE0056E	Online	New
OSAE0057E	Online	New
OSAE0058E	Online	New
OSAE0060E	Online	New
OSAE0061E	Online	New
OSAE0062E	Online	New
OSAE0063E	Online	New
OSAE0064E	Online	New
OSAE0065E	Online	New
OSAE0066E	Online	New
OSAE0067E	Online	New
OSAE0068E	Online	New
OSAE0069E	Online	New
OSAE0070E	Online	New
OSAE0071E	Online	New
OSAE0073E	Online	New
OSAE0074E	Online	New
OSAE0075E	Online	New
OSAE0076E	Online	New
OSAE0077E	Online	New
OSAE0100E	Online	New
OSAE0101E	Online	New
OSAE0102E	Online	New
OSAE0103E	Online	New
OSAE0104E	Online	New
OSA00001I	Online	New
OSA00002I	Online	New
OSA00024E	Online	New
OSA00025E	Online	New
OSA00026A	Online	New

Table 960. Changes to Messages and System Errors for OSA-Express Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
OSA00027I	Online	New
OSA00072E	Online	New
TTCP0023I	Online	New
TTCP0030I	Online	New
TTCP0032I	Online	New
TTCP0040I	Online	New
TTCP0042I	Online	New
TTCP0060I	Online	New
TTCP0061I	Online	New
TTCP0062I	Online	New
TTCP0065I	Online	New
TTCP0066I	Online	New
TTCP0151E	Online	New
TTCP0152E	Online	New
TTCP0153E	Online	New
TTCP0154E	Online	New
TTCP0155E	Online	New
TTCP0156E	Online	New
TTCP0157E	Online	New
TTCP0158E	Online	New
TTCP0162E	Online	New
TTCP0163E	Online	New
TTCP0185I	Online	New
TTCP0186I	Online	New
TTCP0187I	Online	New
TTCP0188I	Online	New
TTCP0301E	Online	New
TTCP0302E	Online	New
TTCP0303E	Online	New
TTCP0304E	Online	New
TTCP0305E	Online	New
TTCP0306E	Online	New
TTCP0307E	Online	New
TTCP0308E	Online	New
TTCP0309E	Online	New
TTCP0310E	Online	New
TTCP0312E	Online	New
TTCP0313E	Online	New
TTCP0314E	Online	New
TTCP0315E	Online	New
TTCP0316E	Online	New
VIPA0001I	Online	New
VIPA0002I	Online	New
VIPA0003I	Online	New

Table 960. Changes to Messages and System Errors for OSA-Express Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
VIPA0004I	Online	New
VIPA0005I	Online	New
VIPA0006I	Online	New
VIPA0050E	Online	New
VIPA0051E	Online	New
VIPA0052E	Online	New
VIPA0053E	Online	New
VIPA0054E	Online	New
VIPA0055E	Online	New
VIPA0057E	Online	New
VIPA0058E	Online	New
VIPA0059E	Online	New
VIPA0061E	Online	New
VIPA0062E	Online	New
VIPA0063E	Online	New
VIPA0064E	Online	New
VIPA0065E	Online	New
VIPA0066E	Online	New
VIPA0067E	Online	New

Performance or Tuning Changes

If you have a loosely coupled TPF 4.1 system and want to use movable VIPAs, you must determine the following:

- How many movable VIPAs you need for your loosely coupled complex to balance the network workload
- How to distribute the workload across those movable VIPAs to balance the workload evenly.

For more information about workload balancing with movable VIPAs, see *TPF Transmission Control Protocol/Internet Protocol*.

Storage Considerations and Changes

The MAXOSA parameter on the SNAKEY macro specifies the maximum number of OSA-Express connections that can be active on the TPF 4.1 system. The total amount of storage required is approximately:

1 MB × the value of the MAXOSA parameter

For more information about the SNAKEY macro, see *TPF ACF/SNA Network Generation*.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 961 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 961. Changes to TPF Publications for OSA-Express Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF0C	Updated with the MAXOSA parameter on the SNAKEY macro.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for OSA-Express support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for OSA-Express support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for OSA-Express support.
<i>TPF Program Development Support Reference</i>	GTPPDR0D	Updated with main storage dump labels that were added for OSA-Express support.
<i>TPF System Generation</i>	GTPSYG0D	Updated with #OSIT processor shared file records in the FACE table (FCTB) for movable VIPA support.
<i>TPF System Installation Support Reference</i>	GTPINR0D	Updated with the VIPA processor deactivation user exit (UVIP) for movable VIPA support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated to include information about OSA-Express support and TCP/IP workload balancing with movable VIPA support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install OSA-Express support on your existing TPF 4.1 system:

1. Install program update tape (PUT) 13.
2. Reassemble any segment that references the ISOK_ENTRY_LEN equate in the ISOCK data macro, including the following segments:

- CTFB
 - CTFD
 - CTS0
 - CTSK
 - CTSN.
3. Define the #OSIT processor shared file record to your TPF 4.1 system in the FACE table (FCTB).
 4. Define the MAXOSA parameter on the SNAKEY macro in keypoint 2 (CTK2).
 5. Reassemble and load updated CTK2 to your TPF 4.1 system.
 6. Code the virtual IP address (VIPA) processor deactivation user exit, UVIP, if you are using movable VIPAs and do not want to use the default logic provided by this user exit.
 7. IPL the TPF 4.1 system and cycle the system to NORM state.
 8. Define the OSA-Express connections to the TPF 4.1 system by entering the ZOSAE command with the DEFINE and MODIFY parameters specified.
 9. Define the VIPAs (if you are using them) to the TPF 4.1 system by entering the ZOSAE command with the ADD parameter specified.
 10. Activate OSA-Express connections by entering the ZTTCP ACTIVATE command.

Additional Information:

- See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.
- See *TPF Operations* for more information about the ZOSAE and ZTTCP commands.
- See *TPF System Generation* for more information about the FACE table and #OSIT file record.
- See *TPF System Installation Support Reference* for more information about the VIPA processor deactivation (UVIP) user exit.
- See *TPF Transmission Control Protocol/Internet Protocol* for more information about OSA-Express support.

TPF Data Event Control Block Support (APAR PJ27393)

The following section discusses the migration considerations for TPF data event control block (DECB) support.

Prerequisite APARs

See the APEDIT for APAR PJ27393 for information about prerequisite APARs.

Functional Overview

A data event control block (DECB) can logically be thought of as another data level in an entry control block (ECB). A DECB does not physically reside in an ECB, but it contains the same information as standard data levels. That information includes the following:

- A core block reference word (CBRW)
- A file address reference word (FARW)
- A file address extension word (FAXW)
- A detailed error indicator.

See *TPF Application Programming* for more information about DECB fields.

One major difference between an ECB data level and a DECB is that the field that contains the file address has been expanded to 8 bytes in the DECB. Because there is no room for that expansion in the ECB, the logical place for 8-byte file addresses to be stored is in a DECB. With the addition of TPF DECB support, 8-byte file addressing in 4x4 format is being provided. 4x4 format provides for standard 4-byte file addresses (FARF3, FARF4, or FARF5) to be stored in an 8-byte field. This is done by having the file address reside in the low-order 4 bytes of the field. The high-order 4 bytes of the field contain an indicator that classifies the address as a valid 4x4 format address.

Before the addition of TPF DECB support, there were only 16 data levels (D0–DF) available for use. Because DECBs can be acquired dynamically by a single ECB (through the use of the DECBC macro), the storage, which will hold the DECB, comes from the 1-MB private area of the ECB. Therefore, the number of DECBs that the ECB is restricted to is only limited by the amount of storage in the private area that is dedicated to the DECB. See *TPF General Macros* for more information about the DECBC macro.

Using TPF DECB support instead of ECB data levels allows you to associate symbolic names with each DECB. This allows different components of a program to easily pass information in core blocks attached to a DECB. Each component only needs to know the name of the DECB where the information is to be found to access it.

TPF DECB support can be used by all types of applications. New application programming interfaces (APIs) have been added to allow TPF programs to access file records with a DECB instead of a data level in an ECB. However, only a subset of the existing macros that currently reference ECB data levels have been updated to accept a DECB instead of a data level. Macros and C functions that use an 8-byte file address will first verify that it is a valid address in 4x4 format. If the address is not valid, a system error will occur. See Table 969 on page 929 and Table 973 on page 930 for a list of the general and system macros that were added or changed for TPF DECB support. See “Application Programming Interface (API) Changes” on page 934 for more information about C functions.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 962 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 962. Changes to Build Scripts for TPF DECB Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CTADBS	DLL	New	Added a TPF application dynamic link library (DLL).

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 963 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 963. Changes to General Use C/C++ Language Header Files for TPF DECB Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$dec.b.h	New	Yes
c\$eb0eb.h	Changed	No
tpfapi.h	Changed	No
tpfio.h	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 964 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 964. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF DECB Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$dec.b.h	New	Yes
i\$ecb3.h	Changed	No

Table 964. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF DECB Support (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
sysapi.h	Changed	Yes (CMQBLD, CMQCKQ, CMQMVM)

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 965 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 965. Changes to Library Members (Object Files) for TPF DECB Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CFACZC	CTAL	Changed	Assembler	Updated the processing of the tpf_faczc function.
CSSDLL	CISO	Changed	C Language	Added the CTAD DLL to the list of subsystem-shared DLLs.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 966 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 966. Changes to Members (Object Files) for TPF DECB Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CATTAD	CTAD	New	Assembler	Added to update the processing of the attac_ext function.
CCSOND	CTAD	New	Assembler	Added to update the processing of the csonc function.
CDECBC	CTAD	New	Assembler	Added to update the processing of the tpf_decb_-type functions.
CDETAD	CTAD	New	Assembler	Added to update the processing of the detac_ext function.
CESFAD	CTAD	New	Assembler	Added to update the processing of the tpf_esfac function.
CFAC8C	CTAD	New	Assembler	Added to update the processing of the tpf_fac8c function.
CFLDEC	CTAD	New	Assembler	Added to update the processing of the file_record_ext function.
CFNDEC	CTAD	New	Assembler	Added to update the processing of the find_record_ext function.
CGDSND	CTAD	New	Assembler	Added to update the processing of the gdsnc function.

Table 966. Changes to Members (Object Files) for TPF DECB Support (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CGDSRD	CTAD	New	Assembler	Added to update the processing of the gdsrsc function.
CGETCD	CTAD	New	Assembler	Added to update the processing of the getcc function.
CGETFD	CTAD	New	Assembler	Added to update the processing of the getfc function.
CRELCD	CTAD	New	Assembler	Added to update the processing of the relcc function.
CRELFD	CTAD	New	Assembler	Added to update the processing of the relfc function.
CSONID	CTAD	New	Assembler	Added to update the processing of the sonic function.
CTADOV	CTAD	New	C++ Language	Added to process overloaded standard TPF APIs.
CUNFRD	CTAD	New	Assembler	Added to update the processing of the unfrc_ext function.
CVXS4	CVXS	Changed	Assembler	Updated the ZDECB command.
CVXS6	CVXS	Changed	Assembler	Updated the ZDECB command.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 967 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 967. Changes to Copy Members for TPF DECB Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CCEB	Control Program	CCENBK	Not Applicable	Changed	Updated to release DECBs at entry control block (ECB) exit time.
CCEF	Control Program	CCENBK	Not Applicable	Changed	Updated to use the new IDECB data macro.
CCEG	Control Program	CCENBK	Not Applicable	Changed	Updated to use the new IDECB data macro.
CDEC	Control Program	CCNUCL	Not Applicable	New	Added to process the DECBC macro.
CEDT	Control Program	CCCPSE	Not Applicable	Changed	Updated to use the new IDECB data macro.
CEFI	Control Program	CCFADC	Not Applicable	Changed	Updated to process DECBs for FIND or FILE requests.
CEFJ	Control Program	CCFADC	Not Applicable	Changed	Updated to process DECBs for FIND or FILE requests.
CEFK	Control Program	CCFADC	Not Applicable	Changed	Updated for general data set (GDS) support.

Table 967. Changes to Copy Members for TPF DECB Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CEFL	Control Program	CCFADC	Not Applicable	Changed	Updated to process DECBs for FIND or FILE requests.
CFAC	Control Program	CCDBAF	Not Applicable	Changed	Updated the processing of the FACZC and FAC8C macros with 8-byte file addresses.
CHSZ	Control Program	CCNUCL	Not Applicable	Changed	Updated to initialize ECB fields.
CICR	Control Program	CCNUCL	Not Applicable	Changed	Updated to process DECBs for various TPF macro requests.
CJ321	Real-Time Assembler	CJ005	CJ00	Changed	Updated to use the new IDECB data macro.
CJ322	Real-Time Assembler	CJ005	CJ00	Changed	Updated to use the new IDECB data macro.
CJ327	Real-Time Assembler	CJ005	CJ00	Changed	Updated to use the new IDECB data macro.
CJ341	Real-Time Assembler	CJ005	CJ00	Changed	Updated to use the new IDECB data macro.
CJIL	Control Program	CCSONA	Not Applicable	Changed	Updated to set up the SUD in the DECB (when DECB is used).
CPSF	Control Program	CCCPSF	Not Applicable	Changed	Updated to use the new IDECB data macro.
CPSL	Control Program	CCCPSE	Not Applicable	Changed	Updated to dump DECBs with the ECB.
CPSM	Control Program	CCCPSE	Not Applicable	Changed	Updated to process DECBs on SNAPC requests.
CRTT	Control Program	CCUTIL	Not Applicable	Changed	Updated real-time trace (RTT) to use the new IDECB data macro.
CTSF	Control Program	CCUTIL	Not Applicable	Changed	Updated selective file trace (SFT) to use the new IDECB data macro.
CVF3	Control Program	CCVFAC	Not Applicable	Changed	Updated the FLVFC macro to process DECBs.
DBAC	Control Program	CCDBAF	Not Applicable	Changed	Updated the CSONC macro to handle 8-byte file addresses.
DBAS	Control Program	CCDBAF	Not Applicable	Changed	Updated the ESFAC and SONIC macros to handle 8-byte file addresses.
GRFS	Control Program	CCSONP	Not Applicable	Changed	Updated to process DECBs on the GETFC and RELFC requests.
MPTV	Control Program	CCUTIL	Not Applicable	Changed	Updated the program test vehicle (PTV) to process DECBs.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 968 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 968. Changes to Data Macros for TPF DECB Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?
EB0EB	Changed	No
ECBEQ	Changed	No
IDDBT	New	Yes
IDECB	New	Yes
IDSDEC	No Longer Supported	Not Applicable
IDSMDP	Changed	Yes
IDSFCZ	Changed	<p>Yes - BAM0, BCC0, BCC3, BDBC, BDBE, BDBF, BEWP, BHWP, BKA0, BKB0, BKC1, BKP4, BPM0, BRFM, BRPK, BRPT, BRSH, BRTO, BRTP, BRTV, BSSC, BSSW, BSSX, BWRA, BWRT, BXBL, CFD1, CIPZ, CYBD, UBDB, UBWR</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. If you are installing integrated online pool maintenance and recoup support (APAR PJ27469), you must also reassemble the following programs: B0P5, BCP1, BCPY, BOF2, BOFF, BOFK, BPDH, BRID, BRIE, BRPI, BRV0, BRV2, BRV3, BRV5, DYDN, DYD1, and DYD2. For more information about integrated online pool maintenance and recoup support, see "Integrated Online Pool Maintenance and Recoup Support (APAR PJ27469)" on page 831. 2. The IDSFCZ data macro increased the input size requirement from 19 bytes to 23 bytes, and the output size from 14 bytes to 22 bytes. Therefore, you should examine any program using the IDSFCZ data macro to make sure the output location defined by this data macro has enough room reserved for the macro call.
IDSFLV	Changed	No
IDSSNP	Changed	No
IDSTTR	Changed	Yes - CCCFLC, CCCLHR, CCCTIN, CCIISC, CCMCDC, CCSICF, CCSTOR, CCTLOG
IEQCE3	Changed	Yes
IFAC8	New	No

General Macros: Table 969 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 969. Changes to General Macros for TPF DECB Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
ATTAC	Changed	No
CRUSA	Changed	No
CSONC	Changed	No
DECBC	New	Yes
DETAC	Changed	No
FA4X4C	New	Yes
FAC8C	New	Yes
FILEC	Changed	No
FILNC	Changed	No
FILSC	Changed	No
FILUC	Changed	No
FINDC	Changed	No
FINHC	Changed	No
FINSC	Changed	No
FINWC	Changed	No
FIWHC	Changed	No
GDSNC	Changed	No
GDSRC	Changed	No
GETCC	Changed	No
GETFC	Changed	No
LEVTA	Changed	No
LISTC	Changed	No
RCRFC	Changed	No
RCUNC	Changed	No
RELCC	Changed	No
RELFC	Changed	No
SONIC	Changed	No
UNFRC	Changed	No

Selected Equate Macros: Table 970 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 970. Changes to Selected Equate Macros for TPF DECB Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CZOCP	Changed	No
CZ1SE	Changed	No

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 971 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 971. Changes to SIP Skeleton and Internal Macros for TPF DECB Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 972 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 972. Changes to SIP Stage II Macros for TPF DECB Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 973 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 973. Changes to System Macros for TPF DECB Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
\$FINDC	Changed	No; publication updates only.
ESFAC	Changed	Yes - CCCTIN. Only reassemble control program (CP) segments that call this macro. You do not need to reassemble real-time assembler segments.
FACZC	Changed	Yes - BAM0, BCC3, BDBC, BDDE, BDBF, BKA0, BKC1, BSSC, BXBL, CFD1, CIPZ, CYBD, UBDB
FLSPC	Changed	No
FLVFC	Changed	No
FNSPC	Changed	No
FTSTC	Changed	No

System Macros (IBM Use Only): Table 974 on page 931 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 974. Changes to System Macros (IBM Use Only) for TPF DECB Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?
CFMCC	Changed	Yes - ICDF
CFMDC	Changed	Yes - ICDF
IBMSVC	Changed	Yes - CCMCDC

Segments

Table 975 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 975. Changes to Segments for TPF DECB Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BMT3	Real-Time Assembler	Not Applicable	Changed	Updated to fix the CTL-1 dump in the real-time trace (RTT) ZSTOP processing.
CCNUCL	CSECT	CPS0	Changed	Updated to include the CDEC copy member.
CDE1	Real-Time Assembler	Not Applicable	Changed	Updated processing of the ZFECB command.
CDE2	Real-Time Assembler	Not Applicable	Changed	Updated processing of the ZFECB command.
CDE3	Real-Time Assembler	Not Applicable	Changed	Updated processing of the ZFECB command.
CPSU	Real-Time Assembler	Not Applicable	Changed	Updated the prolog to include the new information passed to the Dump Data user exit.
STPP	Offline Assembler	PPCP	Changed	Updated offline dump formatting.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 976. Changes to ECB User Exits for TPF DECB Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Dump Data	CCCPSE	CPSU	Changed	Updated to pass information about DECBs to the user exit.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 977 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 977. Changes to Commands for TPF DECB Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZDECB	Changed	Updated to process expanded ECB macro trace entries. This was a code change only.
ZFECB	Changed	Updated to provide DECB information in a formatted ECB display.

Messages and System Errors

Table 978 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 978. Changes to Messages and System Errors for TPF DECB Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000006	System Error	Changed
000007	System Error	Changed
00000B	System Error	Changed
000022	System Error	Changed
000023	System Error	Changed
000027	System Error	Changed
00002E	System Error	Changed
0000D1	System Error	Changed
0000D2	System Error	Changed
0006E3	System Error	Changed
0006E8	System Error	Changed
0DECB0	System Error	New
0DECB1	System Error	New
0DECB2	System Error	New
0DECB3	System Error	New
0DECB4	System Error	New
0DECB5	System Error	New
0DECB6	System Error	New

Table 978. Changes to Messages and System Errors for TPF DECB Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0DECB7	System Error	New
FECB0007I	Online	No Longer Supported
FECB0008I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 979 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 979. Changes to TPF Publications for TPF DECB Support

Book Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0C	Updated with information that was added and changed for TPF DECB support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0D	Updated with C/C++ functions that were added and changed for TPF DECB support.
<i>TPF Concepts and Structures</i>	GTPCON0A	Updated with information that was added and changed for TPF DECB support.
<i>TPF Database Reference</i>	GTPDBR0B	Updated with information that was changed for TPF DECB support.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary.
<i>TPF General Macros</i>	GTPGEN0C	Updated with information about general macros that were added and changed for TPF DECB support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF DECB support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for TPF DECB support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for TPF DECB support.
<i>TPF Program Development Support Reference</i>	GTPPDR0D	Updated with information that was added and changed for TPF DECB support.
<i>TPF System Generation</i>	GTPSYG0D	Updated with information that was added and changed for TPF DECB support.

Table 979. Changes to TPF Publications for TPF DECB Support (continued)

Book Title	Softcopy File Name	Description of Change
<i>TPF System Installation Support Reference</i>	GTPINR0D	Updated the Dump Data user exit for TPF DECB support.
<i>TPF System Macros</i>	GTPSYS0D	Updated with information about system macros that were added and changed for TPF DECB support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Applications that call the following functions (using 8-byte file addresses or DECBs instead of ECB data levels) must be compiled with the C++ compiler:

- attac_ext
- crusa
- csonc
- detac_ext
- file_record_ext
- find_record_ext
- gdsnc
- gdsrc
- getcc
- getfc
- levtest
- rcunc
- relcc
- relfc
- sonic
- tpf_decb_create
- tpf_decb_locate
- tpf_decb_release
- tpf_decb_swapblk
- tpf_decb_validate
- tpf_esfac
- tpf_fac8c
- tpf_faczc
- tpf_fa4x4c
- tpf_rcrhc
- unfrc_ext.

See the *TPF C/C++ Language Support User's Guide* for more information about these functions.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To add TPF DECB support to your current TPF 4.1 system, do the following:

1. Install program update tape (PUT) 13.
2. Install the following:
 - C/C++ language header files listed in Table 963 on page 924 and Table 964 on page 924
 - Copy members listed in Table 967 on page 926
 - Macros listed in Table 968 on page 928, Table 969 on page 929, Table 973 on page 930, and Table 974 on page 931.
3. Reassemble or recompile the following:
 - DLM members listed in Table 966 on page 925
 - CSECTS listed in Table 967 on page 926
 - Macros listed in Table 968 on page 928
 - Programs listed in Table 973 on page 930
 - Programs listed in Table 974 on page 931
 - Segments listed in Table 975 on page 931.

Note: Reassemble any CSECTs or programs you have modified that call the ESFAC, FACZC, or IDSFCZ macros.
4. Link-edit CPS0.
5. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and SAL table. See Table 965 on page 925 and Table 975 on page 931 for more information about new segments.
6. Run CBLD for build scripts listed in Table 962 on page 924.
7. Assemble the following offline and online TPF utility programs that were modified:
 - ICDF
 - IPLB
 - STPP.
8. Link the PPCP offline program (include STPP).
9. Compile the following C/C++ programs that have been created or modified:
 - CSSDLL
 - CTADOV.
10. Compile the following C++ programs to pick up changes to the `sysapi.h` header file and the `tpf_faczc` function:
 - CMQBLD
 - CMQCKQ.
11. Link-edit the following DLLs:
 - CTADBS
 - CMQKBS.

12. Link-edit the following ISO-C Libraries (LIBs):
 - CJ00BS
 - CISOBS
 - CTALBS.
13. Link-edit the CVXSBS DLM.
14. Modify and assemble the Dump Data (CPSU) user exit, as needed.
15. Load the updated object code to your TPF 4.1 system.
16. Cycle the TPF 4.1 system to NORM state before running any application programs.

Fallback and Coexistence

If TPF DECB support is installed at your complex, system errors that occur on the online TPF system cannot be post-processed using a back-level version of the post-processor control program (PPCP). Both your online system and dump post-processor must have TPF DECB support installed.

TPF MQSeries Enhancements (APARs PJ27230, PJ27231, PJ27351, and PJ27431)

The following section discusses the migration considerations for TPF MQSeries enhancements.

Prerequisite APARs

See the APEDIT for APARs PJ27230, PJ27231, PJ27351, and PJ27431 for information about prerequisite APARs.

Functional Overview

TPF MQSeries enhancements include the following:

- MQSeries Transmission Control Protocol/Internet Protocol (TCP/IP) support (APAR PJ27230) allows the TPF 4.1 system to connect to MQSeries server platforms that do not support the Systems Network Architecture (SNA) protocol.
- MQSeries user exit support (APAR PJ27231) adds the TPF MQSeries start queue manager user exit, CUIA, which allows you to start your MQSeries applications immediately after the start or restart of the queue manager, and moves other TPF MQSeries user exits from dynamic link library (DLL) CMQS to DLL CMQU, allowing you to load CMQS without modifying the DLL.
- MQSeries slow queue sweeper and move support (APARs PJ27351 and PJ27431) creates the slow queue sweeper mechanism and the ZMQSC MOVEMSGS command. The slow queue sweeper mechanism moves messages on a queue to a TPF collection support (TPFCS) persistent collection if the number of messages on the queue are increasing. This prevents memory resources from becoming depleted. Before MQSeries slow queue sweeper and move support, messages were moved to a TPFCS persistent collection when the message queue was not serviced in a user-defined time interval. The ZMQSC MOVEMSGS command allows you to move messages from a processor unique normal local queue when that processor is deactivated.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF MQSeries enhancements, you must establish the required operating environment. The following section describes hardware and software requirements specific to TPF MQSeries enhancements.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for TCP/IP-Based Communication: TPF MQSeries TCP/IP support will work with TCP/IP native stack support or TCP/IP offload support. See

“TCP/IP Native Stack Support (APAR PJ26683)” on page 626 and “Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)” on page 221 for more information.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 980 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 980. Changes to Build Scripts for TPF MQSeries Enhancements

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27230			
CMQIBS	DLM	Changed	Updated for MQSeries TCP/IP support.
APAR PJ27351, PJ27431			
CMQSBS	DLL	Changed	Updated for MQSeries slow queue sweeper and move support.
APAR PJ27231			
CMQSBS	DLL	Changed	Deleted user exit segments for MQSeries user exit support.
CMQUBS	DLL	New	Created to contain user exit segments for MQSeries user exit support.
CUIMBS	DLM	Changed	Updated for MQSeries user exit support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: There are no changes.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 981 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 981. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF MQSeries Enhancements

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
APAR PJ27230		
amqcccha.h	Changed	Yes (see note)
amqccih.h	Changed	Yes (see note)
amqccxha.h	Changed	Yes (see note)
amqrrcha.h	Changed	Yes (see note)
c\$mqcd.h	Changed	Yes (see note)
c\$mqpr.h	Changed	Yes (see note)

Table 981. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF MQSeries Enhancements (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
Note: Compile CNMQD, CNMQI, CNMQJ, CQCCCX, CQCCIC, CQCCMX, CQCLIB, CQREXT, CQRFPT, CQRMSS, and CQRREQ with these header files and compile option RENT.		
APAR PJ27351, PJ27431		
amquscw.h	Changed	Yes
c\$mqcp.h	Changed	Yes
c\$mqmg.h	Changed	Yes
c\$mq.s.h	Changed	Yes
APAR PJ27231		
c\$mq.s.h	Changed	Yes

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 982 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 982. Changes to Library Members (Object Files) for TPF MQSeries Enhancements

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
APAR PJ27230				
CRFD	CTBX	Changed	C Language	Updated for MQSeries TCP/IP support.
CRFE	CTBX	Changed	C Language	Updated for MQSeries TCP/IP support.
CQCITA	CMQI	New	Object Code Only	Added for MQSeries TCP/IP support.
CQCLIB	CMQI	Changed	C Language	Updated for MQSeries TCP/IP support.
CQRREQ	CMQI	Changed	C Language	Updated for MQSeries TCP/IP support.
APAR PJ27351, PJ27431				
CXQPRP	CTAL	Changed	Assembler	Updated for MQSeries slow queue sweeper and move support.

Link-Edited Modules: Table 983 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 983. Changes to Link-Edited Modules for TPF MQSeries Enhancements

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27351, PJ27431		
CMQS	Changed	Updated for MQSeries slow queue sweeper and move support.
APAR PJ27231		
CMQS	Changed	Updated for MQSeries user exit support.
CUIM	Changed	Updated for MQSeries user exit support.
CMQU	New	Created for MQSeries user exit support.

Members (Object Files): Table 984 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 984. Changes to Members (Object Files) for TPF MQSeries Enhancements

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
APAR PJ27230				
CNMQD	CMQ2	Changed	C Language	Updated for MQSeries TCP/IP support.
CNMQI	CMQ2	Changed	C Language	Updated for MQSeries TCP/IP support.
CNMQJ	CMQ2	Changed	C Language	Updated for MQSeries TCP/IP support.
APAR PJ27351, PJ27431				
CMQAPI	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQBAT	CMQS	Changed	Object Code Only	Updated for MQSeries slow queue sweeper and move support.
CMQBLD	CMQK	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQGRU	CUIU	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQMGC	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQMGR	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQMVM	CMQS	New	C++ Language	Created for MQSeries slow queue sweeper and move support.
CMQQUE	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQRCV	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQSWP	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQUTL	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CMQXLR	CMQX	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CRMTRA	CMQS	Changed	Object Code Only	Updated for MQSeries slow queue sweeper and move support.
CUIB	CUIB	Changed	Object Code Only	Updated for MQSeries slow queue sweeper and move support.
CUSC	CUSC	Changed	Object Code Only	Updated for MQSeries slow queue sweeper and move support.
CUSCCD	CMQS	Changed	Object Code Only	Updated for MQSeries slow queue sweeper and move support.
CUSCPF	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CUSCQL	CMQS	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.
CUSCRW	CUSC	Changed	C++ Language	Updated for MQSeries slow queue sweeper and move support.

Table 984. Changes to Members (Object Files) for TPF MQSeries Enhancements (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
APAR PJ27231				
CMQQUE	CMQS	Changed	C++ Language	Created for MQSeries user exit support.
CMQMGR	CMQS	Changed	C++ Language	Created for MQSeries user exit support.
CUIA	CMQU	New	C++ Language	Created for MQSeries user exit support.
CUIM	CUIM	New	C++ Language	Updated for MQSeries user exit support.
CUIQ	CMQU	Changed	C++ Language	Updated for MQSeries user exit support.
CUIS	CMQU	Changed	C++ Language	Updated for MQSeries user exit support.
CUIT	CMQU	Changed	C++ Language	Updated for MQSeries user exit support.
CUIV	CMQU	Changed	C++ Language	Updated for MQSeries user exit support.
CUIW	CMQU	Changed	C++ Language	Updated for MQSeries user exit support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 985 on page 942 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 985. Changes to SIP Skeleton and Internal Macros for TPF MQSeries Enhancements

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
APAR PJ27231	
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 986 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 986. Changes to SIP Stage II Macros for TPF MQSeries Enhancements

SIP Stage II Macro	New, Changed, or No Longer Supported?
APAR PJ27231	
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 987. Changes to ECB User Exits for TPF MQSeries Enhancements

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27231				
TPF MQSeries Assign LNIATA	CMQS	CUIW	Changed	Updated for MQSeries user exit support.
TPF MQSeries Convert to Object Handle	CMQS	CUIV	Changed	Updated for MQSeries user exit support.
TPF MQSeries Dead Letter Queue	CMQS	CUIQ	Changed	Updated for MQSeries user exit support.

Table 987. Changes to ECB User Exits for TPF MQSeries Enhancements (continued)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
TPF MQSeries Nonpersistent Message Handler	CMQS	CUIS	Changed	Updated for MQSeries user exit support.
TPF MQSeries Queue Manager MCA Security	CMQS	CUIT	Changed	Updated for MQSeries user exit support.
TPF MQSeries Start Queue Manager	CMQS	CUIA	New	Updated for MQSeries user exit support.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 988 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 988. Changes to Commands for TPF MQSeries Enhancements

Command	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27230		
ZMQID ALTER	Changed	Updated for MQSeries TCP/IP support.
ZMQID DEFINE	Changed	Updated for MQSeries TCP/IP support.
ZMQID DISPLAY	Changed	Updated for MQSeries TCP/IP support.
APAR PJ27351, PJ27431		
ZMQSC ALT MQP	Changed	Updated for MQSeries slow queue sweeper and move support.
ZMQSC ALT QL	Changed	Updated for MQSeries slow queue sweeper and move support.
ZMQSC DEF MQP	Changed	Updated for MQSeries slow queue sweeper and move support.
ZMQSC DEF QL	Changed	Updated for MQSeries slow queue sweeper and move support.
ZMQSC DISPLAY	Changed	Updated for MQSeries slow queue sweeper and move support.
ZMQSC MOVEMSGS	New	Created for MQSeries slow queue sweeper and move support.

Messages and System Errors

Table 989 on page 944 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 989. Changes to Messages and System Errors for TPF MQSeries Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
APAR PJ27230		
MQID0095E	Online	No Longer Supported
MQID0098E	Online	No Longer Supported
MQID0106E	Online	New
MQID0107E	Online	New
MQID0108E	Online	New
MQID0109E	Online	New
MQID0110E	Online	New
APAR PJ27351, PJ27431		
MQSC0141E	Online	No Longer Supported
MQSC0179E	Online	New
MQSC0217E	Online	New
MQSC0218E	Online	New
MQSC0220I	Online	New
MQSC0221E	Online	New
MQSC0222E	Online	New
MQSC0223E	Online	New
MQSC0224E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 990 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 990. Changes to TPF Publications for TPF MQSeries Enhancements

Publication Title	Softcopy File Name	Description of Change
APAR PJ27230		
<i>TPF Application Programming</i>	GTPAPP0C	Updated information for MQSeries TCP/IP support.

Table 990. Changes to TPF Publications for TPF MQSeries Enhancements (continued)

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for MQSeries TCP/IP support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for MQSeries TCP/IP support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for MQSeries TCP/IP support.
APAR PJ27351, PJ27431		
<i>TPF Application Programming</i>	GTPAPP0C	Updated information for MQSeries slow queue sweeper and move support.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary for MQSeries slow queue sweeper and move support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for MQSeries slow queue sweeper and move support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for MQSeries slow queue sweeper and move support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for MQSeries slow queue sweeper and move support.
APAR PJ27231		
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with information for the repackaged CMQS DLL and start queue manager user exit.
<i>TPF System Installation Support Reference</i>	GTPINR0D	Updated with information for the repackaged CMQS DLL and start queue manager user exit.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install MQSeries TCP/IP support (APAR PJ27230) on your TPF 4.1 system.

1. Install program update tape (PUT) 13.
2. Compile segments CQCCCX, CQCCIC, CQCCMX, CQREXT, CQRFPT, CQRMSS, CRFD, CRFE and the segments listed for this APAR in Table 984 on page 940.
3. Assemble the CQEXIT segment.

4. Run the CBLD program to create the link-edit decks for the CMQI LLM, CMQ2 DLM, and CTBX LLM. You do not need to compile the CQCITA library member (object file) contained in the CMQI LLM because it has been provided to you as an object code only (OCO) module.
5. Link-edit the CMQI LLM, CMQ2 DLM, and CTBX LLM.
6. Stop all TPF MQSeries client channels.
7. Load CMQI LLM, CMQ2 DLM, and CTBX LLM to your TPF 4.1 system.

Note: With TCP/IP support, it is possible to have APPC and TCP/IP channel definitions to the same remote TPF MQSeries server. It cannot be predicted which channel will be used when a TPF MQSeries client application connects to the remote server.

Use the following procedure to install MQSeries slow queue sweeper and move support (APARs PJ27351 and PJ27431) on your TPF 4.1 system.

1. Install PUT 13.
2. Compile segments CMQCKP, CMQCKQ, CMQMRM, and all segments except object code only segments listed for this APAR in Table 984 on page 940.
3. Run the CBLD program to create the link-edit decks for CMQK DLL, CMQM DLM, CMQS DLL, CMQX DLM, CTAL LLM, CUIB DLM, CUIU DLM, and CUSC DLM.
4. Link-edit the CMQK DLL, CMQM DLM, CMQS DLL, CMQX DLM, CTAL LLM, CUIB DLM, CUIU DLM, and CUSC DLM.
5. Stop the TPF MQSeries local queue manager.
6. Load CMQK DLL, CMQS DLL, CUIB DLM, CUIU DLM, and CUSC DLM to your TPF 4.1 system.
7. Start the TPF MQSeries local queue manager.

Note: The SWEEP parameter has replaced the SWEEPTIME parameter for the ZMQSC ALT and ZMQSC DEF QL commands. Any TPF MQSeries local queues with a SWEEPTIME parameter value of zero, will have an initial SWEEP parameter value of OFF. Any TPF MQSeries local queues with a nonzero SWEEPTIME parameter value will have an initial SWEEP parameter value of ON.

Use the following procedure to install MQSeries user exit support (APAR PJ27231) on your TPF 4.1 system.

1. Install PUT 13.
2. Compile the segments listed for this APAR in Table 984 on page 940.
3. Run the CBLD program to create the link-edit decks for CMQS DLL, CMQU DLL, and CUIM DLM.
4. Link-edit the CMQS DLL, CMQU DLL, and CUIM DLM.
5. Stop the TPF MQSeries local queue manager.
6. Generate a new SAL table, which contains segment CMQU.
7. Load the new SAL table, CMQS DLL, CMQU DLL, and CUIM DLM to your TPF 4.1 system.
8. Start the TPF MQSeries local queue manager.

Fallback and Coexistence

If you need to fall back to a TPF 4.1 system that does not have APARs PJ27351 and PJ27431 applied, the SWEEPTIME parameter value is restored to its previous value or is set to 30 if the queue was defined with APARs PJ27351 and PJ27431 installed.

Program Update Tape 14 (PUT 14)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 14 (PUT 14).

SPE	Where to Go For More Information
Recoup Follow-On Support	"Recoup Follow-On Support (APAR PJ27804)" on page 950
TCP/IP Enhancements for PUT 14	"TCP/IP Enhancements for PUT 14 (APARs PJ27451, PJ27491, PJ27714, PJ27617, PJ27625, PJ27650, PJ27679, and PJ27859)" on page 960
TPF Internet Mail Server Support	"TPF Internet Mail Server Support (APARs PJ27784 and PJ27865)" on page 973
Unlimited Pool Segment Support	"Unlimited Pool Segment Support (APAR PJ27484)" on page 988
XML Parser	"XML Parser (APAR PJ27634)" on page 1000
32-Way Loosely Coupled Pool Support	"32-Way Loosely Coupled Pool Support (APAR PJ27686)" on page 1006

Compiler Support

Table 991. PUT 14 Compiler Support

PUT Level	Compiler	System Support Compiler
PUT 14	IBM OS/390 C/C++ Version 2 Release 10	IBM OS/390 C/C++ Version 2 Release 10

See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Recoup Follow-On Support (APAR PJ27804)

The following section discusses the migration considerations for recoup follow-on support.

Prerequisite APARs

See the APEDIT for APAR PJ27804 for information about prerequisite APARs.

Functional Overview

Recoup follow-on support includes the following:

- Recoup core resident descriptor support, which enhances recoup processing performance because descriptors are loaded to and accessed from memory instead of files.
- Recoup functional support console (FSC) support, which provides a recoup profile option that routes recoup status messages to the real-time database services (RDBS) console instead of the prime CRAS.
- Recoup message parsing enhancements, which centralize ZRECP command parsing routines and allow extra spaces to be specified when a ZRECP command is entered with parameters.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: There are no changes.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 992 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 992. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Recoup Follow-On Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$bk01c.h	New	No	Not Applicable
c\$bk0rp.h	Changed	No	Not Applicable
c\$b10rp.h	Changed	No	Not Applicable

Table 992. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Recoup Follow-On Support (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
i\$recp.h	Changed	No	Not Applicable
i\$rsct.h	Changed	No	Not Applicable

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 993 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 993. Changes to Members (Object Files) for Recoup Follow-On Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
BAM6	BAM6	Changed	C++ Language	Updated for recoup follow-on support.
BEWA	BEWA	Changed	C Language	Updated for recoup follow-on support.
BJ00	BJ00	Changed	C++ Language	Updated for recoup follow-on support.
BJ02	BJ02	Changed	C++ Language	Updated for recoup follow-on support.
BJ12	BJ12	Changed	C++ Language	Updated for recoup follow-on support.
BRR1	BRR1	Changed	C++ Language	Updated for recoup follow-on support.
BRR2	BRR1	Changed	C++ Language	Updated for recoup follow-on support.
BRR3	BRR1	Changed	C++ Language	Updated for recoup follow-on support.
BRR4	BRR1	Changed	C++ Language	Updated for recoup follow-on support.
BRR5	BRR1	Changed	C++ Language	Updated for recoup follow-on support.
BRR6	BRR1	Changed	C++ Language	Updated for recoup follow-on support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

Table 994 on page 952 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 994. Changes to Fixed File Records for Recoup Follow-On Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#BKDSV	No Longer Supported	Deleted by recoup follow-on support.
#BKD4K	No Longer Supported	Deleted by recoup follow-on support.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 995 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 995. Changes to Data Macros for Recoup Follow-On Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
BK0LC	Changed	No	Not Applicable
BK0RP	Changed	No	Not Applicable
BK9MC	New	No	Not Applicable
BL0RP	Changed	No	Not Applicable
IFMSG	Changed	Yes	CVAI
MPRECP	Changed	No	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: Table 996 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 996. Changes to Selected Equate Macros for Recoup Follow-On Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
BRPEQ	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 997 on page 953 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 997. Changes to SIP Skeleton and Internal Macros for Recoup Follow-On Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 998 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 998. Changes to SIP Stage II Macros for Recoup Follow-On Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 999 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 999. Changes to System Macros for Recoup Follow-On Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
BRPRO	Changed	No	Not Applicable

System Macros (IBM Use Only): There are no changes.

Segments

Table 1000 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1000. Changes to Segments for Recoup Follow-On Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BAM0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BAM1	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BAM5	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BCC0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BCC1	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BCC3	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BCP5	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.

Table 1000. Changes to Segments for Recoup Follow-On Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BEWP	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BJ11	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BKA0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BKB0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BKC1	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BKPA	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BKP0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BKP5	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BOFK	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BPM0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BPM1	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRB2	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRB4	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRCB (TPFDF)	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRCP	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRCX (TPFDF)	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRDP	Real-Time Assembler	Not Applicable	New	Created for recoup follow-on support.
BRFM	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRMK	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRPA	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRPK	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRPT	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRPX	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRSH	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRS0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRT0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.

Table 1000. Changes to Segments for Recoup Follow-On Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BRUB	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRUC	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRUD	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRV2	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BRV5	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BR0T	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BSSC	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BSSU	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BSSW	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by recoup follow-on support.
BS0C	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BS0D	Real-Time Assembler	Not Applicable	New	Created for recoup follow-on support.
BWRA	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
BWRT	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
B0P0	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
B0P5	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
B0P6	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by recoup follow-on support.
B0SH	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
B1BK	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
CVAI	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.
DYD2	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted by recoup follow-on support.
UBRP	Real-Time Assembler	Not Applicable	Changed	Changed for recoup follow-on support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1001 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1001. Changes to Commands for Recoup Follow-On Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZACRS	Changed	Updated for recoup follow-on support.
ZFMSG	Changed	Updated for recoup follow-on support.
ZPOOL INIT	Changed	Updated for recoup follow-on support. ZPOOL INIT no longer initializes the #BKDSV and #BKD4K record types, which have been deleted.
ZRBKD	Changed	Updated for recoup follow-on support.
ZRECP PROFILE	Changed	Updated for recoup follow-on support.
ZSTIM A	Changed	Updated for recoup follow-on support.

Messages and System Errors

Table 1002 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1002. Changes to Messages and System Errors for Recoup Follow-On Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0412F0	System Error	Changed
042001	System Error	No Longer Supported
BCP00025A	Online	Changed
BRUB0012I	Online	Changed
BRUC0009W	Online	No Longer Supported
BRUC0010E	Online	New
BRUC0011W	Online	New
RECP0098E	Online	No Longer Supported
RECP009EE	Online	No Longer Supported

Table 1002. Changes to Messages and System Errors for Recoup Follow-On Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
RECP00A0E	Online	Changed
RECP0504I	Online	Changed
RECP0658E	Online	Changed
RECP0659E	Online	Changed
RECP0661E	Online	No Longer Supported
RECP0791E	Online	New
RECP0792E	Online	New
RECP0793E	Online	New
RECP0794E	Online	New
RECP0795E	Online	New
RECP0796E	Online	New
RECP0797E	Online	New
RECP0798E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1003 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1003. Changes to TPF Publications for Recoup Follow-On Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Database Reference</i>	GTPDBR0C	Updated with changed pre-recoup procedural information for recoup follow-on support.
<i>TPF General Macros</i>	GTPGEN0E	Updated with information about new and changed system macros for recoup follow-on support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for recoup follow-on support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG204	Updated with migration considerations for recoup follow-on support.

Table 1003. Changes to TPF Publications for Recoup Follow-On Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Operations</i>	GTPOPR0E	Updated with information about the commands that were changed for recoup follow-on support.
<i>TPF System Generation</i>	GTPSYC0E	Updated with changed system generation information for recoup follow-on support.
<i>TPF System Macros</i>	GTPSYS0E	Removed a reference to the #BKD4K fixed file record from the GROUP macro. Updated the BRPRO macro.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To install and use recoup follow-on support, do the following:

1. Ensure that no deactivation or reallocation processing is running on the TPF 4.1 system to which you are installing program update tape (PUT) 14.
2. Install PUT 14.
3. Reassemble or recompile the segments listed in Table 1000 on page 953.
4. Link-edit the dynamic load modules (DLMS) listed in Table 993 on page 951.
5. Do the following on all subsystems:
 - a. Delete the fixed file records listed in Table 994 on page 952 using the RAMFIL macro statements in the SIP stage 1 deck. See *TPF System Generation* for more information.
 - b. Run the FACE table generator (FCTBG) to create the new FACE table.
 - c. Load all descriptors into the program allocation table (PAT) as core resident.
 - d. Run the system allocator program (SALO) using IBMPAL additions for newly created segments to create an updated IBM program allocation table (IPAT) and system allocator (SAL) table.
6. Link-edit the control program (CP).
7. To prevent a loss of pool space or data if there are any problems migrating to recoup follow-on support, do the following before loading and IPLing the TPF 4.1 system with recoup follow-on support changes:
 - a. Run recoup.
 - b. Run pool directory update (PDU).
 - c. Capture all critical data.

8. Load the FACE table, IPAT, CP, the DLMs listed in Table 993 on page 951, and the programs listed in Table 1000 on page 953 to each subsystem.
9. Make sure that recoup or PDU is not running on the TPF 4.1 system.
10. IPL the TPF 4.1 system.
11. Cycle the TPF 4.1 system to 1052 state.
12. Cycle the TPF 4.1 system to NORM state.
13. Load updated descriptors as follows on all subsystems:
 - a. Enter **ZRBKD INIT CTL** to initialize the BKD load control record (BK0LC).
 - b. Enter **ZRBKD DUMM ALL** to create dummy recoup descriptors.
 - c. For each descriptor container used for recoup processing, enter **ZRBKD MOVE *progrname* Nordnum**, where *progrname* is the name and version of the descriptor container and *ordnum* is an ordinal number (from 0 to 99) that represents the order in which descriptor containers are processed during chain chase processing.
 - d. Enter **ZRBKD DISP ALL** to verify that the descriptors were loaded correctly.
14. Enter the ZRECP PROFILE command to display your recoup run-time option settings and record these settings to be used after ZRECP SETUP processing is completed.
15. Enter **ZRECP SETUP** once on each subsystem in which you run recoup. The ZRECP SETUP command will create an expanded recoup scheduling control table (IRSCT) that is required by recoup follow-on support, and will also set recoup profile options to their initial settings.
16. Enter the ZRECP PROFILE command to change any recoup settings that you want to change.
17. If you want to route recoup status messages to the recoup functional support console (FSC) instead of the primary recoup console, do the following:
 - a. Enter the ZACRS command to define a real-time database services (RDBS) FSC if one is not already defined.

Note: In a loosely coupled environment, add RDBS routing for each processor that participates in running recoup processing.

 - b. Enter **ZRECP PROFILE FSC-YES** to route recoup status messages to the RDBS FSC instead of the prime CRAS.
 - c. IPL the TPF 4.1 system.

TCP/IP Enhancements for PUT 14 (APARs PJ27451, PJ27491, PJ27714, PJ27617, PJ27625, PJ27650, PJ27679, and PJ27859)

The following section discusses the migration considerations for Transmission Control Protocol/Internet Protocol (TCP/IP) enhancements for PUT 14.

Prerequisite APARs

See the APEDIT for APARs PJ27451, PJ27491, PJ27714, PJ27617, PJ27625, PJ27650, PJ27679, and PJ27859 for information about prerequisite APARs.

Functional Overview

TCP/IP enhancements for PUT 14 increase the usability and effectiveness of TCP/IP native stack support and OSA-Express support with the following APARs:

- Display enhancements (APAR PJ27451) adds the following:
 - The ZTTCP CLEAR command, to clear TCP/IP statistics.
 - The output of the ZTTCP DISPLAY command with the STATS parameter specified now includes the number of Transmission Control Protocol (TCP) sockets that have been cleaned up because of retransmit timeouts.
 - The output of the ZTTCP DISPLAY command with the ALL parameter specified now includes the symbolic device addresses (SDAs) for Open Systems Adapter (OSA)-Express connections.
 - The output of the ZVIPA command with the IP parameter specified now includes which CPUs have the specified movable virtual IP address (VIPA) defined to them.
- Movable VIPA program interface (APAR PJ27491 and APAR PJ27714) provides additional ways to move a VIPA from one processor to another. Previously, TPF operators could move a VIPA by using the ZVIPA command with the MOVE parameter specified. Now application programs can use the VIPAC macro and the `tpf_vipac` C function to also move a specified VIPA to a specified CPU.
- Individual IP trace support (APAR PJ27617) provides individual IP trace tables for tracing packets to and from specific remote nodes and also provides the option to turn off the tracing of Routing Information Protocol (RIP) messages. This support is provided through the ZINIP command and the RIP/NORIP parameter of the ZTTCP TRACE command.
- Fast Ethernet OSA-Express support (APAR PJ27625) allows the TPF 4.1 system to connect to Fast Ethernet (FENET) OSA-Express adapters.
- Diagnostic tools (PJ27650 and PJ27859) provides you with the ability to determine if a specific socket or an OSA-Express connection is hung. This support is provided by the DATAFLOW parameter of the ZOSAE and ZSOCK commands.
- TCP/IP activate on receipt load balancing (APAR PJ27679) allows load balancing of applications that use the `activate_on_receipt` or `activate_on_receipt_with_length` function and can be run on all I-streams. With load balancing set on, the new ECB is created on the least busy I-stream rather than on the I-stream of the ECB that issued the `activate_on_receipt` or `activate_on_receipt_with_length` function. Load balancing is set on or off by the AOR_BALANCE option of the `ioctl` function.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TCP/IP enhancements for PUT 14, you must establish the required operating environment. The following section describes hardware and software requirements specific to TCP/IP enhancements for PUT 14.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

The following section contains information about hardware requirements.

Communication Devices: Fast Ethernet OSA-Express support supports Fast Ethernet (FENET) OSA-Express adapters.

Software (Programming Requirements)

There are no software requirements.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1004 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1004. Changes to Build Scripts for TCP/IP Enhancements for PUT 14

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27617			
CTIEBS	DLM	New	Created for individual IP trace support.

Dynamic Load Module (DLM) Stubs: Table 1005 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 1005. Changes to Dynamic Load Module (DLM) Stubs for TCP/IP Enhancements for PUT 14

DLM Stub	New or No Longer Supported?
APARs PJ27491 and PJ27714	
CMOV	New
APAR PJ27650	
CTFF	New

General Use C/C++ Language Header Files: Table 1006 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1006. Changes to General Use C/C++ Language Header Files for TCP/IP Enhancements for PUT 14

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
APARs PJ27491 and PJ27714			
socket.h	Changed	No	Not Applicable
APAR PJ27617			
c\$ck2sn.h	Changed	No	Not Applicable
c\$syseq.h	Changed	No	Not Applicable
APAR PJ27679			
ioctl.h	Changed	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: Table 1007 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 1007. Changes to Library Interface Scripts for TCP/IP Enhancements for PUT 14

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
APARs PJ27491 and PJ27714		
COMXXV	Changed	Updated to support the tpf_vipac C function.

Library Members (Object Files): Table 1008 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 1008. Changes to Library Members (Object Files) for TCP/IP Enhancements for PUT 14

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
APARs PJ27491 and PJ27714				
C535	COMX	Changed	C Language	Updated to support the tpf_vipac C function.

Link-Edited Modules: Table 1009 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1009. Changes to Link-Edited Modules for TCP/IP Enhancements for PUT 14

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27451		
CPS0	Changed	Updated to support retransmit timeouts.

Table 1009. Changes to Link-Edited Modules for TCP/IP Enhancements for PUT 14 (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27617		
CPS0	Changed	Updated to add individual IP trace support.
CTIE	New	Created to allow a formatted display in individual IP trace support.
APARs PJ27650 and PJ27859		
CPS0	Changed	Updated with counter fields for the DATAFLOW parameter of the ZSOCK command.
CTFC	Changed	Updated to add the DATAFLOW parameter to the ZSOCK command.

Members (Object Files): Table 1010 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1010. Changes to Members (Object Files) for TCP/IP Enhancements for PUT 14

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
APAR PJ27617				
CTIE	CTIE	New	C Language	Created to allow a formatted display in individual IP trace support.
APARs PJ27650 and PJ27859				
CTFC	CTFC	Changed	C++ Language	Updated to add the DATAFLOW parameter to the ZSOCK command.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1011 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1011. Changes to Copy Members for TCP/IP Enhancements for PUT 14

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27451					
CTSS40	Control Program	CCTCP3	Not Applicable	Changed	Updated the number of TCP sockets that have been cleaned up because of retransmit timeouts.
APAR PJ27617					
CTT6	Control Program	CCTCP1	Not Applicable	Changed	Updated to allow tracing packets for individual IP trace support.

Table 1011. Changes to Copy Members for TCP/IP Enhancements for PUT 14 (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CT15	Control Program	CCCTIN	Not Applicable	Changed	Updated to carve out tables for individual IP trace support.
APAR PJ27650					
CTT6	Control Program	CCTCP1	Not Applicable	Changed	Updated data flow byte counters for UDP sockets.
APAR PJ27679					
CTT6	Control Program	CCTCP1	Not Applicable	Changed	Updated for TCP/IP activate on receipt load balancing.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 1012 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the SNA communication macro or statement.

Table 1012. Changes to Communication Macros and Statements for TCP/IP Enhancements for PUT 14

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
APAR PJ27617			
SNAKEY	Changed	Yes	CTK2

Data Macros: Table 1013 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1013. Changes to Data Macros for TCP/IP Enhancements for PUT 14

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
APAR PJ27451			
ISOCK	Changed	No	Not Applicable
APAR PJ27617			
CK2SN	Changed	No	Not Applicable
INDTR	New	No	Not Applicable
ISTAK	Changed	No	Not Applicable
APAR PJ27625			
IOSCR	Changed	No	Not Applicable
APAR PJ27650			

Table 1013. Changes to Data Macros for TCP/IP Enhancements for PUT 14 (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
ISOCK	Changed	Yes	CCCTIN, CCTCP1, CCTCP3, CMVW, CTFA, CTFB, CTFD, CTF4, CTSK, CTSN, CTSR, CTSW, CTS0
APAR PJ27679			
IPWBL	Changed	No	Not Applicable
ISOCK	Changed	No	Not Applicable

General Macros: Table 1014 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 1014. Changes to General Macros for TCP/IP Enhancements for PUT 14

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
APARs PJ27491 and PJ27714			
VIPAC	New	No	Not Applicable

Selected Equate Macros: Table 1015 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1015. Changes to Selected Equate Macros for TCP/IP Enhancements for PUT 14

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
APAR PJ27617			
CZ1SE	Changed	No	Not Applicable
SYSEQ	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1016 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1016. Changes to SIP Skeleton and Internal Macros for TCP/IP Enhancements for PUT 14

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
APARs PJ27491 and PJ27714	
SPPGML	Changed
APAR PJ27617	
SPPGML	Changed

Table 1016. Changes to SIP Skeleton and Internal Macros for TCP/IP Enhancements for PUT 14 (continued)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
APAR PJ27650	
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1017 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1017. Changes to SIP Stage II Macros for TCP/IP Enhancements for PUT 14

SIP Stage II Macro	New, Changed, or No Longer Supported?
APARs PJ27491 and PJ27714	
IBMPAL	Changed
APAR PJ27617	
IBMPAL	Changed
APAR PJ27650	
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 1018 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 1018. Changes to System Macros (IBM Use Only) for TCP/IP Enhancements for PUT 14

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
APAR PJ27617			
DLTEC	Changed	No	Not Applicable

Segments

Table 1019 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1019. Changes to Segments for TCP/IP Enhancements for PUT 14

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27451				
CMV2	Real-Time Assembler	Not Applicable	Changed	Updated to support the ZVIPA command.

Table 1019. Changes to Segments for TCP/IP Enhancements for PUT 14 (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CTF1	Real-Time Assembler	Not Applicable	Changed	Updated to support the ZTTCP CLEAR command.
CTF5	Real-Time Assembler	Not Applicable	Changed	Updated to display the correct message number and the number of TCP sockets.
CTF7	Real-Time Assembler	Not Applicable	Changed	Updated to support the ZTTCP DISPLAY command.
APARs PJ27491 and PJ27714				
CMOV	Real-Time Assembler	Not Applicable	New	Created to support processing to move a VIPA to a new CPU.
CMV1	Real-Time Assembler	Not Applicable	Changed	Updated to remove movable VIPA support and to move the support to the CMOV segment.
APAR PJ27617				
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated for the ZNKEY command.
CTF1	Real-Time Assembler	Not Applicable	Changed	Updated to add the RIP/NORIP parameter to the ZTTCP TRACE command.
CTF3	Real-Time Assembler	Not Applicable	Changed	Updated to add the RIP/NORIP parameter to the ZTTCP TRACE command.
CTIA	Real-Time Assembler	Not Applicable	New	Created for the ZINIP command.
CTIB	Real-Time Assembler	Not Applicable	New	Created for the ZINIP command.
CTIC	Real-Time Assembler	Not Applicable	New	Created for the ZINIP command.
CTID	Real-Time Assembler	Not Applicable	New	Created for the ZINIP command.
CTIR	Real-Time Assembler	Not Applicable	New	Created for individual IP trace restart.
CTSR	Real-Time Assembler	Not Applicable	Changed	Updated to call individual IP trace restart.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for the ZINIP command.
APAR PJ27625				
COE7	Real-Time Assembler	Not Applicable	Changed	Updated to support Fast Ethernet OSA-Express connections.
COED	Real-Time Assembler	Not Applicable	Changed	Updated to support Fast Ethernet OSA-Express connections.
APAR PJ27650				
COEB	Real-Time Assembler	Not Applicable	New	Created to process the DATAFLOW parameter of the ZOSAE command.
COE1	Real-Time Assembler	Not Applicable	Changed	Updated to add the DATAFLOW parameter to the ZOSAE command.
COE8	Real-Time Assembler	Not Applicable	Changed	Updated the ZOSAE HELP command.
CTFF	Real-Time Assembler	Not Applicable	New	Created to process the DATAFLOW parameter of the ZSOCK command.
CTTO	Assembler	Not Applicable	Changed	Updated data flow byte sent counters.
APAR PJ27679				

Table 1019. Changes to Segments for TCP/IP Enhancements for PUT 14 (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CTSA	Real-Time Assembler	Not Applicable	Changed	Added TCP/IP activate on receipt load balancing support.
CTSC	Real-Time Assembler	Not Applicable	Changed	Added TCP/IP activate on receipt load balancing support.
CTSI	Real-Time Assembler	Not Applicable	Changed	Added TCP/IP activate on receipt load balancing support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1020 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1020. Changes to Commands for TCP/IP Enhancements for PUT 14

Command	New, Changed, or No Longer Supported?	Description of Change
APAR PJ27451		
ZTTCP CLEAR	New	Added to clear TCP/IP statistics.
ZTTCP DISPLAY	Changed	The output of the ZTTCP DISPLAY command with the ALL parameter specified now includes read symbolic device address (SDA) and data SDA information for OSA-Express connections. The output of the ZTTCP DISPLAY command with the STATS parameter specified now includes the number of TCP sockets that have been cleaned up because of retransmit timeouts.
ZVIPA	Changed	The output of the ZVIPA command with the IP parameter specified now includes which CPUs have the specified movable VIPAs defined to them.
APAR PJ27617		
ZINIP	New	Created to allow for individual Internet Protocol (IP) trace tables.
ZNKEY	Changed	Updated for individual IP trace tables.
ZTTCP TRACE	Changed	Updated to add the RIP/NORIP parameter.
APAR PJ27625		
ZOSAE	Changed	Updated to support Fast Ethernet OSA-Express connections.
APAR PJ27650		
ZOSAE	Changed	Updated to add the DATAFLOW parameter.
ZSOCK	Changed	Updated to add the DATAFLOW parameter.

Messages and System Errors

Table 1021 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1021. Changes to Messages and System Errors for TCP/IP Enhancements for PUT 14

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
APAR PJ27451		
TTCP0020I	Online	No Longer Supported
TTCP0022I	Online	No Longer Supported
TTCP0023I	Online	Changed
TTCP0182I	Online	New
TTCP0183I	Online	New
TTCP0184I	Online	New
VIPA0002I	Online	Changed
VIPA0010I	Online	New
APAR PJ27617		
INIP0001I	Online	New
INIP0002I	Online	New
INIP0003I	Online	New
INIP0004I	Online	New
INIP0005I	Online	New
INIP0006I	Online	New
INIP0007I	Online	New
INIP0008I	Online	New
INIP0009I	Online	New
INIP0010I	Online	New
INIP0011I	Online	New
INIP0020E	Online	New
INIP0021E	Online	New
INIP0022E	Online	New
INIP0023E	Online	New
INIP0024E	Online	New
INIP0025E	Online	New
INIP0026E	Online	New
INIP0027E	Online	New
INIP0028E	Online	New

Table 1021. Changes to Messages and System Errors for TCP/IP Enhancements for PUT 14 (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
INIP0029E	Online	New
TTCP0034I	Online	New
TTCP0035I	Online	New
007813	System	New
007814	System	New
APAR PJ27650		
OSAE0008I	Online	New
OSAE0009I	Online	New
OSAE0010I	Online	New
SOCK0024I	Online	New
SOCK0025I	Online	New
SOCK0026E	Online	New
SOCK0027E	Online	New

Performance or Tuning Changes

For applications that can be run on any I-stream and that use the TCP/IP `activate_on_receipt` or `activate_on_receipt_with_length` function, use TCP/IP activate on receipt load balancing (APAR PJ27679) to improve performance. APAR PJ27679 allows the TPF 4.1 system to balance the application load across all I-streams by creating the new ECB on the least busy I-stream when the `activate_on_receipt` or `activate_on_receipt_with_length` function is completed.

Use the `AOR_BALANCE` option of the `ioctl` function to set TCP/IP activate on receipt load balancing support on for a socket.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1022 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1022. Changes to TPF Publications for TCP/IP Enhancements for PUT 14

Publication Title	Softcopy File Name	Description of Change
APAR PJ27451		

Table 1022. Changes to TPF Publications for TCP/IP Enhancements for PUT 14 (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Messages, Volume 2</i>	GTPMC200	Updated with information about messages that were added, changed, and no longer supported for display enhancements.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for display enhancements.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for display enhancements.
APARs PJ27491 and PJ27714		
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0D	Updated with the <code>tpf_vipac</code> C function for movable VIPA program interface.
<i>TPF General Macros</i>	GTPGEN0C	Updated with the VIPAC macro for the movable VIPA program interface.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for the movable VIPA program interface.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated with information about using the movable VIPA program interface.
APAR PJ27617		
<i>TPF ACF/SNA Network Generation</i>	GTPACF0C	Updated with information about the new SNAKEY parameters that were added for individual IP trace support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for individual IP trace support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for individual IP trace support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for individual IP trace support.
<i>TPF Program Development Support Reference</i>	GTPPDR0D	Updated with the main storage dump labels that were added for individual IP trace support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated with information about using individual IP trace support.
APAR PJ27625		
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology in the master glossary.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for Fast Ethernet OSA-Express support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about commands that were changed for Fast Ethernet OSA-Express support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated with information about using Fast Ethernet OSA-Express support.
APARs PJ27650 and PJ27859		
<i>TPF Messages, Volume 2</i>	GTPMC200	Updated with information about messages that were added, changed, and no longer supported for diagnostic tools.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for diagnostic tools.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the commands that were added and changed for diagnostic tools.
APAR PJ27679		
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for TCP/IP activate on receipt load balancing.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated with information about TCP/IP activate on receipt load balancing.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To install TCP/IP enhancements for program update tape (PUT) 14 on your existing TPF 4.1 system, do the following:

- For Fast Ethernet (FENET) OSA-Express support (APAR PJ27625), refer to the migration scenario in “OSA-Express Support (APAR PJ27333)” on page 907. With that scenario, when you define OSA-Express connections to the TPF 4.1 system, you must specify NET-FENET for the ZOSAE command with the DEFINE or MODIFY parameters specified.
- For individual IP trace support (APAR PJ27617), use the following procedure:
 1. Install PUT 14.
 2. Define the IPTRCNUM and IPTRCSIZ parameters on the SNAKEY macro in keypoint 2 (CTK2).
 3. Reassemble and load updated CTK2 to your TPF 4.1 system.
 4. IPL the TPF 4.1 system and cycle the system to NORM state.
 5. Define individual IP traces with the ZINIP command.
- For TCP/IP activate on receipt load balancing (APAR PJ27679), analyze your socket applications that use the TCP/IP `activate_on_receipt` or `activate_on_receipt_with_length` function to determine if these applications can be run on all I-streams. These applications use load balancing, which is set on or off by the AOR_BALANCE option of the `ioctl` function.

Additional Information:

- See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.
- See *TPF Operations* for more information about the ZINIP, ZOSAE, and ZTTCP commands.
- See *TPF Transmission Control Protocol/Internet Protocol* for more information about TCP/IP enhancements for PUT 14.

TPF Internet Mail Server Support (APARs PJ27784 and PJ27865)

The following section discusses the migration considerations for TPF Internet mail server support.

Prerequisite APARs

See the APEDIT for APARs PJ27784 and PJ27865 for information about prerequisite APARs.

Functional Overview

TPF Internet mail server support provides a set of servers that implement the standard Internet mail protocols on the TPF 4.1 system. Users, or mail clients, interact with the TPF Internet mail servers to send and retrieve Internet mail, also known as electronic mail (e-mail).

The TPF 4.1 system supports the following standard Internet protocols:

- Simple Mail Transfer Protocol (SMTP)
- Internet Message Access Protocol (IMAP) Version 4
- Post Office Protocol (POP) Version 3.

SMTP describes how mail messages are delivered from one computer user to another. IMAP and POP describe how mail messages that are received on a computer (that is, the mail server) are retrieved by a mail client (usually another computer, such as a workstation).

The TPF 4.1 system can support multiple domains in a single server. In addition, if a TPF processor fails, another TPF processor in your complex can seamlessly take over and continue delivering the mail.

TPF Internet mail server support takes advantage of the high-performance, availability, and reliability characteristics of the TPF 4.1 system to provide a high-volume, high-speed mail server that can scale up to handle very large numbers of users and mail items. The TPF Internet mail servers can reduce the cost of ownership of a large Internet mail service with a single-image system, simplifying system management and operations.

TPF Internet mail server support is designed for the most demanding Internet mail environments, providing a scalable architecture that is capable of handling a quarter of a billion users in a single TPF processor complex. TPF Internet mail server support provides a cost-effective backend or commercial mail serving solution as well as allowing TPF applications to readily participate in Internet mail.

Architecture

The architecture for the standard Internet protocols is defined by the following Request for Comments (RFC) documents:

- RFC 821 *Simple Mail Transfer Protocol*
- RFC 2060 *Internet Message Access Protocol - Version 4rev1*
- RFC 1939 *Post Office Protocol - Version 3*
- RFC 822 *Standard for the Format of ARPA Internet Text Messages.*

For more information about these RFCs and any related extensions, go to:
<http://www.ietf.org>

On the TPF 4.1 system, the SMTP server is based on the Secure Mailer (also known as Postfix), and the IMAP and POP servers are based on the Cyrus project. For more information about these products, go to:

- <http://www.postfix.org>
- <http://www.cmu.edu/computing/cyrus>

The TPF Internet mail servers can run on the same TPF 4.1 system as other TPF applications. If the volume of mail (throughput) gets large, consider running the TPF Internet mail servers on a separate processor to ensure that the servers have enough resources and do not interfere with other TPF applications.

Configuration Files

The behavior of the TPF Internet mail servers is controlled by the following configuration files:

- `/etc/postfix/main.cf`, which specifies the configuration parameters for the SMTP server
- `/etc/imapd.conf`, which specifies the configuration parameters for the IMAP and POP servers
- `/etc/tpf_mail.conf`, which specifies the configuration parameters for TPF-unique information.

You can also create an optional access list, named `/etc/postfix/access`, which directs the SMTP server to selectively accept or reject mail from or to specific addresses.

You can create and update the configuration files by using one of the following methods:

- Use the ZFILE commands to create and update the files directly on your TPF 4.1 system.
- Create and update the files on another system and use Trivial File Transfer Protocol (TFTP) or File Transfer Protocol (FTP) to transfer the files to your TPF 4.1 system.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about the configuration files, including how to create and update them.

Using TPF Internet Mail Server Support

The tasks associated with using the TPF Internet mail servers are divided into two categories based on the type of user:

Administrators or Operators

As an administrator or operator, you can perform tasks related to:

- Controlling and configuring the mail servers
- Controlling and configuring the user accounts and user mailboxes.

Clients or End Users

As a client, you can:

- Send and receive Internet mail
- Control and configure submailboxes.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about how to configure and use TPF Internet mail server support.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TPF Internet mail server support, you must establish the required operating environment. The following section describes hardware and software requirements specific to TPF Internet mail server support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for TCP/IP-Based Communication: To use TPF Internet mail server support, TCP/IP native stack support must be installed on the TPF 4.1 system. See “TCP/IP Native Stack Support (APAR PJ26683)” on page 626 for more information about TCP/IP native stack support.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1023 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1023. Changes to Build Scripts for TPF Internet Mail Server Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
JCI2BS	DLM	New	Added for TPF Internet mail server support.

Dynamic Load Module (DLM) Stubs: Table 1024 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 1024. Changes to Dynamic Load Module (DLM) Stubs for TPF Internet Mail Server Support

DLM Stub	New or No Longer Supported?
CMNG	New

General Use C/C++ Language Header Files: Table 1025 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1025. Changes to General Use C/C++ Language Header Files for TPF Internet Mail Server Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$ck2sn.h	Changed	No	Not Applicable
c\$syseq.h	Changed	No	Not Applicable
errno.h	Changed	No	Not Applicable
fcntl.h	Changed	No	Not Applicable
modes.h	Changed	No	Not Applicable
param.h	Changed	No	Not Applicable
resolv.h	Changed	Yes	Reassemble CNSNAM, CNSPAR, CNSPRN, CRESCO, CRESDA, CRESDB, CRESIN, CRESMK, CRESQR, CRESSN, and link-edit CTXO.
signal.h	Changed	No	Not Applicable
socket.h	Changed	No	Not Applicable
sys/file.h	New	No	Not Applicable
sys/filio.h	New	No	Not Applicable
sys/ioccom.h	New	No	Not Applicable
sys/lock.h	New	No	Not Applicable
sys/resource.h	New	No	Not Applicable
sys/sockio.h	New	No	Not Applicable
sys/sys_time.h	New	No	Not Applicable
sys/ttycom.h	New	No	Not Applicable
sys/un.h	New	No	Not Applicable
tpf_mail.h	New	No	Not Applicable
types.h	Changed	No	Not Applicable
unistd.h	Changed	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1026 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1026. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF Internet Mail Server Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
i\$dpwd.h	Changed	Yes	Reassemble CPWGR0 and link-edit COMX.
tpfmail.h	New	No	Not Applicable
tpfmaild.h	New	No	Not Applicable

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 1027 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 1027. Changes to Library Members (Object Files) for TPF Internet Mail Server Support

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CDDNPI	COMX	Changed	C Language	Updated for TPF Internet mail server support.
CFS181	COMX	Changed	C Language	Updated for TPF Internet mail server support.
CPWGR0	COMX	Changed	C Language	Updated for TPF Internet mail server support.
C536	COMX	Changed	C Language	Updated for TPF Internet mail server support.

Link-Edited Modules: Table 1028 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1028. Changes to Link-Edited Modules for TPF Internet Mail Server Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CMNA	New	Added for TPF Internet mail server support.
CMNC	New	Added for TPF Internet mail server support.
CMNG	New	Added for TPF Internet mail server support.
CMNI	New	Added for TPF Internet mail server support.
CMNJ	New	Added for TPF Internet mail server support.
CMNZ	New	Added for TPF Internet mail server support.
CMN0	New	Added for TPF Internet mail server support.
CMN1	New	Added for TPF Internet mail server support.
CMN2	New	Added for TPF Internet mail server support.
CMN3	New	Added for TPF Internet mail server support.
CMN8	New	Added for TPF Internet mail server support.
COMX	Changed	Updated for TPF Internet mail server support.
CTXO	Changed	Updated for TPF Internet mail server support.
JCI2	New	Added for TPF Internet mail server support.

Members (Object Files): Table 1029 on page 978 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1029. Changes to Members (Object Files) for TPF Internet Mail Server Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
CNA2E	CTXO	Changed	C Language	Updated for TPF Internet mail server support.
CNE2A	CTXO	Changed	C Language	Updated for TPF Internet mail server support.
CRESDA	CTXO	Changed	C Language	Updated for TPF Internet mail server support.
JCI2	JCI2	New	C Language	Added for TPF Internet mail server support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1030 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1030. Changes to Copy Members for TPF Internet Mail Server Support

Copy Member	Type	CP CSECT Where Copy Member Is Located	DLM Where CP CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CT15	Control Program	CCCTIN	Not Applicable	Changed	Updated for TPF Internet mail server support.
CPSE	Control Program	CCCPSE	Not Applicable	Changed	Updated for TPF Internet mail server support.

Fixed File Records

Table 1031 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 1031. Changes to Fixed File Records for TPF Internet Mail Server Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#IBMMP4	Changed	Updated to include ordinals 20 – 26 for TPF Internet mail server support.
#MAILxx, where xx is a 2-character alphanumeric string.	New	Added for TPF Internet mail server support. See <i>TPF Transmission Control Protocol/Internet Protocol</i> for more information about the #MAILxx record.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 1032 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1032. Changes to Data Macros for TPF Internet Mail Server Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
CK2SN	Changed	No	Not Applicable
DC0DC	Changed	Yes	Reassemble CCDCOL, JCD1, and JCS0, and link-edit CPS0.
IMAIL	New	No	Not Applicable
LDTRT	Changed	No	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: Table 1033 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1033. Changes to Selected Equate Macros for TPF Internet Mail Server Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
CZ1SE	Changed	No	Not Applicable
SYSEQ	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1034 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1034. Changes to SIP Skeleton and Internal Macros for TPF Internet Mail Server Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed
SPRIAT	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1035 on page 980 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1035. Changes to SIP Stage II Macros for TPF Internet Mail Server Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 1036 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1036. Changes to Segments for TPF Internet Mail Server Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BKD1	Real-Time Assembler	Not Applicable	New	Added for TPF Internet mail server support.
CTKR	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Internet mail server support.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Internet mail server support.
JCS0	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Internet mail server support.
JRA2	Offline PL/I	DATAREAD	Changed	Updated for TPF Internet mail server support.
JRS3	Offline PL/I	DATAREAD	Changed	Updated for TPF Internet mail server support.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 1037 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 1037. Changes to SYSEQ Tags for TPF Internet Mail Server Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#AQ_ORD	20	New
#DQ_ORD	21	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1038 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1038. Changes to Commands for TPF Internet Mail Server Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZMAIL	New	Controls the TPF Internet mail servers.
ZMAIL CREATEMAILBOX	New	Creates a mailbox.
ZMAIL DELETEACLMAILBOX	New	Deletes a user from a mailbox.
ZMAIL DELETEMAILBOX	New	Deletes a mailbox.
ZMAIL LISTACLMAILBOX	New	Displays users for a mailbox.
ZMAIL LISTMAILBOX	New	Displays a list of mailboxes.
ZMAIL LISTQUOTA	New	Displays storage for a mailbox.
ZMAIL LISTQUOTAROOT	New	Displays the quota root for a mailbox.
ZMAIL PASSWORD	New	Sets or changes the password for an account.
ZMAIL PATH	New	Displays the path to an account.
ZMAIL RENAMEMAILBOX	New	Changes the name of a submailbox.
ZMAIL SETACLMAILBOX	New	Sets the list of users for a mailbox.
ZMAIL SETQUOTA	New	Sets the storage limit for a mailbox.

Messages and System Errors

Table 1039 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1039. Changes to Messages and System Errors for TPF Internet Mail Server Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
098100	System Error	New
098101	System Error	New
098102	System Error	New
098103	System Error	New
098104	System Error	New
098105	System Error	New
098106	System Error	New
098107	System Error	New
098108	System Error	New

Table 1039. Changes to Messages and System Errors for TPF Internet Mail Server Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
098109	System Error	New
09810A	System Error	New
09810B	System Error	New
098120	System Error	New
098121	System Error	New
098122	System Error	New
098123	System Error	New
098124	System Error	New
098125	System Error	New
098126	System Error	New
098127	System Error	New
098128	System Error	New
098129	System Error	New
09812A	System Error	New
09812B	System Error	New
09812C	System Error	New
098130	System Error	New
098131	System Error	New
098132	System Error	New
098133	System Error	New
098134	System Error	New
098135	System Error	New
098136	System Error	New
098137	System Error	New
098138	System Error	New
098139	System Error	New
09813A	System Error	New
09813B	System Error	New
09813C	System Error	New
09813D	System Error	New
09813E	System Error	New
098140	System Error	New
098141	System Error	New
098142	System Error	New
098143	System Error	New
098144	System Error	New
098145	System Error	New
098146	System Error	New
098147	System Error	New
098148	System Error	New
098149	System Error	New
09814A	System Error	New
MAIL0001I	Online	New

Table 1039. Changes to Messages and System Errors for TPF Internet Mail Server Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MAIL0002E	Online	New
MAIL0003I	Online	New
MAIL0007E	Online	New
MAIL0092E	Online	New
MAIL0093E	Online	New
MAIL0094E	Online	New
MAIL0098E	Online	New
MAIL0099E	Online	New
MAIL0100I	Online	New

Performance or Tuning Changes

There are parameters in the configuration files for the TPF Internet mail servers that you can change to further tune your mail system. See *TPF Transmission Control Protocol/Internet Protocol* for more information about the configuration files. In addition, there is a data reduction report, the TPF Internet mail server summary report, that contains data to help you determine how to tune some of the configuration parameters. See *TPF System Performance and Measurement Reference* for more information about, and an example of, this summary report.

TPF Internet mail server support uses the IDNSHOSTNAME and BINDCACHE caches. Use the ZCACH command to increase the size of these caches as needed to ensure there are enough entries. See *TPF Operations* for more information about the ZCACH command.

Storage Considerations and Changes

There are parameters in the configuration files for the TPF Internet mail servers that can affect how long mail items are saved and the storage used by each user. You can change these parameters as needed to further tune your mail system. See *TPF Transmission Control Protocol/Internet Protocol* for more information about the configuration files.

The dynamic load modules (DLMs) that are provided with TPF Internet mail server support are very large and may require additional system heap storage. Use the ZCTKA DISPLAY and the ZCTKA ALTER commands to display and change the size of system heap storage, respectively. See *TPF Operations* for more information about these commands.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1040 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1040. Changes to TPF Publications for TPF Internet Mail Server Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0D	Updated with information about TPF Internet mail server support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0E	Updated with information about C functions that were added or changed for TPF Internet mail server support.
<i>TPF Concepts and Structures</i>	GTPCON0B	Updated with information about TPF Internet mail server support.
<i>TPF Database Reference</i>	GTPDBR0C	Updated with recoup information about TPF Internet mail server support.
<i>TPF Library Guide</i>	GTPDOC0E	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF Internet mail server support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG204	Updated with migration considerations for TPF Internet mail server support.
<i>TPF Operations</i>	GTPOPR0E	Updated with information about the commands that were added and changed for TPF Internet mail server support.
<i>TPF System Generation</i>	GTPSYG0E	Updated with information about the new fixed file records for TPF Internet mail server support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR0D	Updated the sample data collection and reduction reports for TPF Internet mail server support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0A	Updated with information about how to configure and use TPF Internet mail server support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

With the new mail function, you can write TPF application programs to access Internet mail. See *TPF C/C++ Language Support User's Guide* for more information about the mail function.

Database Changes

Before you run recoup for the TPF Internet mail server database, ensure the mail server recoup descriptor (BKD1) is loaded on the TPF subsystem in which you plan to run the TPF Internet mail servers. Do not load the mail server recoup descriptor to subsystems in which the TPF Internet mail servers will not run.

In addition, you must ensure that BKD1 contains a GROUP and INDEX macro pair associated with each #MAILxx record that you have defined. Segment BKD1 is initially shipped with the macro statements needed for a mail domain associated with a #MAIL01 fixed file record type. If you define additional #MAILxx fixed file record types (such as, #MAIL02, #MAIL03, and so on) or want to use a record type value other than #MAIL01, you must update segment BKD1.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about recoup considerations for the mail database and how to update segment BKD1.
See *TPF Database Reference* for more information about how to run recoup.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before You Begin

Ensure that your TPF 4.1 system is at program update tape (PUT) 13. In particular, ensure that you have the following APARs from PUT 13 installed:

- Domain Name System (DNS) support (APAR PJ27268). See “Domain Name System (DNS) Support (APAR PJ27268)” on page 766 for more information.
- FIFO special file support (APAR PJ27214). See “FIFO Special File Support (APAR PJ27214)” on page 787 for more information.
- Logical record cache and coupling facility (CF) cache support (APAR PJ27083). See “Logical Record Cache and Coupling Facility (CF) Cache Support (APAR PJ27083)” on page 894 for more information.

Use the following procedure to install TPF Internet mail server support on your TPF 4.1 system:

1. Unpack PUT 14, which contains APARs PJ27784 and PJ27865 for TPF Internet mail server support. See *TPF Memo to Licensees* for more information about unpacking the tape.

Note: If you plan to run the TPF Internet mail servers in a subsystem other than the basic subsystem (BSS), you **must** apply APAR PJ27758.

2. Install the following:
 - C/C++ language header files listed in Table 1026 on page 976 and Table 1025 on page 976
 - Copy members listed in Table 1030 on page 978
 - Macros found in “Macros” on page 978.
3. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
4. Update the record ID attribute table (RIAT) with the new FC55 record ID, as appropriate. See *TPF System Generation* for more information about the RIAT.
5. Determine how many mail domains you need for your mail system.
6. Determine which subsystem the TPF Internet mail servers will run on, referred to as the mail subsystem in the remainder of this information.
7. On the mail subsystem, update the SIP RAMFIL macro input statements to the FACE table generator (FCTBG) by specifying the #MAILxx fixed file record type, where xx is a 2-character alphanumeric string. You will need a different #MAILxx record type for each domain in your mail system. Allocate 1000

#MAILxx records for each domain. See *TPF System Generation* for more information about the #MAILxx record type and the RAMFIL macro.

8. On the mail subsystem, ensure that there are at least 100 #IBMMP4 records allocated.
9. Run the FCTBG to create a new FACE table.
10. Assemble the SIP stage I deck to create a SIP stage II deck.
11. Run SIP stage II.
12. Run the CBLD program for the build scripts listed in Table 1023 on page 975.
13. Reassemble or recompile the following:
 - Library members listed in Table 1027 on page 977
 - Members (object files) listed in Table 1029 on page 978
 - CSECTs listed in Table 1030 on page 978
 - Segments listed in Table 1026 on page 976, Table 1025 on page 976, Table 1032 on page 979, and Table 1036 on page 980.
14. On the mail subsystem, verify that recoup descriptor BKD1 is coded correctly for each mail domain that you are defining. If you define a fixed file record type other than #MAIL01 or if you define more than one #MAILxx fixed file record type, you must update and reassemble segment BKD1. See *TPF Transmission Control Protocol/Internet Protocol* for more information about recoup considerations and how to update BKD1.
15. Load the link-edited modules listed in Table 1028 on page 977.
16. IPL your TPF 4.1 system.
17. On the mail subsystem, cycle the TPF 4.1 system to CRAS state or higher.
18. On the mail subsystem, enter a ZIFIL command to initialize each #MAILxx record type that you defined. For example, enter the following to initialize the #MAIL01 records:
ZIFIL MAIL01/FC55/00/0/999/NNN/N
19. On the mail subsystem, enter the following on every processor to initialize the mail-related IBMMP4 records:
ZIFIL IBMMP4/FC63/00/20/20/NNN/N
ZIFIL IBMMP4/FC66/00/21/21/NNN/N
20. Enter **ZFILE echo "postfix::14:3::/" >> /etc/passwd** to add the postfix user ID to the password file on the TPF 4.1 system.
21. On the mail subsystem, enter **ZMAIL FLUSH** to initialize the database queue pointers.
22. Create the SMTP, IMAP and POP, and TPF configuration files. See *TPF Transmission Control Protocol/Internet Protocol* for more information about how to create these files.
23. Ensure that you have a valid registered domain name.
24. Update the external DNS servers with the domain names and IP addresses of the TPF Internet mail servers.
25. On the mail subsystem, enter the following to add the TPF Internet mail servers to the Internet daemon configuration file (IDCF):
ZINET ADD S-SMTP PGM-CMN0 MODEL-NOWAIT PORT-25 P-TCP IP-ANY ACT-OPER STATE-CRAS
ZINET ADD S-IMAP PGM-CMNA MODEL-NOWAIT PORT-143 P-TCP IP-ANY ACT-OPER STATE-CRAS
ZINET ADD S-POP3 PGM-CMNC MODEL-NOWAIT PORT-110 P-TCP IP-ANY ACT-OPER STATE-CRAS

See *TPF Operations* for more information about the ZINET ADD command.

26. On the mail subsystem, enter **ZMAIL START READ** to start the IMAP and POP servers.
27. Enter the ZFILE export command to set the MAILDOMAIN environment variable to the domain in which you want to create mailboxes. See *TPF Operations* for more information about the ZFILE export command.
28. On the mail subsystem, use the appropriate ZMAIL commands to create user accounts, mailboxes, and access permissions. See *TPF Transmission Control Protocol/Internet Protocol* for more information about how to do this. See *TPF Operations* for more information about the ZMAIL commands.
29. On the mail subsystem, enter **ZMAIL START ALL** to start the TPF Internet mail servers.

The mail servers are now ready for you to use.

Unlimited Pool Segment Support (APAR PJ27484)

The following section discusses the migration considerations for unlimited pool segment support.

Prerequisite APARs

See the APEDIT for APAR PJ27484 for information about prerequisite APARs.

Functional Overview

Unlimited pool segment support enhances the recoup, pool directory update (PDU), pool generation, pool reallocation, and pool deactivation utilities in a TPF 4.1 system environment by doing the following:

- Eliminating pool segment restrictions
- Increasing performance
- Simplifying pool generation and reallocation procedures.

Eliminating Pool Segment Restrictions

Section 2 of the long-term directory reference table (LTDRT), which describes pool directories, is limited to 125 pool segments. Segment DYD0, which contains assembled pool segment information, is limited to 190 pool segments. The problem is that large TPF customer sites have more than 125 defined pool segments. Unlimited pool segment support eliminates pool segment restrictions by eliminating section 2 of the LTDRT and the assembled pool section information from program segment DYD0.

Section 2 of the LTDRT has been replaced by the IBM pool allocation resource table (IPART), which resides in main storage. ZPOOL GENERATION CREATE command processing no longer uses DYD0 to extract pool segment information. This information is now retrieved directly from the FACE table (FCTB).

Increasing Performance

Recoup and PDU processing sequentially searches the LTDRT to find the bit in a specific pool directory that represents a specific file address, but the LTDRT is a fixed file and the sequential search mechanism can be slow. Unlimited pool segment support replaces section 2 of the LTDRT with the IPART, which resides in main storage, and uses a combination index and B-tree search mechanism for quicker searches to improve recoup and PDU processing performance.

Simplifying Pool Generation and Reallocation Procedures

Pool generation and reallocation procedures have been changed. You no longer have to build an online pool maintenance available (OPMAAA) table or online pool maintenance deactivation (OPMBBB) table in the DYD0 segment because unlimited pool segment support eliminates the need for these tables. Internal processing calls to the RTCUC macro with the POOLSEGMENT parameter specified returns data similar to what existed in the OPMAAA table. Internal processing calls to the RTCUC macro with the DEACTIVATEDSEGMENT parameter specified returns data similar to what existed in the OPMBBB table. See *TPF Database Reference* for more information about pool generation and reallocation procedures.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1041 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1041. Changes to Build Scripts for Unlimited Pool Segment Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
BBLDBS	DLM	New	Created for unlimited pool segment support.

Object Code Only (OCO) Stubs: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1042 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1042. Changes to General Use C/C++ Language Header Files for Unlimited Pool Segment Support

C/C++ Language Header File	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cinfc.h	X	Changed	No
c\$cy3d.h	X	New	No
c\$cy7p.h	X	New	No
c\$fctb.h	X	Changed	No
c\$fgn0.h	X	Changed	No
c\$fps0.h	X	Changed	No
c\$frg0.h	X	Changed	No
c\$syseq.h	X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1043 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1043. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Unlimited Pool Segment Support

C/C++ Language Header File (IBM Use Only)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$breq.h	X	Changed	No
i\$part.h	X	New	No
i\$recp.h	X	Changed	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: There are no changes.

Members (Object Files): Table 1044 summarizes changes to members (object files). This information is presented in alphabetic order by the name of the member (object file).

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1044. Changes to Members (Object Files) for Unlimited Pool Segment Support

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	Description of Change
BBLD01	BBLD	New	Real-Time Assembler	Created for unlimited pool segment support.
BBUILD	BBLD	New	C Language	Created for unlimited pool segment support.
BOFI	BOFI	Changed	C Language	Updated for unlimited pool segment support.
BOF1	BOF1	Changed	C Language	Updated for unlimited pool segment support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 1045 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 1045. Changes to CINFC Tags for Integrated Online Pool Maintenance and Recoup Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMIPART	297	New
CMMLTDRT	297	No Longer Supported

Copy Members

Table 1046 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1046. Changes to Copy Members for Unlimited Pool Segment Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CICR	Control Program	CCNUCL	Not Applicable	Changed	Updated for unlimited pool segment support.
CTI0	Control Program	CCCTIN	Not Applicable	Changed	Updated for unlimited pool segment support.

Table 1046. Changes to Copy Members for Unlimited Pool Segment Support (continued)

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
RTCU	Control Program	CCDBAF	Not Applicable	Changed	Updated for unlimited pool segment support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 1047 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1047. Changes to Data Macros for Unlimited Pool Segment Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
FC0TB	Changed	No	Not Applicable
IDSPS	New	No	Not Applicable
IPART	New	No	Not Applicable
LTDRT	Changed	No	Not Applicable

General Macros: Table 1048 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 1048. Changes to General Macros for Unlimited Pool Segment Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
ADDLDC	New	No	Not Applicable
ADDRC	New	No	Not Applicable
RTCUC	Changed	No	Not Applicable
SUBLDC	New	No	Not Applicable
SUBRC	New	No	Not Applicable

Selected Equate Macros: Table 1049 on page 992 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1049. Changes to Selected Equate Macros for Unlimited Pool Segment Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
BRPEQ	Changed	No	Not Applicable
CINFC	Changed	No	Not Applicable
SYSEQ	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1050 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1050. Changes to SIP Skeleton and Internal Macros for Unlimited Pool Segment Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKSYCN	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements:

Table 1051 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck

See “System Initialization Program (SIP) and System Generation Changes” on page 997 for a description of other system generation changes you must make.

Table 1051. Changes to SIP Stage I Macros and Statements for Unlimited Pool Segment Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
RAMFIL	Changed

System Initialization Program (SIP) Stage II Macros: Table 1052 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1052. Changes to SIP Stage II Macros for Unlimited Pool Segment Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 1053 on page 993 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro.

See *TPF System Macros* for a complete description of all system macros.

Table 1053. Changes to System Macros for Unlimited Pool Segment Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
SYCON	Changed	No	Not Applicable

System Macros (IBM Use Only): There are no changes.

Segments

Table 1054 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1054. Changes to Segments for Unlimited Pool Segment Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
B0P0	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
B0P5	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
B0SH	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
B1A8	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
B1A9	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
B1BK	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCAI	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCP0	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCP1	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCP2	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCP6	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCPI	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCPY	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BCPZ	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BOF2	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BOF3	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BOF4	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BOF5	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BOF6	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.

Table 1054. Changes to Segments for Unlimited Pool Segment Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BOF9	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BOFB	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BOFF	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BPDH	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BRB3	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BRSH	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BRV1	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BRV3	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BRV5	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BRV6	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
BS0C	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
CYAE	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYD0	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYD5	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYD7	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYD8	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYD9	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYDA	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYDU	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
DYOM	Real-Time Assembler	Not Applicable	Changed	Updated for unlimited pool segment support.
FTBD09	Offline C Language	FCTBG	Changed	Updated for unlimited pool segment support.
FTBD10	Offline C Language	FCTBG	No Longer Supported	Deleted by unlimited pool segment support.
FTGN00	Offline C Language	FCTBG	Changed	Updated for unlimited pool segment support.
FTPS03	Offline C Language	FCTBG	Changed	Updated for unlimited pool segment support.
FTRG06	Offline C Language	FCTBG	Changed	Updated for unlimited pool segment support.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 1055 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 1055. Changes to SYSEQ Tags for Unlimited Pool Segment Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#LTDRT	122	No Longer Supported

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1056 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1056. Changes to Commands for Unlimited Pool Segment Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZPOOL DISPLAY	Changed	Updated for unlimited pool segment support.
ZPOOL GENERATION	Changed	Updated for unlimited pool segment support.
ZPOOL INIT	Changed	Updated for unlimited pool segment support.
ZRECP DISPLAY	Changed	Updated for unlimited pool segment support.
ZRPDU CREATE	Changed	Updated for unlimited pool segment support.

Messages and System Errors

Table 1057 on page 996 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1057. Changes to Messages and System Errors for Unlimited Pool Segment Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
04100C	System Error	No Longer Supported
BBLD0001I	Online	New
BBLD0002E	Online	New
BBLD0003E	Online	New
BBLD0004E	Online	New
BBLD0006E	Online	New
BBLD0007E	Online	New
BBLD0008E	Online	New
BCAI0007E	Online	No Longer Supported
BCPI0001E	Online	No Longer Supported
BCP00030E	Online	No Longer Supported
BCP60001E	Online	No Longer Supported
BOFF0002E	Online	No Longer Supported
BOF20001I	Online	No Longer Supported
BOF20002I	Online	No Longer Supported
BOF20003I	Online	New
BOF20004I	Online	New
BOF20005I	Online	New
BOF20006I	Online	New
BOF20007I	Online	New
BOF20008I	Online	New
BOF20009E	Online	New
BOF30004E	Online	No Longer Supported
BOF30005E	Online	No Longer Supported
BOF30006E	Online	Changed
BOF40004E	Online	Changed
BOF40005E	Online	No Longer Supported
BOF40006E	Online	No Longer Supported
BRV10000I	Online	No Longer Supported
BRV10001I	Online	No Longer Supported
BRV10002E	Online	Changed
BRV10004E	Online	No Longer Supported
BRV10005E	Online	No Longer Supported
BRV10006E	Online	No Longer Supported
BRV10007E	Online	Changed
BRV10010I	Online	New
BRV10011I	Online	New
BRV10016E	Online	New
BRV50001I	Online	No Longer Supported
BRV50002I	Online	No Longer Supported
BRV50010I	Online	New
BRV50011I	Online	New
BRV60001I	Online	Changed
BRV60008E	Online	No Longer Supported

Table 1057. Changes to Messages and System Errors for Unlimited Pool Segment Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
B1A80017E	Online	No Longer Supported
B1A80018E	Online	No Longer Supported
DYDD0006W	Online	Changed
DYDU0079E	Online	No Longer Supported
DYD90002T	Online	No Longer Supported
DYD90003T	Online	No Longer Supported
DYD90007T	Online	No Longer Supported
DYD90008T	Online	No Longer Supported
DYD90015E	Online	New
DYD90016E	Online	New
RECP0032A	Online	No Longer Supported
RECP0302E	Online	No Longer Supported
RECP0423E	Online	No Longer Supported

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1058 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1058. Changes to TPF Publications for Unlimited Pool Segment Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Database Reference</i>	GTPDBR0C	Updated with changed reallocation procedural information for unlimited pool segment support.
<i>TPF General Macros</i>	GTPGEN0E	Updated with information about new and changed system macros for unlimited pool segment support.
<i>TPF Library Guide</i>	GTPDOC0E	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for unlimited pool segment support.

Table 1058. Changes to TPF Publications for Unlimited Pool Segment Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG204	Updated with migration considerations for unlimited pool segment support.
<i>TPF Operations</i>	GTPOPR0E	Updated with information about the commands that were added and changed for unlimited pool segment support.
<i>TPF Programming Standards</i>	GTPPSM0A	Deleted OPMTBL and OPMTBLO from the list of data macro (DSECT) names that deviate from the naming standard.
<i>TPF System Generation</i>	GTPSYC0E	Updated with changed system generation information for unlimited pool segment support.
<i>TPF System Macros</i>	GTPSYS0E	Deleted the DIR=SON parameter from the SYCON macro for unlimited pool segment support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To install and use unlimited pool segment support, do the following:

1. Ensure that no pool reallocation processing is running on the TPF 4.1 system to which you are installing program update tape (PUT) 14.
2. For any pool segments that are being deactivated, specify DEACTIVATE=YES on the RAMFIL macro statements in the system initialization program (SIP) stage 1 deck.
3. Install PUT 14 on all processors that will be running recoup.
4. Reassemble or recompile the following:
 - DLM members listed in Table 1044 on page 990
 - CSECTS listed in Table 1046 on page 990
 - Segments listed in Table 1054 on page 993.
5. Link-edit the dynamic load modules (DLMs) listed in Table 1044 on page 990.
6. Do the following on all subsystems:
 - a. Run the FACE table generator (FCTBG) to create the new FACE table.
 - b. Run the system allocator program (SALO) using IBMPAL additions for newly created segments to create an updated IBM program allocation table (IPAT) and system allocator (SAL) table.
7. Link-edit the control program (CP).
8. To prevent a loss of pool space or data if there are any problems migrating to unlimited pool segment support, run recoup, run pool directory update (PDU),

and capture all critical data before loading and IPLing the TPF 4.1 system with unlimited pool segment support changes.

9. Load the CP to the basic subsystem (BSS).
10. Load the FACE table, IPAT, the dynamic load modules (DLMs) listed in Table 1044 on page 990, and the programs listed in Table 1054 on page 993 to each subsystem.
11. Make sure that recoup or PDU is not running on the TPF 4.1 system.
12. IPL the TPF 4.1 system.
13. Cycle the TPF 4.1 system to 1052 state.
14. Cycle the TPF 4.1 system to NORM state.

XML Parser (APAR PJ27634)

The following section discusses the migration considerations for the XML parser.

Note: The XML parser (APAR PJ27634) is **replaced** by XML4C Parser 3.5.1 (APAR PJ28176) shipped on PUT 16. See “XML4C Parser 3.5.1 (APAR PJ28176)” on page 1244 for more information about XML4C Parser 3.5.1 migration considerations.

Prerequisite APARs

There are no prerequisite APARs.

Functional Overview

The XML parser allows you to read (parse) Extensible Markup Language (XML) data on the TPF 4.1 system. XML is a markup language that combines the power of Standard Generalized Markup Language (SGML) and the simplicity of Hypertext Markup Language (HTML). XML allows you to mark up data based on what information the data contains rather than on how it is to be rendered. Data marked up in XML is easy to share across various platforms and across various companies. For more information about the XML specification, go to <http://www.w3.org/>.

The XML parser is the XML Parser for C++ (XML4C) Version 3.1.2 ported to the TPF 4.1 system. The parser is XML Version 1.0 compliant and allows TPF 4.1 applications written in C++ language to do the following:

- Parse XML documents using the Document Object Model (DOM) Version 1.0 specification

Notes:

1. DOM can also assist in using TPF applications to modify and create XML documents.
 2. Some APIs from the DOM version 2.0 specification are provided for experimental use. They are not supported for production work.
- Parse XML documents using the Simple API for XML (SAX) Version 1.0 specification
 - Parse XML documents with or without validation against a specified Document Type Definition (DTD).

Applications on the TPF 4.1 system interact with XML documents that are in the file system, coming in through standard input (`stdin`) or residing in memory. This interaction is made possible through application programming interfaces (APIs) specified by either the DOM or SAX specifications and can be either nonvalidating or validating against a DTD. The API definitions are contained within a set of header files that application programmers will need to have in their `#include` (or `search`) path. See General Use C/C++ Language Header Files on page 1001 for more information about these header files.

The TPF information for XML parser is exclusively online. Go to *XML on TPF: An Online User's Guide* for more information. See Publication Changes on page 1004 for more information about XML parser written information.

Architecture

IBM contributed the XML4C parser to the Apache XML Project (<http://xml.apache.org>) as open source in November 1999. The XML Parser for C++ (XML4C) Version 3.1.2 is based on Xerces-C Version 1.1 and is fully compliant with

the Unicode 3.0 specification. While the Apache Xerces-C parser can be updated by the open source community, the XML4C parser is maintained only by IBM and may differ slightly from the Xerces-C parser.

- For more information about the Unicode specification, go to the Unicode Consortium's Web page (<http://www.unicode.org>).
- For more information about XML and the DOM specification, go to <http://www.w3.org/>.
- For more information about the SAX specification, go to <http://www.megginson.com>.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: The ported XML4C parser code provides a set of header files (or `#include` files) that are needed for applications that use the XML4C parser to access XML data. These header files are included with APAR PJ27634 and must be copied into a directory accessible by application programmers. (Application programmers are instructed to concatenate the directory that contains these header files in their `#include` path.)

When copying the XML4C header files to your system, ensure that you retain the directory structure in which they reside. The following shows the directory structure for the files (note that there are many header files in each directory):

```
include
|
| - dom
| - framework
| - internal
| - parsers
| - sax
| - util
|   | - Compilers
|   | - MsgLoaders
|   |   | - InMemory
|   | - Platforms
|   |   | - TPF
|   | - Transcoders
|   |   | - IconvTPF
| - validators
|   | - DTD
```

See Publication Changes on page 1004 for more information about XML parser (APAR PJ27634) information. (For specific information about the XML4C header files, open *XML on TPF: An Online User's Guide* and click **XML4C Version 3.1.2 Documentation**.)

Note: The XML4C header files cannot reside in a partitioned data set (PDS) because the first eight characters of all header files that reside in a PDS must be unique and the XML4C header file names do not follow this rule. To ensure that your application programs work, put the header files into a hierarchical file system (HFS); these header files cannot be renamed and each must reside in its native directory in the HFS.

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Library Members (Object Files): Table 1059 summarizes the library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 1059. Changes to Library Members (Object Files) for the XML Parser

Library Member (Object File)	Library Module Name	New, Changed, or No Longer Supported?	Type	Description of Change
CICONT	CISO	Changed	Object Code Only	Internal updates that support changes to the iconv function.

Link-Edited Modules: Table 1060 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1060. Changes to Link-Edited Modules for the XML Parser

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CXML	New	Created for ported XML parser code.
CISO	Changed	Updated the CICONT library member (object file). See Table 1059 for more information about this change.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1061 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1061. Changes to SIP Skeleton and Internal Macros for the XML Parser

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1062 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1062. Changes to SIP Stage II Macros for the XML Parser

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

There are no changes.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1063 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1063. Changes to TPF Publications for the XML Parser

Publication Title	Softcopy File Name	Description of Change
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG204	Updated with migration considerations the for XML parser.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0E	Added the list of classes that are supported by the XML Parser for C++ (XML4C) Version 3.1.2 but not documented in <i>TPF C/C++ Language Support User's Guide</i> .
<i>XML on TPF: An Online User's Guide</i>	Not Applicable	Created for the delivery of TPF information on the XML parser.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

XML4C supports the DOM and SAX specifications, which are each comprised of several APIs. These APIs are supported on the TPF 4.1 system but are not documented in the library. The information for the APIs was included with the ported parser and is available in *XML on TPF: An Online User's Guide*. See Publication Changes for more information.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install the XML parser on your TPF 4.1 system:

1. Unpack program update tape (PUT) 14, which contains APAR PJ27634 for the XML parser. See *TPF Memo to Licensees* for more information about unpacking the tape.
2. Copy the XML4C C/C++ language header files into an HFS so that they are available to application programmers. The directory structure must be maintained. See General Use C/C++ Language Header Files on page 1001 for more information about the XML4C header files.
3. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
4. Assemble the SIP stage I deck to create a SIP stage II deck.
5. Run SIP stage II.
6. Link and load the CISO link-edited module listed in Table 1060 on page 1002, which includes the changed CICON object code only library member (object file).
7. Load the CXML link-edited module listed in Table 1060 on page 1002.
8. IPL your TPF 4.1 system.

Listing files are available on a CD-ROM. See your IBM service representative for more information about these CD-ROMs.

Notes:

1. The tar file `xml4c3_1_2.tpf.ascii.tar.z` is provided and contains the XML Parser for C++ (XML4C) Version 3.1.2 source code. The files created after extracting this tar file contain source code, listings, samples, written information, and makefiles. (IBM does not, however, warrant that these makefiles will run in your development environment because these files may use tools that are not required for your TPF 4.1 system.) The tar file is provided **for your information only** and this source code is not supported on the TPF 4.1 system.
2. Extracting the contents of the tar file will create a `samples` directory. The samples in this directory may be useful to programmers who are writing applications that interact with XML data. Directions for using these samples (included in *XML on TPF: An Online User's Guide*) assume that the programmers have access to the extracted `samples` directory.

32-Way Loosely Coupled Pool Support (APAR PJ27686)

The following section discusses the migration considerations for 32-way loosely coupled pool support.

Prerequisite APARs

See the APEDIT for APAR PJ27686 for information about prerequisite APARs.

Functional Overview

The goal of 32-way loosely coupled processor support is to provide the additional capacity you need to support application workload growth. 32-way loosely coupled pool support is one of several steps toward this goal. In this deliverable, all 8-way constraints in the pools area are removed. 32-way loosely coupled pool support provides the following:

- Enhancements to pool data structures:
 - Adds processor unique data fields
 - Reserves additional space for future pool sections
 - Moves keypoint data to new fixed file records
 - Converts the short-term processor control fixed file records (STPCR) from ordinal-based processor unique allocations to file address compute (FACE) program short-term processor unique fixed file records (STPUR).
- Extensions to user exits and access functions when pool data structures are retrieved or filed.
- Coexistence of processors running pool expansion (PXP) support and 32-way loosely coupled pool support during the migration of the loosely coupled complex.

Note: 32-way loosely coupled pool support does not remove the constraint of a maximum of 8 loosely coupled processors. Additional functions are required to complete 32-way loosely coupled processor support.

These changes and enhancements are discussed in more detail in the following sections.

Pool Data Structures

The following pool data structures have moved to different storage locations or have been given a new format:

- Keypoint 9 (CY1KR)
- Pool section keypoint records (CY2KT)
- Pool descriptor record (CY0PD)
- Short-term common control records (CY\$CR)
- Short-term processor control and data records (ICY\$PR).

To support the restructuring of the pool data structures, the following additional fixed file record types are provided:

#CY2CPY

During a recoup run or when the ZDDIR command is entered, the pool section keypoint tables (CY2KTs), keypoint 9 (CTK9), and the pool directories are stored in fixed file records. The CY2KTs are stored in the #CY2CPY fixed file record type. The copy of keypoint 9 that corresponds to the #CY2CPY record type is kept in the #IBMM4 fixed file record type,

ordinal #KY9CPY1. #CY2CPY is a 4-K processor shared fixed file record type with a minimum of 48 ordinals (1 ordinal for each pool section plus ordinals for pool expansion).

#CY2KT

The pool section keypoint table, or CY2KT record, was previously contained in keypoint 9. While part of CY2KT remains in keypoint 9, most of the record is now in #CY2KT, a 4-K processor shared fixed file record type. A total of 48 ordinals must be allocated for the #CY2KT fixed file record type (1 ordinal for each pool section plus ordinals for pool expansion). Pool sections are assigned ordinals in the same order as their corresponding CY2KT records appear in keypoint 9.

#CY2NEW

During pool generation and reconfiguration, the pool section keypoint tables (CY2KTs) are built in the #CY2NEW fixed file record type. The CY2KTs are later transferred to the #CY2KT fixed file record type. The copy of keypoint 9 that corresponds to the #CY2NEW record type is kept in the #IBMM4 fixed file record type, ordinal #KPT9NEW. #CY2NEW is a 4-K processor shared fixed file record type with a minimum of 48 ordinals (1 ordinal for each pool section plus ordinals for pool expansion).

#STPUR

The short-term processor unique records (control and data records) reside in #STPUR, which is a 4-K, processor unique record type. These records were previously kept in the #STPCR record type. Currently, n ordinals are allocated for the #STCCR fixed file record type, where n is related to the number of short-term directories allocated. For each processor, n #STPUR ordinals must be allocated.

Once migration and conversion to 32-way loosely coupled pool support is completed, and there is no requirement to fall back to pool expansion (PXP) support, you can delete the following record type:

#STPCR

The short-term processor unique records (control and data records) were previously found in the #STPCR record type.

Once the #STPCR fixed file record type is deleted, fallback is no longer possible and the pool data structures cannot be converted back to PXP format. See "Migration, Coexistence, and Conversion" on page 1009 for more information about migration and conversion considerations.

See "Architecture" on page 1010 for more information about the pool data structures and fixed record types. Also see *TPF System Generation* for more information about record types.

ECB-Type User Exits and Pool Data Access

User exits Rearrange_CTK9, Dearrange_CTK9, Get_CY\$CR, and File_CY\$CR were first introduced with PXP support and provide user access to the pool data structures when they are retrieved or filed by the TPF 4.1 system. These user exits are being reused by 32-way loosely coupled pool support. You must examine your TPF 4.1 system and determine if you must modify your user exits to accommodate 32-way loosely coupled pool support.

The Get_CY\$CR and File_CY\$CR user exits have been renamed to Find_STCCR and File_STCCR.

The following ECB-type user exits are provided by 32-way loosely coupled pool support:

Rearrange_CTK9

The Rearrange_CTK9 user exit, UPX0, allows you to perform accounting or other activities when the TPF 4.1 system retrieves keypoint 9 through the CYYM interface. This user exit also provides a mechanism for you to provide your own function to convert keypoint 9 from its current format to 32-way loosely coupled pool format or to a compatible user-defined format. The Rearrange_CTK9 user exit is called by the Rearrange_CTK9 function in CYH0.

Dearrange_CTK9

The Dearrange_CTK9 user exit, UPX1, allows you to perform accounting or other activities when the TPF 4.1 system files keypoint 9 through the CYA interface. This user exit also provides a mechanism for you to provide your own function to convert keypoint 9 from its current format in storage to PXP format or a compatible user-defined format. The Dearrange_CTK9 user exit is called by the Dearrange_CTK9 function in CYH1.

Find_STCCR

The Find_STCCR user exit, UPX2, allows you to perform accounting or other activities when the TPF 4.1 system retrieves a short-term common control record (STCCR). This user exit also provides a mechanism for you to provide your own function to convert the STCCR from its current format to 32-way loosely coupled pool format or a compatible user-defined format. The Find_STCCR user exit is called by the Find_STCCR function in CYH2.

File_STCCR

The File_STCCR user exit, UPX3, allows you to perform accounting or other activities when the TPF 4.1 system files a short-term common control record (STCCR). This user exit also provides a mechanism for you to provide your own function to convert the STCCR from its current format in storage to PXP format or a compatible user-defined format. The File_STCCR user exit is called by the File_STCCR function in CYH3.

Find_CY2KT

The Find_CY2KT user exit, UPX6, allows you to perform accounting or other activities when the TPF 4.1 system retrieves a pool section keypoint table (CY2KT). This user exit also provides a mechanism for you to provide your own function to convert CY2KT from its current format to 32-way loosely coupled pool format or a compatible user-defined format. The Find_CY2KT user exit is called by the Find_CY2KT function in CYH6.

File_CY2KT

The File_CY2KT user exit, UPX7, allows you to perform accounting or other activities when the TPF 4.1 system files a pool section keypoint table (CY2KT). This user exit also provides a mechanism for you to provide your own function to convert CY2KT from its existing format to PXP format or a compatible user-defined format. The File_CY2KT user exit is called by the File_CY2KT function in CYH6.

For a user-defined PXP format or 32-way loosely coupled pool format to be compatible with the TPF-supplied default format, the user-defined format must not change any names or properties (data type, length, or word boundary requirements) for any data fields defined in the TPF-supplied DSECT.

To support coexistence of processors running both PXP support and 32-way loosely coupled pool support in the same loosely coupled complex, you must use the pool

access functions provided as part of 32-way loosely coupled pool support to access pool data structures in your code. These functions determine the format of the pool data structures on DASD and the format being used by the requesting processor. The appropriate format conversions are performed as the data is retrieved from DASD and presented to the processor or filed back to DASD from the processor. The following pool access functions are provided:

- FIND_CTK9
- FILE_CTK9
- FIND_CY2KT
- FILE_CY2KT
- FIND_CY0PD
- FILE_CY0PD
- FIND_STCCR
- FILE_STCCR
- FIND_STPCR.

See *TPF System Installation Support Reference* for more information about user exits and see “Pool Access Functions” on page 1011 for more information about pool data access.

Migration, Coexistence, and Conversion

The migration strategy for 32-way loosely coupled pool support allows you to move from PXP support to 32-way loosely coupled pool support over time without having to take down your loosely coupled complex. You can install and IPL 32-way loosely coupled pool support on a processor and have that processor coexist with other active processors in the complex that are still running from an image using PXP support.

When all processors in the complex have been migrated to 32-way loosely coupled pool support, you convert the pool data on DASD from PXP format to 32-way loosely coupled pool format by using the ZPMIG command.

As long as the pool data on DASD remains in PXP format, you can IPL any of the processors in the complex with either a 32-way loosely coupled pool image or a PXP image. Once you have converted the pool data structures on DASD to 32-way loosely coupled pool format, all the active processors in the complex must operate from a 32-way loosely coupled pool image.

The pool generation and reallocation procedure can only be used if all processors in the complex are running 32-way loosely coupled pool support and the pool data structures on DASD have been converted to 32-way loosely coupled pool format. See *TPF Database Reference* for more information about the pool generation and reallocation procedure.

See “Migration Scenarios” on page 1025 for more information about migrating to 32-way loosely coupled pool support.

ZPMIG--Migrate Pool Structures: This command was initially introduced with PXP support to convert pool data structures from the previous pool format to PXP format. It has been modified for 32-way loosely coupled pool support to do the following:

- Convert the pool data structures for each subsystem from PXP format to 32-way loosely coupled pool format

- Return the pool data structures for each subsystem from 32-way loosely coupled pool format back to PXP format
- Display the migration state of each processor in the complex.

The ZPMIG command uses the conversion mode indicator in keypoint 9. This indicator has the following settings:

PXP The pool data structures on DASD are in PXP format.

CONVERTING

The processor complex is in the process of converting the pool data structures on DASD from PXP format to 32-way loosely coupled pool format.

FALLING_BACK

The processor complex is in the process of converting the pool data structures on DASD from 32-way loosely coupled pool format to PXP format.

32LC The pool data structures on DASD and in storage are in 32-way loosely coupled pool format.

See *TPF Operations* for more information about the ZPMIG command.

Architecture

In the 32-way loosely-coupled environment, all data structures are changed to support as many as 32 loosely coupled processors. To accommodate 32-way loosely coupled processors, several tables in keypoint 9, the pool section keypoint tables (CY2KTs), and the short-term common control records (STCCRs) are expanded. This expansion causes keypoint 9 to exceed its 4-K size limit, so the CY2KT tables are moved from keypoint 9 to their own fixed file record type. A small part of each CY2KT remains in keypoint 9 to accommodate critical paths such as the get and retrieve file support function (GRFS).

While the format of the short-term processor control records (STPCRs) does not have any 32-way constraints, the layout of the STPCRs in the #STPCR fixed file record type is limited to 8 processors. As a result, the STPCRs and associated data records are moved to a new processor unique fixed file record type.

Changed Record Structures

The following record structures have been changed:

CY0PD

The format of the CY0PD record structure is changed to accommodate the addition of future pool types. The CY0PD DSECT is provided with two expansions: one for PXP format and another for 32-way loosely coupled pool format. The 32-way loosely coupled pool support expansion is the default.

CY1KR

To make more room in keypoint 9, many of the fields from the CY2KT are removed from the CY1KR and placed in their own fixed file record type. The set size fields are moved from the CY1KR into the CY2KT. The CY1KR DSECT is provided with two expansions: one for PXP format and another for 32-way loosely coupled pool format. The 32-way loosely coupled pool support expansion is the default.

CY2KT

Each CY2KT entry in keypoint 9 (currently there are 36, one for each pool

section) is moved to the #CY2KT fixed file record type. Each CY2KT is assigned an ordinal in #CY2KT as shown in Table 1064.

The CY2KT DSECT has the following expansions:

- VRSN=PPX, which defines the CY2KT in PXP format.
- VRSN=CTK9 (default), which defines the portion of the CY2KT that resides in keypoint 9. This mapping is in 32-way loosely coupled pool format.
- VRSN=FIXED, which maps the CY2KT table that resides in the #CY2KT fixed file record type. This mapping is in 32-way loosely coupled pool format.

Table 1064. CY2KT Table Ordinal Assignments in #CY2KT

Ordinal	0	1	2	3	...	33	34	35	36 – 47
Pool Section RCC	04	08	0C	10	...	88	8C	90	94 – C0
Pool Section	SLT-A	SST-A	SDP-A	LLT-A	...	4LT-D	4ST-D	4DP-D	Future Pool Sections

CY\$CR

The CY\$CR record structure maps the short-term common control records (STCCRs). The CY2KT that was embedded in CY\$CR is removed. New fields are defined in CY\$CR to replace the few fields from CY2KT that were also used in CY\$CR. The CY\$CR DSECT is provided with two expansions: one for PXP format and another for 32-way loosely coupled pool format. 32-way loosely coupled pool support expansion is the default.

ICY\$PR

The ICY\$PR record structure maps the STPCRs and associated data records. The records are moved to a different fixed file record type. The ICY\$STA field, which contains status indicators, is no longer required and is removed from the record.

Pool Access Functions

To support the migration and conversion strategy discussed in “Migration, Coexistence, and Conversion” on page 1009, processors that are operating with a TPF image containing 32-way loosely coupled pool support (migrated processors) access the pool data structures through a set of access methods. These access methods read the pool data structures from DASD and convert them to 32-way loosely coupled pool format for use by the migrated processors. When a migrated processor needs to file a pool data structure to DASD, the access method returns the pool data structure to the PXP format before writing the pool data back to DASD.

The following functions are provided to access the pool data structures:

- CTK9 Functions: The interface to retrieve and file keypoint 9 (CYM and CYA) remains unchanged. The conversion routine called by CYM (REARRANGE_CTK9 in CYH0) is changed to convert keypoint 9 from PXP format to 32-way loosely coupled pool format. The fallback routine called by CYA (DEARRANGE_CTK9 in CYH1) is changed to convert keypoint 9 from 32-way loosely coupled pool format to PXP format.

This function provides the following access methods:

Find CTK9

Each time a migrated processor needs keypoint 9, it calls CYM as it currently does. If the conversion mode indicator is PXP or

CONVERTING, CYYM calls the Rearrange_CTK9 function to convert keypoint 9 to 32-way loosely coupled pool format.

File CTK9

Each time a migrated processor needs to file keypoint 9, it calls CYYA as it currently does. If the conversion mode indicator is PXP or CONVERTING, CYYA calls the Rearrange_CTK9 function to convert keypoint 9 to PXP format before filing.

- STCCR Functions: PXP support used Get_CY\$CR in CYH2 and File_CY\$CR in CYH3 to find and file short-term common control records (STCCRs). 32-way loosely coupled pool support renames Get_CY\$CR to Find_STCCR and File_CY\$CR to File_STCCR. All other aspects of the interface to these functions (inputs, outputs, segment names, and others) remain unchanged.

Note: This name change does not require you to make any changes to your code.

The conversion routines embedded in these functions are changed to support 32-way loosely coupled pool support. The conversion routine in Find_STCCR is changed to convert the STCCR from PXP format to 32-way loosely coupled pool format. The conversion routine in File_STCCR is changed to convert the STCCR from 32-way loosely coupled pool format to PXP format.

This function provides the following access methods:

Find STCCR

Each time a migrated processor needs a short-term common control record (STCCR), it calls the Find_STCCR function to retrieve the STCCR. If the format indicator (CY\$CON) in the STCCR is set to 32-way loosely coupled pool format, the record is returned unchanged. If the conversion indicator in the STCCR is not set to 32-way loosely coupled pool format, the processor converts the STCCR to 32-way loosely coupled pool format before returning the record.

File STCCR

Each time a migrated processor needs to file an STCCR, it calls File_STCCR to file the STCCR. If the format indicator (CY\$CON) in the STCCR is set to 32-way loosely coupled pool format, the processor will file the record unchanged. If the format indicator in the STCCR is not set to 32-way loosely coupled pool format, the processor will convert the STCCR to PXP format before filing it.

STCCR Data Records

Finding and filing of short-term common data records stored in the #STCCR fixed file record type does not change.

- RECORD_RETRIEVER Functions: The interface to access CY2KT, CY0PD, and STPCRs is provided by a new RECORD_RETRIEVER function in segment CYH6. The interface for the RECORD_RETRIEVER function is as follows:
 - Function code
 - Ordinal number of the record being retrieved
 - Indicator to hold or not to hold the record
 - Processor ordinal used to get processor unique records
 - Data level.

This function provides the following access methods:

Find CY2KT

Each time a migrated processor needs the fixed file copy of CY2KT, it calls the Record_Retriever function. If the conversion mode indicator in keypoint 9 is 32LC or FALLING_BACK, Record_Retriever retrieves CY2KT from the #CY2KT fixed file record type. If the conversion mode indicator is PXP or CONVERTING, Record_Retriever retrieves the CY2KT from the file copy of keypoint 9 and converts CY2KT to 32-way loosely coupled pool format.

File CY2KT

Each time a migrated processor needs to file a CY2KT, it calls the Record_Retriever function. If the conversion mode indicator in keypoint 9 is 32LC or FALLING_BACK, Record_Retriever files CY2KT in the #CY2KT fixed file record type. If the conversion mode indicator in keypoint 9 is PXP or CONVERTING, Record_Retriever converts CY2KT to PXP format and stores CY2KT in the file copy of keypoint 9.

Find CY0PD

Each time a migrated processor needs to find the pool descriptor record (CY0PD), it calls the Record_Retriever function. If the format indicator (CY0IND) in the CY0PD record is set to 32-way loosely coupled pool format, the Record_Retriever function returns the record unchanged. If the format indicator is not set to 32-way loosely coupled pool format, Record_Retriever converts the CY0PD record to 32-way loosely coupled pool format before returning the record.

File CY0PD

Each time a migrated processor needs to file the pool descriptor record (CY0PD), it calls the Record_Retriever function. If the format indicator (CY0IND) in the CY0PD record is set to 32-way loosely coupled pool format, the Record_Retriever function files the record. If the format indicator in the CY0PD record is not set to 32-way loosely coupled pool format, Record_Retriever converts the record to PXP format before filing.

Find STPCR Control Record

Each time a migrated processor needs a STPCR, it calls the Record_Retriever function. If the format indicator (CY\$CON) in the STCCR of the pool section is set to 32-way loosely coupled pool format, Record_Retriever retrieves the STPCR from the #STPUR fixed file record type. If the format indicator is not set to 32-way loosely coupled pool format, Record_Retriever retrieves the STPCR from the #STPCR fixed file record type.

Find STPCR Data Record

Segment CYA3 is currently used as the central routine to retrieve the STPCR data records. If the format indicator (CY\$CON) in the STCCR of the given section is set to 32-way loosely coupled pool format, CYA3 retrieves the STPCR data records from the #STPUR fixed file record type. If the format indicator is not set to 32-way loosely coupled pool format, CYA3 retrieves the STPCR data records from the #STPCR fixed file record type.

File STPCR Control and Data Records

If a migrated processor needs to file an STPCR or an associated data record, the record is filed using the file macros directly, as it is currently done. Because the data in the STPCR is not being converted in any way (it is just being moved from one fixed file record type to another), there is no need to have a specialized routine to file these records.

See *TPF System Installation Support Reference* and the TPF 4.1 system source code for more information about accessing and filing these pool data structures and for detailed information about function interfaces and data record formats.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1065 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1065. Changes to General Use C/C++ Language Header Files for 32-Way Loosely Coupled Pool Support

C/C++ Language Header File	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
c\$cy1k.h	X	Changed	Yes
c\$fva0.h	X	Changed	No

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1066 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1066. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for 32-Way Loosely Coupled Pool Support

C/C++ Language Header File (IBM Use Only)	ISO-C	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?
i\$breq.h	X	Changed	No

Library Interface Scripts: There are no changes.

Library Members (Object Files): There are no changes.

Link-Edited Modules: Table 1067 on page 1015 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1067. Changes to Link-Edited Modules for 32-Way Loosely Coupled Pool Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CPS0	Changed	Changed CSECTs CCCTIN and CCDBAF.

Members (Object Files): There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1068 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1068. Changes to Copy Members for 32-Way Loosely Coupled Pool Support

Copy Member	Type	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	New, Changed, or No Longer Supported?	Description of Change
CAAA	Control Program	CCNUCL	Not Applicable	Changed	Removed comments listing CT55 in control program table of contents.
CTIN	Control Program	CCCTIN	Not Applicable	Changed	Modified keypoint 9 retrieval and pool storage carve and removed invocation of CT55.
CT01	Control Program	CCCTIN	Not Applicable	Changed	Minor changes for keypoint 9 migration support.
CT10	Control Program	CCCTIN	Not Applicable	Changed	Modified keypoint 9 retrieval and pool storage carve for 32-way loosely coupled pool support.
CT55	Control Program	CCCTIN	Not Applicable	No Longer Supported	Pool storage initialization moved to restart segment CYGR. CCCTIN must be reassembled, and link edit module CPS0 must be relinked.
GRFS40	Control Program	CCSONP	Not Applicable	Changed	Changed the reference from CY1NEW to CY2NEW.

Fixed File Records

Table 1069 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 1069. Changes to Fixed File Records for 32-Way Loosely Coupled Pool Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#CY2CPY	New	Contains the pool section keypoint tables (CY2KTs) during a recoup run or when the ZDDIR command is entered.
#CY2KT	New	Contains parts of the pool section keypoint table (CY2KT) that were moved from keypoint 9.
#CY2NEW	New	Contains pool section keypoint tables (CY2KTs) during pool generation and reconfiguration.
#STPCR	No Longer Supported	No longer required after pool data structures on DASD are converted to 32-way loosely coupled pool support; replaced by #STPUR.

Table 1069. Changes to Fixed File Records for 32-Way Loosely Coupled Pool Support (continued)

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#STPUR	New	Contains short-term processor unique control records; replaces #STPCR.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 1070 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1070. Changes to Data Macros for 32-Way Loosely Coupled Pool Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
CFMDC	Changed	Yes	ICDF, additional programs included in Table 1074 on page 1018
CY\$CR	Changed	Yes	Programs included in Table 1074 on page 1018
CY0PD	Changed	Yes	DYD2, additional programs included in Table 1074 on page 1018
CY1KR	Changed	Yes	BCPU, BCP1, BDBP, BOFB, BPDH, BRCQ, BRPB, BRTV, BRYA, BRYD, BRYU, B1A5, CYAA, CYD0, CYD1, CYD2, CYD3, CYE2, CYF0, DYDI, DYDK, DYDU, DYD1, DYD2, DYD4, DYD6, DYD8, JCS0, additional programs included in Table 1074 on page 1018
CY2KT	Changed	Yes	BCP1, BDBF, BDBL, BDBP, BOFB, BRPB, BRYU, B1A5, CYD2, CYE2, DYDK, DYDU, DYD4, additional programs included in Table 1074 on page 1018

Table 1070. Changes to Data Macros for 32-Way Loosely Coupled Pool Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
CY5GT	Changed	Yes	BCPE, BCP1, BDBA, BDBF, BDBL, BKC1, BKP5, BOFK, BOF8, BRCQ, BRV3, BRYU, CDCR, CYD0, CYD1, CYD2, CYE2, CYF0, CYF6, DYDE, DYDI, DYDN, JCS0, additional programs included in Table 1074 on page 1018
ICY\$PR	Changed	Yes	Programs included in Table 1074 on page 1018
ICYCWB	Changed	Yes	CYA9, additional programs included in Table 1074 on page 1018
ICY7PR	Changed	No	Not Applicable
IFMRBK	Changed	Yes	CYFM, additional programs included in Table 1074 on page 1018
IRECBK	Changed	Yes	Programs included in Table 1074 on page 1018

General Macros: There are no changes.

Selected Equate Macros: Table 1071 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1071. Changes to Selected Equate Macros for 32-Way Loosely Coupled Pool Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
BRPEQ	Changed	No	Not Applicable
CZ1SE	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1072 on page 1018 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1072. Changes to SIP Skeleton and Internal Macros for 32-Way Loosely Coupled Pool Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKCTKB	Changed
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1073 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1073. Changes to SIP Stage II Macros for 32-Way Loosely Coupled Pool Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 1074 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1074. Changes to Segments for 32-Way Loosely Coupled Pool Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BCPY	Real-Time Assembler	Not Applicable	Changed	Copies CY2KT fixed file records to #CY2CPY.
BCP2	Real-Time Assembler	Not Applicable	Changed	Updated comments.
BRTD	Real-Time Assembler	Not Applicable	Changed	Restores CY2KT fixed file records from #CY2CPY.
BRV1	Real-Time Assembler	Not Applicable	Changed	Replaced hardcoded values with equates.
BRV2	Real-Time Assembler	Not Applicable	Changed	Updated indexing into P11DT for base only systems.
CCDBAF	CSECT	Not Applicable	Changed	Removed CY1KR and CY3DR DSECTs.
CDCR	Real-Time Assembler	CDCP	Changed	Reassembled to include changes to data macro CY1KR.
CIPZ	Real-Time Assembler	Not Applicable	Changed	Changed to support move of pool initialization to pool restart.
CTKO	Real-Time Assembler	Not Applicable	Changed	Added support for pool restart.
CTK9	Real-Time Assembler	Not Applicable	Changed	Updated for new format of keypoint 9.

Table 1074. Changes to Segments for 32-Way Loosely Coupled Pool Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYAB	Real-Time Assembler	Not Applicable	Changed	Removed reference to copy member CT55.
CYAE	Real-Time Assembler	Not Applicable	Changed	Updated to correctly determine if system is in restart.
CYAR	Real-Time Assembler	Not Applicable	Changed	Set new flags for the interface to CYFM and CYIO.
CYA0	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface to access the CY0PD record.
CYA1	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface and changed to support the new record structures.
CYA2	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface and changed to support the new record structures.
CYA3	Real-Time Assembler	Not Applicable	Changed	Set new flags for the interface to CYFM and CYIO.
CYA4	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface and changed to support the new record structures.
CYA7	Real-Time Assembler	Not Applicable	Changed	Changed to support new format for the CY0PD data structure.
CYB0	Real-Time Assembler	Not Applicable	Changed	Changed to support new format for the CY1KR data structure.
CYC0	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface and changed to support the new record structures.
CYC1	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface and changed to support the new record structures.
CYC2	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface and changed to support the new record structures.
CYC6	Real-Time Assembler	Not Applicable	Changed	Added Record_Retrieve interface and changed to support the new record structures.
CYD4	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
CYE0	Real-Time Assembler	Not Applicable	Changed	Added new error messages.
CYE1	Real-Time Assembler	Not Applicable	Changed	Added new error messages.
CYF1	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
CYF2	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
CYF3	Real-Time Assembler	Not Applicable	Changed	Changed to start pool monitor after filing keypoint 9.
CYF4	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
CYF8	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
CYF9	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.

Table 1074. Changes to Segments for 32-Way Loosely Coupled Pool Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYGM	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
CYGR	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
CYH0	Real-Time Assembler	Not Applicable	Changed	Changed to transform keypoint 9 from PXP support to 32-way loosely coupled pool support.
CYH1	Real-Time Assembler	Not Applicable	Changed	Changed to transform keypoint 9 from 32-way loosely coupled pool support to PXP support.
CYH2	Real-Time Assembler	Not Applicable	Changed	Changed to transform CY\$CR from PXP support to 32-way loosely coupled pool support.
CYH3	Real-Time Assembler	Not Applicable	Changed	Changed to transform CY\$CR from 32-way loosely coupled pool support to PXP support.
CYH4	Real-Time Assembler	Not Applicable	Changed	Changed to convert all pool structures from PXP support to 32-way loosely coupled pool support and to fall back pool structures from 32-way loosely coupled pool support to PXP support.
CYH5	Real-Time Assembler	Not Applicable	New	Utility routines added for CYH4.
CYH6	Real-Time Assembler	Not Applicable	New	Record_Retrieve interfaces for the CY0PD, CY2KT, and short-term processor control record (STPCR) data structures.
CYIO	Real-Time Assembler	Not Applicable	Changed	Added interface to support processor unique record types.
CYYM	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
DCR2	Offline Assembler	DCRS	Changed	Added new system errors.
DYDC	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
DYDG	Real-Time Assembler	Not Applicable	Changed	Changed to have STPCR and short-term common control record (STCCR) initialized independently.
DYDL	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
DYDQ	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
DYDS	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
DYD3	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
DYD5	Real-Time Assembler	Not Applicable	Changed	Changed to support new formats for record structures.
FTVA02	Offline C Language	FCTBG	Changed	Changed validation from #STPCR record to #STPUR record.
FTVA03	Offline C Language	FCTBG	Changed	Added validation for new records and removed validation for #STPCR.

Table 1074. Changes to Segments for 32-Way Loosely Coupled Pool Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
JCD4	Real-Time Assembler	Not Applicable	Changed	Added versioning support for Data Collection PB/PE Pools Summary records.
STPP	Offline Assembler	PPCP	Changed	Reassembled to include changes to data macro CFMDC.
UPX0	Real-Time Assembler	Not Applicable	Changed	Updated comments.
UPX1	Real-Time Assembler	Not Applicable	Changed	Updated comments.
UPX2	Real-Time Assembler	Not Applicable	Changed	Updated comments.
UPX3	Real-Time Assembler	Not Applicable	Changed	Updated comments.
UPX6	Real-Time Assembler	Not Applicable	New	User exit added for Find_CY2KT.
UPX7	Real-Time Assembler	Not Applicable	New	User exit added for File_CY2KT.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 1075. Changes to ECB User Exits for 32-Way Loosely Coupled Pool Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Pool Migration	CYH0	UPX0	Changed	REARRANGE_CTK9 changed for 32-way loosely coupled pool format.
Pool Migration	CYH1	UPX1	Changed	DEARRANGE_CTK9 changed for 32-way loosely coupled poolformat.
Pool Migration	CYH2	UPX2	Changed	Renamed GET_CY\$CR to FIND_STCCR and changed for 32-way loosely coupled pool format.
Pool Migration	CYH3	UPX3	Changed	Renamed FILE_CY\$CR to FILE_STCCR and changed for 32-way loosely coupled pool format.
Pool Migration	CYH6	UPX6	New	FIND_CY2KT added for 32-way loosely coupled pool support.
Pool Migration	CYH6	UPX7	New	FILE_CY2KT added for 32-way loosely coupled pool support.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1076 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1076. Changes to Commands for 32-Way Loosely Coupled Pool Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZPMIG	Changed	Modified to convert pools from PXP format to 32-way loosely coupled pool format and fall back from 32-way loosely coupled pool format to PXP format.
ZPOOL GENERATION	Changed	Added restriction that all pool structures must be converted to 32-way loosely coupled pool format before entering this command.
ZRDIR CAPTURE	Changed	Added pool keypoint tables to capture content for 32-way loosely coupled pool format.
ZRDIR START RESTORE	Changed	Added pool keypoint tables to restore content for 32-way loosely coupled pool format.

Messages and System Errors

Table 1077 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1077. Changes to Messages and System Errors for 32-Way Loosely Coupled Pool Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
00001A	System Error	Changed
000690	System Error	Changed
000691	System Error	Changed
000697	System Error	Changed
000698	System Error	New
000699	System Error	New
00069A	System Error	New

Table 1077. Changes to Messages and System Errors for 32-Way Loosely Coupled Pool Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
00069B	System Error	New
00069C	System Error	New
041014	System Error	New
041015	System Error	New
BRTD0005E	Online	New
CTIN0042I	Online	No Longer Supported
CYA20001I	Online	New
CYGR0002T	Online	New
CYGR0099T	Online	New
DYDG0026E	Online	New
DYDG0027E	Online	New
DYD30017E	Online	No Longer Supported
DYD50013T	Online	No Longer Supported
DYD50014T	Online	No Longer Supported
GFSP0054E	Online	No Longer Supported
GFSP0055E	Online	No Longer Supported
GFSP0068E	Online	New
GFSP0069E	Online	New
GFSP0071E	Online	New
GFSP0072E	Online	New
GFSP0073E	Online	New
GFSP0074E	Online	New
GFSP0080E	Online	New
PMIG0001I	Online	Changed
PMIG0002I	Online	Changed
PMIG0003T	Online	Changed
PMIG0004I	Online	No Longer Supported
PMIG0006W	Online	Changed
PMIG0009T	Online	Changed
PMIG0011I	Online	New
PMIG0012E	Online	New
PMIG0013E	Online	New
PMIG0014E	Online	New
RFPC0003T	Online	Changed
RFPC0004T	Online	Changed
RFPC0006T	Online	No Longer Supported
RFPC0019T	Online	Changed
RFPC0020T	Online	No Longer Supported
RFPC0021T	Online	New
RFPC0022T	Online	New
RFPC0023T	Online	New
SISN0006T	Online	No Longer Supported

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1078 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1078. Changes to TPF Publications for 32-Way Loosely Coupled Pool Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Database Reference</i>	GTPDBR0C	Updated for 32-way loosely coupled pool support with: <ul style="list-style-type: none">• Restrictions to pool generation and reallocation procedure• Addition of the ZPMIG command.
<i>TPF Library Guide</i>	GTPDOC0E	Updated with definitions for new terminology in the master glossary for 32-way loosely coupled pool support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with new and changed messages and system errors for 32-way loosely coupled pool support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG204	Updated with migration considerations for 32-way loosely coupled pool support.
<i>TPF Operations</i>	GTPOPR0E	Updated with changes to the ZPMIG, ZPOOL, and ZRDIR commands for 32-way loosely coupled pool support.
<i>TPF System Generation</i>	GTPSYG0E	Updated with information for 32-way loosely coupled pool support.
<i>TPF System Installation Support Reference</i>	GTPINR0E	Updated with new and changed ECB user exits for 32-way loosely coupled pool support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before you begin your migration to 32-way loosely coupled pool support, read “Functional Overview” on page 1006 and “Architecture” on page 1010, paying particular attention to “Migration, Coexistence, and Conversion” on page 1009.

Migration Terminology

When discussing migration to 32-way loosely coupled pool support from PXP support, the following terms need to be understood:

Fallback

The process of IPLing a processor from an image that does not contain 32-way loosely coupled pool support. Fallback implies that the processor was previously IPLed from an image that did contain 32-way loosely coupled pool support.

Migrate

The process of IPLing a processor from an image containing 32-way loosely coupled pool support.

Migrated Processor

A processor that has been IPLed from an image containing 32-way loosely coupled pool support.

Unmigrated Processor

A processor that has been IPLed from an image that does not contain 32-way loosely coupled pool support.

Pool Conversion

The process of converting all pool data structures from PXP format to 32-way loosely coupled pool format. For pool conversion to take place, all processors in the complex must be migrated. After pool conversion is completed, only migrated processors can join the complex.

Pool Conversion Fallback

The process of converting all pool data structures from 32-way loosely coupled pool format to PXP format. For pool conversion fallback to take place, all processors in the complex must be migrated. After pool conversion fallback is completed, unmigrated processors can join the complex or migrated processors can be re-IPLed with an unmigrated image.

Migration and Conversion Process

The migration, coexistence, and conversion process for 32-way loosely coupled pool support is similar to that used for PXP support in PUT 2. See “Pool Expansion (PXP) Support (APAR PJ17912)” on page 89 for more information about migration to PXP support.

Migrating processors to a TPF image containing 32-way loosely coupled pool support and converting the pool data structures on DASD from PXP format to 32-way loosely coupled pool format is a two-stage process. This process is shown in Figure 9 on page 1027 where the boxes labeled B and C are processors in the complex and the DASD icon represents the pool data structures on DASD.

The letter O or N inside a processor box indicates the level of pool support contained in the image from which the processor was IPLed. O represents PXP support and N represents 32-way loosely coupled pool support. The small box in

the larger processor box represents the pool data structures in the processor's main storage. The pool data structures are always in the format of the pool support of the image that was IPLed. For the DASD icon, O indicates that the pool data structures on DASD are in PXP format, and N indicates that the pool data structures on DASD are in 32-way loosely coupled pool format.

Old Base (**1**) in Figure 9 on page 1027 represents a TPF complex before beginning Stage 1 migration. **Migration** (**2** and **3**) represent a TPF complex during Stage 1 migration. **New Base** (**4**) represents the complex at the completion of Stage 2 conversion where the pool data structures in main storage of all processors and on DASD are in 32-way loosely coupled pool format. Stage 2 conversion of pool data structures on DASD from PXP format to 32-way loosely coupled pool format is represented by the transition between **3** and **4** where the ZPMIG command is used to convert the pool data structures.

Stage 1 - Migration: Stage 1 is performed on a processor-by-processor basis. In this stage you will migrate each processor from PXP support to 32-way loosely coupled pool support. At any point during stage 1, a processor that has been IPLed from an image with 32-way loosely coupled pool support can be re-IPLed from an image containing PXP support. Pool data structures on DASD remain in PXP format. This Stage 1 complex configuration is represented by **2** in Figure 9 on page 1027.

During stage 1, processors with 32-way loosely coupled pool support (migrated) and processors with PXP support (unmigrated) are able to coexist indefinitely provided that no more than eight processors are defined in the TPF complex. The code of unmigrated processors is not changed to support the coexistence of migrated and unmigrated processors in the same complex. Migrated processors access the pool data structures on DASD by using a set of access functions that translate between the PXP format on DASD and 32-way loosely coupled pool format in the processor's main storage. These access routines are represented by the Xlator layer on the migrated processor in Figure 9 on page 1027.

When all processors in the complex are IPLed from an image with 32-way loosely coupled pool support, as represented by **3**, you have completed Stage 1 of the migration process and may proceed to Stage 2.

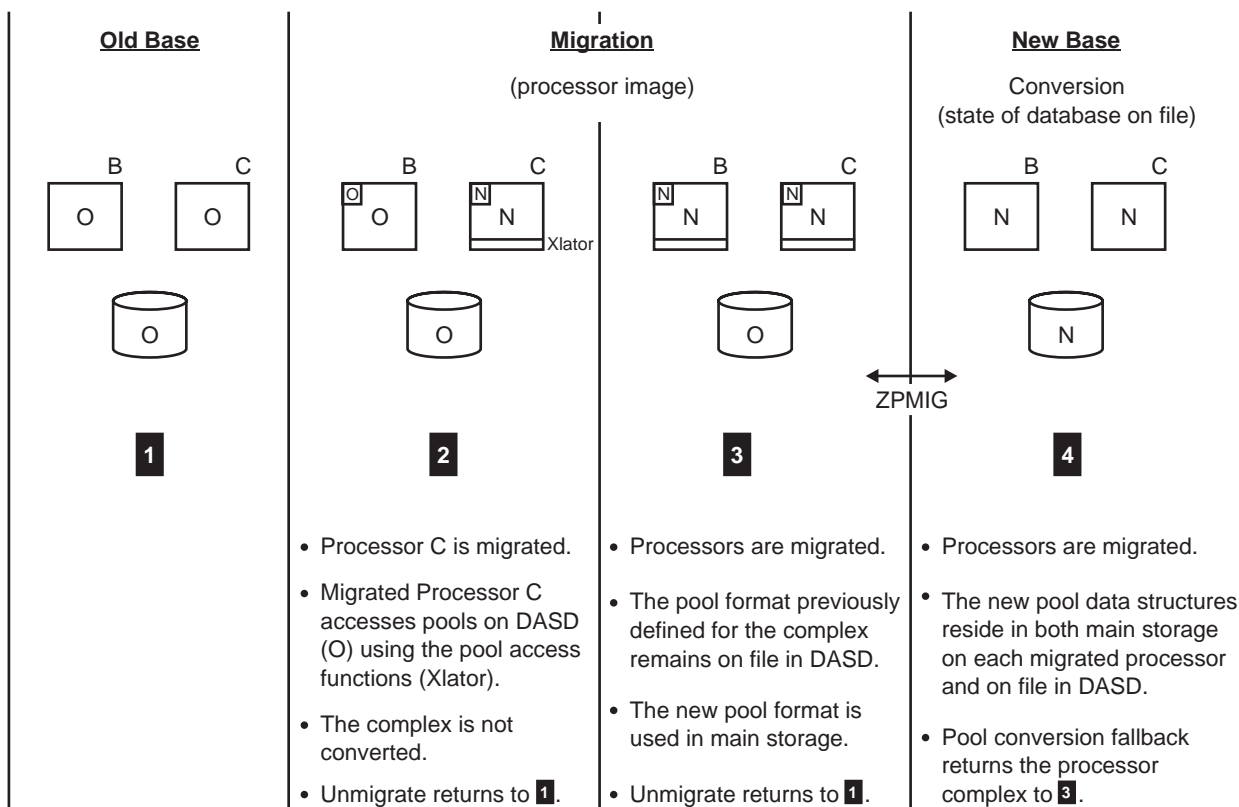


Figure 9. Migration and Conversion from Pool Expansion Support to 32-Way Loosely Coupled Pool Support

Stage 2 - Conversion: Stage 2 is performed complex-wide after Stage 1 is completed and all active processors have been migrated to 32-way loosely coupled pool support as shown by **3**.

During Stage 2, the pool data structures on DASD are converted to 32-way loosely coupled pool format using the ZPMIG command described in “ZPMIG--Migrate Pool Structures” on page 1009. The command must be entered for each subsystem. This process is represented by the double arrow labelled ZPMIG between **3** and **4**. The completion of Stage 2 is represented by **New Base** (**4**).

You may still return to PXP support by using the ZPMIG command to do pool conversion fallback on pool data structures on DASD and re-IPLing processors with an unmigrated image.

Note: As noted in “Pool Data Structures” on page 1006, once the #STPCR record type is deleted, fallback to PXP support is no longer possible.

Migrating to 32-Way Loosely Coupled Pool Support

There are two migration scenarios to consider when migrating your complex to 32-way loosely coupled pool support:

- You are installing a new TPF 4.1 system.
- You are installing 32-way loosely coupled pool support on an existing TPF 4.1 system.

New TPF 4.1 System: If you are installing the TPF 4.1 system for the first time, install the system using the system installation information provided in *TPF System*

Generation, TPF System Installation Support Reference, and the program directories. 32-way loosely coupled pool support is installed as part of the normal installation procedure.

Existing TPF 4.1 System: If you have the TPF 4.1 system installed in your complex and want to add 32-way loosely coupled pool support, use the following migration scenario.

To Migrate Your Complex to 32-Way Loosely Coupled Pool Support:

Before You Begin

- If you are a TPF 4.1 user who has not installed or has not completed migrating to PXP support, you must complete the migration and conversion to PXP support before installing 32-way loosely coupled pool support and then continue with step 1 of this procedure. See “Pool Expansion (PXP) Support (APAR PJ17912)” on page 89 for more information about PXP support.
- If during the installation and migration to 32-way loosely coupled pool support you need to fall back to PXP support, follow the procedure in “Falling Back to Pool Expansion (PXP) Support” on page 1030.
- If you have any code that refers to pool data structures you must determine if the format or location of the data structures have changed. Use the appropriate pool data structure access method to access changed data structures. See “Pool Access Functions” on page 1011 for more information about pool access methods.
- You must also examine your TPF system to determine if you must modify your user exits to accommodate 32-way loosely coupled pool support. See “ECB-Type User Exits and Pool Data Access” on page 1007 for more information about user exits.

1. Ensure that no deactivation or reallocation processing is running on the TPF 4.1 system in which you are installing program update tape (PUT) 14.
2. Install PUT 14, which contains APAR PJ27686 for 32-way loosely coupled pool support, on your TPF 4.1 system.
3. Verify that the conversion indicators in keypoint 9 (CY1MD32 and CY1PLC) are set to zeros. If they are not set to zeros, change them to zeros (X'00').
4. Update the SIP RAMFIL macro input statements to the FACE table generator (FCTBG):
 - a. Add RAMFIL statements specifying the following new record types in the RECID parameter:
 - #CY2KT
 - #CY2CPY
 - #CY2NEW
 - #STPUR.

Make sure that the required number of ordinals is specified. See “Pool Data Structures” on page 1006 and *TPF System Generation* for more information about these fixed record types.

- b. Ensure that the subsystem users (SSUs), processors, and I-streams correspond correctly with the fixed file record types in the USER parameter. See Table 1069 on page 1015 for the fixed file record types.

See *TPF System Generation* for more information about the RAMFIL macro.

5. Run the FCTBG to create a new FACE table.
6. Assemble the SIP stage I deck to create a SIP stage II deck.
7. Run the system allocator program (SALO) using the IBMPAL and SPPGML additions for the newly created segments to create an updated program allocation table (IPAT) and a system allocator table (SAL).
8. Run SIP stage II.
9. Complete Stage 1 (see “Stage 1 - Migration” on page 1026) by migrating each processor in the loosely coupled complex to 32-way loosely coupled pool support as follows:
 - a. Deactivate the processor and IPL it from an image containing 32-way loosely coupled pool support.
 - b. Once all processors in the complex have been migrated and are operating with 32-way loosely coupled pool support, Stage 1 is completed.

Note: During coexistence mode when migrated and unmigrated processors are active in the same complex, unmigrated processors operate unchanged. They do not check any new bits or call any new functions.

Migrated processors read pool data structures from DASD using the record retriever routines. The record retriever routines convert the pool data structures on DASD from PXP format to 32-way loosely coupled pool format. When migrated processors file pool data structures, the record retriever routines convert the pool data structures back to PXP format before being filed to DASD. In this way, all pool data structures on DASD remain in a format that is understood by the unmigrated processors.

Coexistence mode creates restrictions on the use of the ZRDIR CAPTURE and ZRDIR START RESTORE commands. See *TPF Operations* for more information about these commands.

You can return any processor to PXP support by performing migration fallback, see “Falling Back to Pool Expansion (PXP) Support” on page 1030. Any unmigrated processors must be returned to their migrated state before continuing with 10.

10. Complete Stage 2 (see “Stage 2 - Conversion” on page 1027) by converting each subsystem in the complex to 32-way loosely coupled pool support format on DASD as follows:
 - a. Ensure that the pool status for the current pool structure in storage is set for each processor by entering the ZDFPC command on each processor.
 - b. Ensure that all processors in the complex are running with an image containing 32-way loosely coupled pool support by entering the ZPMIG command with the STATUS parameter specified on an active processor. The PMIG0011I message displays the status of each processor. If this message is not received, the processor on which ZPMIG command was entered was not IPLed from an image containing 32-way loosely coupled pool support. Re-IPL the processor with the correct image.
 - c. Enter the ZPMIG command with the CONVERT parameter specified for each subsystem from one of the processors in the complex. This command sets the conversion mode indicator in keypoint 9 to CONVERTING. It then converts keypoint 9, the pool section keypoint tables (CY2KTs), the pool descriptor record (CY0PD), and the short-term common control records

(STCCRs) on DASD from PXP format to 32-way loosely coupled pool support format. The CY2KTs, short-term processor control (STPCR)s, and associated data records are moved to new fixed file records on DASD.

The conversion mode indicator in keypoint 9 will then be set to 32LC and 32-way loosely coupled pool support conversion is completed. Once the conversion mode indicator is set to 32LC, all the intermediate conversion functions are no longer used for the subsystem for which the command was entered and all pool data structures on DASD and in storage are in 32-way loosely coupled pool support format.

- d. When you enter ZPMIG CONVERT and there are inactive processors that have never been IPLed from an image containing 32-way loosely coupled pool support, those processors may not have current pool carve values set in keypoint B. When the inactive processors are brought into the loosely coupled complex, pool restart validates the amount of storage carved for pools, if necessary resetting the pool carve values in keypoint B and requesting an IPL. Because this validation is performed for a single subsystem at a time, a complex with multiple subsystems defined could see multiple requests for IPLs when bringing up the inactive processors. You can avoid these IPLs by entering the ZGFSP SET command on each subsystem for each inactive processor. This sets the pool carve values in keypoint B.

Note: Once the complex has been converted to 32-way loosely coupled pool support format on DASD, any processor joining the complex must be IPLed from an image containing 32-way loosely coupled pool support.

The complex may be returned to PXP format if there are eight or fewer processors in the complex and the #STPCR record type has not been deleted. To return the complex to PXP format, see “Falling Back to Pool Expansion (PXP) Support”. If there is no requirement to return to PXP format, the #STPCR record type may be deleted.

See *TPF Operations* for more information about the ZDFPC and ZPMIG commands.

Falling Back to Pool Expansion (PXP) Support

If a migrated processor must be IPLed from an image that does not contain 32-way loosely coupled pool support, two scenarios are possible:

- If the pool data structures on DASD have been converted to 32-way loosely coupled pool format and the #STPCR record type has not yet been deleted, enter the ZPMIG command with the FALLBACK parameter specified on one of the migrated processors. This causes the pool data structures on DASD to fall back to PXP support format.

The ZPMIG command first sets the conversion mode indicator in keypoint 9 to FALLING_BACK. Keypoint 9, the pool descriptor record (CY0PD), and the short-term common control records (STCCRs) are then returned to PXP format. The pool section keypoint tables (CY2KTs) are moved back into keypoint 9 and the short-term processor control (STPCR)s and associated data records are moved back to their previous storage location. Finally, the conversion mode indicator is set to PXP. After pool conversion fallback is completed, you can IPL processors from images that do not contain 32-way loosely coupled pool support.

After you enter the ZPMIG command with the FALLBACK parameter specified, the processor migration status byte in keypoint 9 is no longer reliable. Enter the ZPMIG command with the STATUS parameter specified to make sure all the

active processors in your complex are IPLed from the new image before entering the ZPMIG command with the CONVERT parameter specified again.

- After you have entered the ZPMIG command with the FALLBACK parameter specified or if the pool data structures on DASD have not yet been converted (the ZPMIG command with the CONVERT parameter specified has not been entered), you can IPL processors from an image containing either PXP support or 32-way loosely coupled pool support.

Program Update Tape 15 (PUT 15)

This chapter discusses the migration considerations for the following small programming enhancements (SPEs) shipped on program update tape (PUT) 15 (PUT 15).

SPE	Where to Go For More Information
Enhancements to TPF MQSeries Local Queue Manager Support	"Enhancements to TPF MQSeries Local Queue Manager Support (APAR PJ28136)" on page 1034
Expression Enhancements for the TPF Debuggers	"Expression Enhancements for the TPF Debuggers (APAR PJ27905)" on page 1042
Secure Sockets Layer (SSL)	"Secure Sockets Layer (SSL) Support (APAR PJ27863)" on page 1061
Shared SSL Session Support	"Shared SSL Session Support (APAR PJ28118)" on page 1069
Simple Network Management Protocol (SNMP) Agent Support	"Simple Network Management Protocol Agent Support (APAR PJ27932)" on page 1083
TCP/IP Enhancements for PUT 15	"TCP/IP Enhancements for PUT 15 (APARs PJ28026, PJ28029, PJ28034, PJ28064, PJ28067, PJ28093, and PJ28087)" on page 1094
TPF Internet Mail Server Enhancements for PUT 15	"TPF Internet Mail Server Enhancements for PUT 15 (APAR PJ27966)" on page 1104
8-Byte File Address Support	"8-Byte File Address Support (APAR PJ28097)" on page 1111
32-Way Loosely Coupled Processor Support	"32-Way Loosely Coupled Processor Support (APAR PJ27785)" on page 1168

Compiler Support

Table 1079. PUT 15 Compiler Support

PUT Level	Compiler	System Support Compiler
PUT 15	IBM OS/390 C/C++ Version 2 Release 10	IBM OS/390 C/C++ Version 2 Release 10 IBM z/OS Version 1 Release 1

See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

Enhancements to TPF MQSeries Local Queue Manager Support (APAR PJ28136)

The following section discusses the migration considerations for enhancements to TPF MQSeries local queue manager support.

Prerequisite APARs

See the APEDIT for APAR PJ28136 for information about prerequisite APARs.

Functional Overview

Enhancements to TPF MQSeries local queue manager support include the following:

- The TPF MQGET application programming interface (API) now supports the MQGMO_WAIT option, which allows an entry control block (ECB) to be suspended when a queue is empty and to resume when a message arrives. A wait interval is specified by the application to indicate how long the MQGET API should wait for the message. The MQGMO_WAIT option works with processor unique and processor shared queues.
- TPF local normal queues now support trigger type EVERY, which triggers a new ECB every time a message arrives on the application queue. Trigger type EVERY works with processor unique and processor shared queues.
- TPF local normal queues now allow you to associate a process object with a queue. This allows you to trigger a program in the process object, when a message arrives on that queue.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with enhancements to TPF MQSeries local queue manager support, you must establish the required operating environment. The following section describes hardware and software requirements specific to enhancements to TPF MQSeries local queue manager support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for TCP/IP-Based Communication: TPF MQSeries TCP/IP support will work with TCP/IP native stack support or TCP/IP offload support. See “TCP/IP Native Stack Support (APAR PJ26683)” on page 626 and “Transmission Control Protocol/Internet Protocol (TCP/IP) Offload Support (APAR PJ21791)” on page 221 for more information.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1080 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1080. Changes to Build Scripts for Enhancements to TPF MQSeries Local Queue Manager Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMQS	DLL	Changed	Updated for enhancements to TPF MQSeries local queue manager support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: There are no changes.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1081 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1081. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Enhancements to TPF MQSeries Local Queue Manager Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
amquscw.h	Changed	No	Not Applicable
c\$mqmg.h	Changed	No	Not Applicable
c\$mqpc.h	New	No	Not Applicable
c\$mq.s.h	Changed	No	Not Applicable
c\$stck.h	Changed	No	Not Applicable

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1082 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1082. Changes to Link-Edited Modules for Enhancements to TPF MQSeries Local Queue Manager Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CMQF	Changed	Updated for enhancements to TPF MQSeries local queue manager support.
CMQS	Changed	Updated for enhancements to TPF MQSeries local queue manager support.
CUIU	Changed	Updated for enhancements to TPF MQSeries local queue manager support.

Table 1082. Changes to Link-Edited Modules for Enhancements to TPF MQSeries Local Queue Manager Support (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CUSC	Changed	Updated for enhancements to TPF MQSeries local queue manager support.

Members: Table 1083 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1083. Changes to Members for Enhancements to TPF MQSeries Local Queue Manager Support

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CMQAPI	CMQS	DLL	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CMQFRM	CMQF	DLM	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CMQGRU	CUIU	DLM	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CMQMGC	CMQS	DLL	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CMQMGR	CMQS	DLL	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CMQQUE	CMQS	DLL	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CMQTRM	CMQS	DLL	New	C++ Language	Created by enhancements to TPF MQSeries local queue manager support.
CMQUTL	CMQS	DLL	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CUSCCD	CMQS	DLL	Changed	Object Code Only	Updated for enhancements to TPF MQSeries local queue manager support.
CUSCPF	CMQS	DLL	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CUSCPR	CMQS	DLL	New	C++ Language	Created by enhancements to TPF MQSeries local queue manager support.
CMQUTL	CMQS	DLL	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.
CUSCQL	CUSC	DLM	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.

Table 1083. Changes to Members for Enhancements to TPF MQSeries Local Queue Manager Support (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CUSCRW	CUSC	DLM	Changed	C++ Language	Updated for enhancements to TPF MQSeries local queue manager support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1084 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1084. Changes to Copy Members for Enhancements to TPF MQSeries Local Queue Manager Support

Copy Member	Type	New, Changed, or No Longer Supported?	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CMIS	CP	Changed	CCNUCL	Not Applicable	Control Program	Updated for enhancements to TPF MQSeries local queue manager support.
CT41	CP	Changed	CCCTIN	Not Applicable	Control Program	Updated for enhancements to TPF MQSeries local queue manager support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1085 on page 1038 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the

SIP Stage II deck.

Table 1085. Changes to SIP Skeleton and Internal Macros for Enhancements to TPF MQSeries Local Queue Manager Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1086 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1086. Changes to Commands for Enhancements to TPF MQSeries Local Queue Manager Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQSC ALT PROCESS	New	Created for enhancements to TPF MQSeries local queue manager support.
ZMQSC ALT QL	Changed	Updated by enhancements to TPF MQSeries local queue manager support.
ZMQSC DEF PROCESS	New	Created for enhancements to TPF MQSeries local queue manager support.
ZMQSC DEF QL	Changed	Updated by enhancements to TPF MQSeries local queue manager support.
ZMQSC DEL	Changed	Updated by enhancements to TPF MQSeries local queue manager support.

Table 1086. Changes to Commands for Enhancements to TPF MQSeries Local Queue Manager Support (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQSC DISPLAY	Changed	Updated by enhancements to TPF MQSeries local queue manager support.

Messages and System Errors

Table 1087 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (Online)* and *Messages (System Error and Offline)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1087. Changes to Messages and System Errors for Enhancements to TPF MQSeries Local Queue Manager Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0700I	Online	New
MQSC0704E	Online	New
MQSC0705E	Online	New
MQSC0721I	Online	New
MQSC0722I	Online	New
MQSC0723I	Online	New
MQSC0724E	Online	New
MQSC0725E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1088 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1088. Changes to TPF Publications for Enhancements to TPF MQSeries Local Queue Manager Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0E	Updated for enhancements to TPF MQSeries local queue manager support.
<i>TPF Concepts and Structures</i>	GTPCON0C	Updated for enhancements to TPF MQSeries local queue manager support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0F	Updated for enhancements to TPF MQSeries local queue manager support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for enhancements to TPF MQSeries local queue manager support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for enhancements to TPF MQSeries local queue manager support.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for enhancements to TPF MQSeries local queue manager support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Table 1089 summarizes API changes. This information is presented in alphabetic order by the name of the command. See *TPF C/C++ Language Support User's Guide* for a complete description of all APIs.

Table 1089. Changes to APIs for Enhancements to TPF MQSeries Local Queue Manager Support

Command	New, Changed, or No Longer Supported?	Description of Change
MQGET	Changed	Updated by enhancements to TPF MQSeries local queue manager support.
MQINQ	Changed	Updated by enhancements to TPF MQSeries local queue manager support.
MQSET	Changed	Updated by enhancements to TPF MQSeries local queue manager support.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install enhancements to TPF MQSeries local queue manager support (APAR PJ28136) on your TPF 4.1 system.

1. Install program update tape (PUT) 15.
2. Compile segment CUSCQM, CMQMVM, and the segments listed for this APAR in Table 1083 on page 1036.
3. Run the CBLD program to create the link-edit decks for the CMQF DLM, CMQS DLL, CUIU DLM, and CUSC DLM.
4. Assemble the control program (CP).
5. Link-edit the CP, CMQF DLM, CMQS DLL, CUIU DLM, and CUSC DLM.
6. Load the CP, CMQF DLM, CMQS DLL, CUIU DLM, and CUSC DLM to your TPF 4.1 system.
7. Stop the TPF MQSeries local queue manager on the processor to which you want to activate the new code.
8. Activate the loadset that contains the new code.
9. Start the TPF MQSeries local queue manager that you previously stopped.
10. If you have to fall back from APAR PJ28136, ensure that APAR PJ28104 is still installed.

Expression Enhancements for the TPF Debuggers (APAR PJ27905)

The following section discusses the migration considerations for expression enhancements for the TPF debuggers.

Prerequisite APARs

See the APEDIT for APAR PJ27905 for information about prerequisite APARs.

Functional Overview

Expression enhancements for the TPF debuggers provides the following enhancements to the TPF Assembler Debugger for VisualAge Client and the TPF C Debugger for VisualAge Client (referred to as the assembler debugger and C debugger, respectively, in the remainder of this information).

- Assembler debugger symbolic support has been added to the assembler debugger listing view.
- Global symbol display for both assembler and C has been added to the assembler and C debuggers.
- `ecbptr` function support in the C debugger. Expression enhancements for the TPF debuggers provides a solution that now allows the `ecbptr->anyfield` expression to be resolved by the C debugger.
- You can now use expressions with all breakpoint type in the assembler debugger.
- Local variable support was added to the assembler debugger to display the operands of the current line of execution.
- You can now view expressions in different data representation in the assembler debugger.

Assembler Debugger Symbolic Support

Previously, to display labels and evaluate tags you had to switch back to the disassembly view from the listing view. Now you can operate fully within the listing view because assembler debugger symbolic support has been added to the assembler debugger for the program monitor, storage monitor, breakpoint, and local variable display. With assembler debugger symbolic support, you can enter an expression for evaluation and have the result displayed in the Program Monitor window or Storage Monitor window. An *expression* is a representation of a value; for example, variables and constants appearing alone or in combination with operators.

To enter an expression for evaluation:

1. Click **Monitor Expression** from the Monitors menu. The Monitor Expression dialog box is displayed.
2. Type the expression that you want to evaluate and determine where you want the result displayed by clicking **Program monitor** or **Storage monitor**.
3. Click **OK** to start the evaluation. The result is displayed in either the Program Monitor window or the Storage Monitor window based on your selection in step 2.

Expressions that have been evaluated and displayed in the Program Monitor window are reevaluated at each stop during the debugging process. For example, if you evaluate expression `REC_ID`, which represents a DSECT label with an active base register using register 1 (R1), and the value of R1 changes, the expression is then reevaluated at each stop of the debugger process regardless of the content of its base register and whether it did or did not change; the current value of that expression is displayed.

The scope of an expression is monitored and reevaluated across multiple programs that the assembler debugger is processing. This is different from the C debugger in which the scope of an expression is the block in which the symbol is defined.

Global Symbol Display for Both Assembler and C

With the global symbol display for both assembler and C:

- You can display areas of the TPF 4.1 system using predefined global symbols as though they were symbols defined in your program. The assembler and C debuggers return the address of the data structure based on your request.
- You can include your own user-defined data structures and labels by adding them to the user global symbol table using the User Global Symbol Table (UGST) user exit or the user symbol override table using the User Symbol Override Table (USOT) user exit. However, you cannot use any global symbols in the construct of a multielement expression. For example, MYDATA is a global symbol; you can use MYDATA as a valid expression, but MYDATA(R3) or MYDATA+20 is not a valid expression. See *TPF System Installation Support Reference* for more information about these user exits and how to use the user global symbol table and the user symbol override table.
- IBM provides a global symbol table (IBM-defined global symbol table) with entries included that allow you to easily display all system control blocks, such as data event control blocks (DECBs) or a particular DECB by name while running the assembler and C debuggers.

New User Exits

The following user exits are provided:

- Common Symbol Table (UCST)
- User Global Symbol Table (UGST)
- User Symbol Override Table (USOT).

See “ECB User Exits” on page 1057 and *TPF System Installation Support Reference* for more information about these user exits.

Architecture

A parser and expression evaluator were developed for the assembler debugger rather than using the expression handler of the C debugger because of the following differences between the assembler and C debuggers:

- Syntax for the assembler and C languages is very different.
- Symbol information for the assembler and C debuggers is stored in different formats: The symbol information for the assembler debugger is stored in a separate table in standard DWARF format while the symbol information for the C debugger is stored in an object (OBJ) file. *DWARF* is a debugging information format that is used to standardize the software interface for development tools across multiple operating environments.

A common user-defined global symbol evaluator was also developed for both the assembler and C debuggers. Figure 10 on page 1044 shows these components.

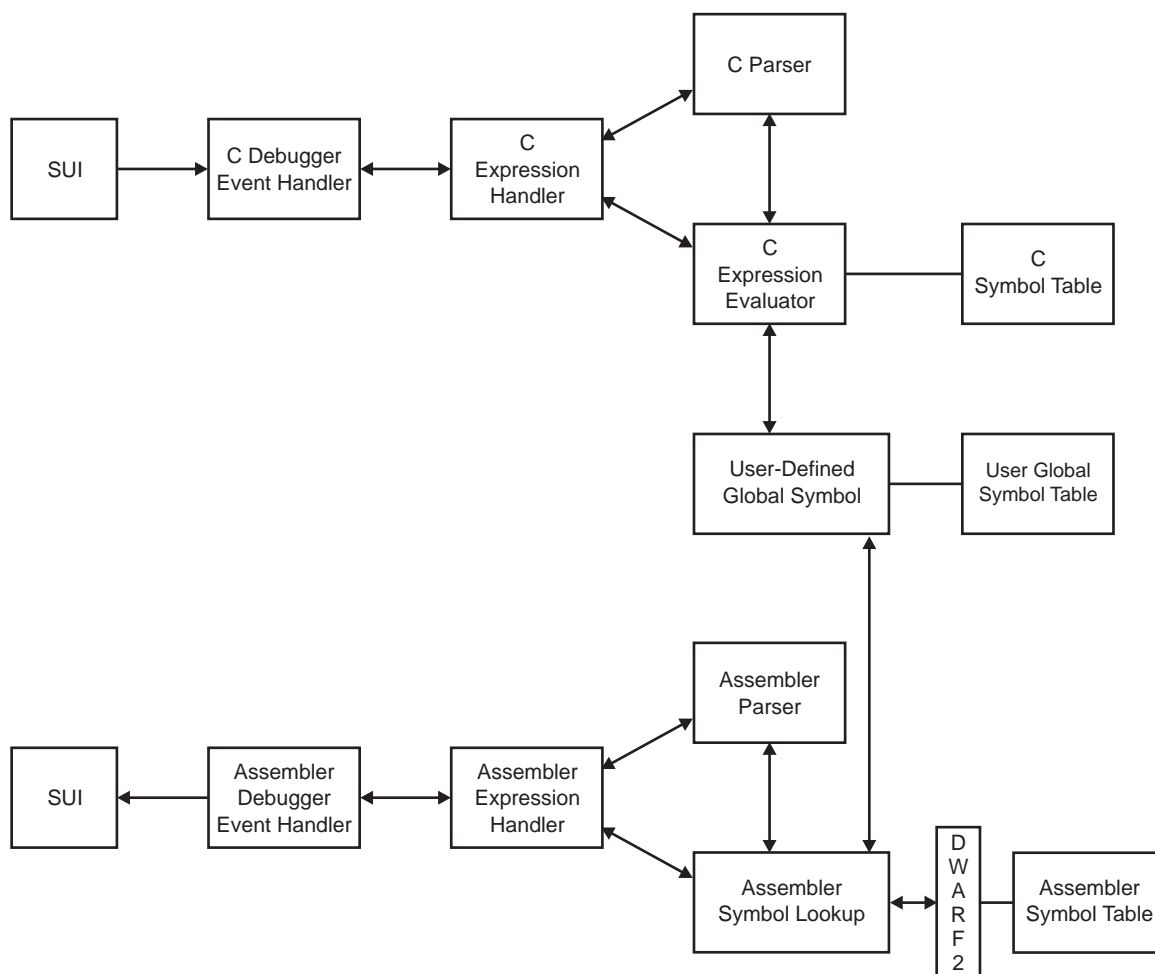


Figure 10. User-Defined Global Symbol Evaluator Concepts

When you assemble an assembler program, the TPFSYM offline program reads the SYSADATA file created by the assembler. The TPFSYM offline program extracts the symbol information to build a symbol table that conforms to the DWARF specification and stores this in the ADATA file. The ADATA file is loaded to the TPF 4.1 system by the online loader and stored in #APRGx fixed file records or by using File Transfer Protocol (FTP) to store the file in the hierarchical file system (HFS).

Syntax for Assembler Expressions

Previously, the disassembly view supported only registers and instruction operands. DSECT labels, equate values, and program address labels were not supported. Now, all valid High Level Assembler (HLASM) expressions are supported with the following exceptions:

- Only ordinary symbols are supported. Variable symbols (&SYMBOL) and sequence symbols (.SYMBOL) are not supported because they only appear in macro processing and conditional assembly instructions.
- The location counter (*) is not supported because the assembler debugger cannot resolve it when it is highlighted in the listing view.
- All register names defined in REGEQ and REGEQ1 are recognized as valid registers. However, expression enhancements for the TPF debuggers does not handle the register equates found in REGEQ and REGEQ1 as normal equates.

They are special cased and, therefore, handled differently. Additionally, F0, F2, F4, and F6 are recognized as floating point registers; and, C0 – C15 and X0 – X15 are recognized as control registers.

- The register contents are returned if the expression is Rx or (Rx). For example, in expression R2, the contents of R2 are returned; in expression (R2), the contents of R2 are returned.
- The explicit base register and the index register in a relocatable expression must be a valid general-purpose register name defined in REGEQ or REGEQ1.
- If Rx is used in a multiple-term expression, the register contents will be used if a symbol of a general-purpose register is interpreted as a base register or an index register. Otherwise, the value of the symbol is used except when it is a single-termed symbol; for example:
 - In expression 0(R2) or PATHNAME(R2), the contents of R2 will be used in evaluating the expression because R2 is the base register or the index register.
 - In expression CE1SRVR+R2*4, the value of 2, which is the value of the R2 equate, will be used instead of the contents of R2 to evaluate the expression.
- If the expression is in the form exp1(exp2) or exp1(exp2,exp3), exp2 will be handled as an explicit length if it is not a general-purpose register.
- If the expression is in the form exp1(,exp3) or exp1(exp2,exp3), exp1 must then be an absolute expression; otherwise the expression is not valid.

Assembler debugger symbolic support supports boolean expressions that resolve to True or False. Boolean expressions are useful when setting breakpoints. Each term in a boolean expression must have a length no longer than 4 bytes. The following operators are used for boolean expressions:

- && (and)
- | (or)
- < (less than)
- > (greater than)
- == (equal)
- != (not equal).

Examples of boolean expressions are:

- R9==0
- EBW000!=C'A'
- (R9==0)|(EBW000!=C'A'
- R12>R11

Assembler debugger symbolic support has also adopted the following operational rules to define the behavior of the assembler debugger:

- Self-defining terms and literals are not evaluated. This input is echoed.
- Constants are evaluated as follows:
 - Only A-type, Y-type, and S-type data constants are evaluated. C-, X-, B-, F-, H-, E-, D-, L-, P-, and Z-type constants are self-defined, so no evaluation is necessary.
 - V- and Q-type data constants reference external symbols that cannot be resolved so evaluation does not occur.

- C-, X-, and B-data types are treated as constants if they are single term expressions; for example, X'55'. They are treated as self-defines if parts of a multiple term expression; for example, X'55'+ B'1111'.
- Only the L-type modifier of data definitions is supported. The bit length modifier is not supported.

Note: The previous set of rules apply only to constants. All other symbols will be dereferenced according to the associated data type when the symbol is dereferenced. Therefore, the scale, exponential, and length modifiers are recognized in addition to the L-type modifier mentioned previously for all other symbols.

The symbol may have an additional data representation based on the data type:

- All expressions with a nonzero length are dereferenced, and the contents of the storage area are returned by the assembler debugger. The length of the expression is the product of the replication factor and the length attribute.
- The value of an expression with a replication factor and a nonzero length is returned by the assembler debugger as an array of the specified data type.
- The value of an absolute expression is returned by the assembler debugger. You can use the storage monitor to map out that location if it is a valid pointer.
- Duplication factors on constants are not allowed.
- Multiple operands are not allowed for constant and literal symbol types.
- Multiple nominal values are not allowed on constant and literal symbol types.
- Modifiers must be decimal self-defining terms on constant and literal symbol types.
- The graphic data type is not supported.
- The assembler debugger parser does not have instruction-context information, so it cannot always determine when tokens are base or index registers, or explicit lengths. For example, in the expression MVC 0(R2,R3),0(R4), the parser handles R2 as an index register. You would use MVC 0(2, R3),0(R4) if you wanted to specify a value of 2.
- If the expression is the name of a DSECT, the assembler debugger returns all fields in the DSECT.
- Symbols used in a relative addressing instruction that do not have an associated base register are not resolved by the assembler debugger.

Table 1090 provides information about the different data types and their data representation.

Table 1090. Data Types and Data Representation

Data Type	Description	Default Representation	Additional Representation
A	Address	Hexadecimal	
B	Binary	Hexadecimal	Binary
C	Character	Hexadecimal	ASCII, EBCDIC
D	8 Bytes, Floating Point	Hexadecimal	Floating Point
E	4 Bytes, Floating Point	Hexadecimal	Floating Point
F	4 Bytes, Floating Point	Hexadecimal	Decimal
H	2 Bytes, Fixed Point	Hexadecimal	Decimal
L	16 Bytes, Floating Point	Hexadecimal	Floating Point
P	Packed Decimal	Hexadecimal	Decimal

Table 1090. Data Types and Data Representation (continued)

Data Type	Description	Default Representation	Additional Representation
S	Address	Hexadecimal	
X	Hexadecimal	Hexadecimal	Decimal
Y	Address	Hexadecimal	
Z	Zoned Decimal	Hexadecimal	Decimal

Examples of Expressions for the Assembler Debugger

Table 1091 provides examples of expressions supported by the assembler debugger.

Table 1091. Expressions Supported by the Assembler Debugger

Expression	Result	Notes
(F4)	Contents of floating point register F4.	
(X1)	Contents of control register 1.	
R3	Content of R3.	R0 – R15 are reserved names for general-purpose registers.
(R3)	Data area pointed to by R3.	Dereference if the expression is (GPR).
F2	Contents of floating point register F2.	F0, F2, F4, and F6 are reserved names for floating point registers.
X1	Contents of control register 1.	X0 – X15 are reserved names for control registers.
EBW000	1 byte of data starting from EBW000.	Dereference a single-term expression. The explicit length of EBW000 is 1 byte.
EBW000(20)	20 bytes of data starting at location EBW000.	Dereference a complex term when it has only one relocatable term.
CE1S00+R4*4	4 bytes of data starting at location CE1S00+16.	Dereference a complex term when it has only one relocatable term.
CE1S00(R3)	4 bytes of data starting at location CE1CR0+R3.	R3 is handled as an index register. Use the index register to reference other data levels.
PATNAME	Contents of PATNAME.	IDSPAT is in a USING scope.
PATNAME(R4)	Contents of PATNAME; use R4 as an index register.	If IDSPAT has a USING scope, use the index register to reference other PAT entries.
PATNAME-PATCNT(R4)	Contents of PATNAME; use R4 as a base register.	Dereference a complex expression if paired relocatable terms are subtracted to remove the relocatability. The base register is overridden.
A(label)	Address of the label in ACON format.	Resolve the ACON format through the user global symbol and user symbol override tables.
S(label)	Address of the label in SCON format.	Resolve the SCON format through the user global symbol and user symbol override tables.

Table 1091. Expressions Supported by the Assembler Debugger (continued)

Expression	Result	Notes
Y(label)	Address of the label in YCON format.	Resolve the YCON format through the user global symbol and user symbol override tables.
C'ABC'	C'ABC'	Echo all C-type constants.
X'FFFF'	X'FFFF'	Echo all X-type constants.
B'0111'	B'0111'	Echo all B-type constants.
F'1'	F'1'	Echo all F-type constants.
H'256'	H'256'	Echo all H-type constants.
L'label	Length attribute of the label.	
=A(label)	Address of the label in ACON format.	Literals are handled the same as self-defining terms.
IDSPAT	Entire IDSPAT, which includes all DS subfields.	Display all subfields if the expression is the name of the DSECT.
18	18	A self-defining term.
TWOFULLWORD	An array of fullwords with two entries starting from location TWOFULLWORD.	TWOFULLWORD is defined as 2F.
FOURCL4	An array of 4; each entry is a 4-byte character field starting at FOURCL4.	FOURCL4 is defined as 4CL4.

Table 1092 provides examples of expressions that are not valid or are not supported by the assembler debugger.

Table 1092. Expressions That Are Not Valid or Not Supported by the Assembler Debugger

Expression	Result	Notes
V(label)	The expression is not supported.	Cannot resolve V-type constants.
Q(label2)	The expression is not supported.	Cannot resolve Q-type constants.
S'label1	The expression is not supported.	Does not support scale modifiers.
E'label1	The expression is not supported.	Does not support exponential modifiers.
&label	The expression is not supported.	Does not support variable symbols.
.label	The expression is not supported.	Does not support sequence symbols.
PATNAME(,R4)	The expression is not valid.	Cannot override its base register.
PATNAME(R4)	Out of scope.	Not valid if IDSPAT does not have an active USING scope.
PATNAME+PATCA	The expression is not valid.	Cannot add two relocatable terms together.
*+4	The expression is not valid.	The location counter is not supported.
label(,3)	The expression is not valid.	The base register must be a valid GPR name defined in REGEQ/REGEQ1.
G'345F'	G-type constants are not supported.	Echo all G-type constants.

Resolving Symbols for the Assembler Debugger

The assembler debugger resolves symbols by searching the following tables in the order shown:

1. The user symbol override table
2. The local symbol table for the assembler program
3. The common symbol table
4. The user global symbol table
5. The IBM-defined global symbol table.

User Symbol Override Table: This contains global symbols that are used to override symbol definitions in the local symbol table or the common symbol table. For example, you can define symbol D0 in the symbol override table as a pointer to the storage block on data level 0 to override the definition in DSECT CPSEQ, which has a value of 0. You can use the User Symbol Override Table (USOT) user exit to define these global symbols. See *TPF System Installation Support Reference* for more information about this user exit.

Local Symbol Table: This table contains all symbols included in the assembler program excluding symbols defined in the common symbol table. The TPFSYM offline program extracts DSECT or symbol definitions from the SYSADATA file that are generated by the assembler debugger and saves the definitions in the ADATA file. You can use either the online loader or File Transfer Protocol (FTP) to load the ADATA file to the TPF 4.1 system.

Common Symbol Table: This contains symbols that are considered common to real-time assembler programs. Use of this table eliminates the need for multiple copies of the symbol information for each real-time assembler program being retained and loaded to the TPF 4.1 system. Instead, only one copy of the symbols is kept in the TPF 4.1 system. You can use the Common Symbol Table (UCST) user exit to add the symbols to the table. The TPFSYM offline program is used to generate the ADATA files that contain the symbol table for loading to the TPF system. The ADATA file that is generated from the TPFSYM offline program for the UCST user exit, UCST.ADATA, should be used as the exclusion file input to TPFSYM when generating ADATA files for assembler programs to remove the appropriate debug information. You must load the UCST.ADATA file to the TPF system to access symbols in the common symbol table. See *TPF System Installation Support Reference* for more information about this user exit and IBM VisualAge for TPF online help for more information about the TPFSYM offline program.

User Global Symbol Table: This table, which you create, contains global symbol definitions that do not exist in a real-time assembler program. The global symbol definitions map to system structures that are not referenced in the real-time assembler program and are resolved to any data structure that you define through XML mapping. You can use the User Global Symbol Table (UGST) user exit to define global symbols. See *TPF System Installation Support Reference* for more information about this user exit.

IBM-Defined Global Symbol Table: This is a table provided by IBM that includes entries that allow you to easily display all system control blocks such as DECBs or a particular DECB by name while running the assembler and C debuggers. IBM provides the following global symbols:

- DECB, which returns a list of DECB addresses that are currently created.
- DECBNAME(name), which returns a list of DECB addresses that have matching names that you provide. The name you provide will first be treated as character

representation so it can be compared with the name in the DECB. If the name does not match, the name will be treated as a hexadecimal representation and compared again with the name in the DECB.

Using Global Symbols: When using global symbols, you can specify one parameter that is handled as a character string. The pointer to that character string is passed to the function that resolves the symbol. If the parameter string contains blanks, the entire string must be enclosed with double quotation marks to preserve the white space; for example, DECBNME("THIS IS MY DECB").

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1093 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1093. Changes to Build Scripts for Expression Enhancements for the TPF Debuggers

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CDB3BS	DLL	Changed	Updated for assembler debugger symbolic support.
CDBGBS	DLL	Changed	Updated for assembler debugger symbolic support.
CEXPBS	DLL	Changed	Updated for assembler debugger symbolic support.
CPLXBS	DLL	Changed	Updated for assembler debugger symbolic support.
CPRSBS	DLL	Changed	Updated for assembler debugger symbolic support.
CUDABS	DLL	Changed	Added the CGSTAB, CGSTDC, CGSTFN, CGSTRT, CUDAGP, CUDALX, CUDASM, CUDAYC members. Added the CDWF and CTLF link-edited modules. Added the CTAD, USOT, and UGST data store definitions.
CUDA2BS	DLL	Changed	Added the CUDB members.
UGSTBS	DLL	New	Created for the user global symbol table.
USOTBS	DLL	New	Created for the user symbol override table.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1094 on page 1051 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1094. Changes to General Use C/C++ Language Header Files for Expression Enhancements for the TPF Debuggers

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$gsut.h	New	No	Not Applicable
c\$udgs.h	New	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1095 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1095. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Expression Enhancements for the TPF Debuggers

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$idspat.h	Changed	No	Not Applicable
dwarf.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
elf_repl.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
i\$tsob.h	New	No	Not Applicable
i\$tsrc.h	New	No	Not Applicable
i\$syml.hpp	New	Yes	Compile the segments listed in Table 1103 on page 1056.
i\$udbg.hpp	Changed	Yes	Compile all CUD*.CPP programs found in the CUDA, CUD2, and CUD1 link-edited modules.
i\$udcl.hpp	Changed	Yes	Compile all CUD*.CPP programs found in the CUDA, CUD2, and CUD1 link-edited modules.
i\$udpr.hpp	New	Yes	Compile the segments listed in Table 1103 on page 1056.
i\$udyc.h	New	No	Not Applicable
libdwarf.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/byteswap.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/config.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.

Table 1095. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Expression Enhancements for the TPF Debuggers (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
libelf/elf_repl.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/errors.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/ext_types.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/libelf.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/nlist.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/private.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
libelf/sys_elf.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
private.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.
sys_elf.h	New	No	This is ported and needed to build the CUDA link-edited module and the TPFSYM offline program.

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1096 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1096. Changes to Link-Edited Modules for Expression Enhancements for the TPF Debuggers

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CDBG	Changed	Updated for assembler debugger symbolic support in the CDBG DLM.
CDB3	Changed	Updated for assembler debugger symbolic support in the CDB3 DLL.
CDWF	New	Created for assembler debugger symbolic support.
CELE	Changed	Updated for assembler debugger symbolic support.

Table 1096. Changes to Link-Edited Modules for Expression Enhancements for the TPF Debuggers (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CEXP	Changed	Updated for assembler debugger symbolic support in the CEXP DLL.
COLH	Changed	Updated for assembler debugger symbolic support.
CPLX	Changed	Updated for assembler debugger symbolic support in the CPLX LLM.
CPRS	Changed	Updated for assembler debugger symbolic support in the CPRS DLL.
CTLF	New	Created for assembler debugger symbolic support.
CUDA	Changed	Updated for assembler debugger symbolic support.
CUD1	Changed	Updated for assembler debugger symbolic support.
CUD2	Changed	Updated for assembler debugger symbolic support.
UGST	New	Created for assembler debugger symbolic support.
USOT	New	Created for assembler debugger symbolic support.

Members: Table 1097 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1097. Changes to Members for Expression Enhancements for the TPF Debuggers

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CELE	CELE	DLM	Changed	C Language	Updated for assembler debugger symbolic support.
CGSTAB	CUDA	DLL	New	C++ Language	Created for IBM-defined global symbols and for resolving functions.
CGSTDC	CUDA	DLL	New	C Language	Created to declare IBM-defined global symbols for the C debugger.
CGSTFN	CUDA	DLL	New	C++ Language	Created for the global symbol lookup function.
CGSTRT	CUDA	DLL	New	C Language	Created to return the PPA address to the IBM-defined global symbols for the C debugger.
COLP	COLH	DLM	Changed	C Language	Updated for assembler debugger symbolic support.
CUDA	CUDA	DLL	No Change – Recompile CUDA because of changes made to the i\$udbg.hpp and i\$udcl.hpp header files.	C++ Language	Updated for assembler debugger symbolic support.
CUDAGP	CUDA	DLL	New	Assembler	Added GetPat support for the assembler debugger.
CUDALX	CUDA	DLL	New	C++ Language	Created for the assembler debugger parser.
CUDAMB	CUDA	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.

Table 1097. Changes to Members for Expression Enhancements for the TPF Debuggers (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CUDAPV	CUDA	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUDASM	CUDA	DLL	New	C++ Language	Added symbol lookup support for the assembler debugger.
CUDAYC	CUDA	DLL	New	C++ Language	Created for the assembler debugger parser.
CUDC	CUDA	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUDD	CUDA	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUDE	CUDA	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUDK	CUDA	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUDN	CUDN	DLM	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD1	CUD1	DLM	Changed	C++ Language	Updated for assembler debugger symbolic support (commentary changes only).
CUD2	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD3	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD4	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD5	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD6	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD7	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD8	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
CUD9	CUD2	DLL	Changed	C++ Language	Updated for assembler debugger symbolic support.
UGST	UGST	DLL	New	C++ Language	Created for user-defined global symbols and for resolving functions.
UGSTDC	UGST	DLL	New	C Language	Created for user-defined global symbols for the C debugger.
UGSTRT	UGST	DLL	New	C Language	Created to return the PPA address to the user-defined global symbols for the C debugger.
USOT	USOT	DLL	New	C++ Language	Created for the user symbol override table and for resolving functions.
USOTDC	USOT	DLL	New	C Language	Created to declare user-defined override symbols for the C debugger.
USOTRT	USOT	DLL	New	C Language	Created to return the PPA address to the user-defined override symbols for the C debugger.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1098 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1098. Changes to Copy Members for Expression Enhancements for the TPF Debuggers

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CUDR	Copy Member	Changed	CCVAGE	CPS0	Control Program	Updated to support assembler debugger symbolic support.
CUDU	Copy Member	Changed	CCVAGE	CPS0	Control Program	Updated to support assembler debugger symbolic support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes

Communication Macros and Statements: There are no changes.

Data Macros: Table 1099 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1099. Changes to Data Macros for Expression Enhancements for the TPF Debuggers

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
CZ1SE	Changed	No	Not Applicable
REGREQ1	Changed	No	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1100 on page 1056 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the

SIP Stage II deck.

Table 1100. Changes to SIP Skeleton and Internal Macros for Expression Enhancements for the TPF Debuggers

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements:

Table 1101 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck

See “System Initialization Program (SIP) and System Generation Changes” on page 1058 for a description of other system generation changes you must make.

Table 1101. Changes to SIP Stage I Macros and Statements for Expression Enhancements for the TPF Debuggers

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed – Updated to punch a job to compile the CGSTDC, UGSTDC, and USOT members. See Table 1097 on page 1053 for more information about these members.

System Initialization Program (SIP) Stage II Macros: Table 1102 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1102. Changes to SIP Stage II Macros for Expression Enhancements for the TPF Debuggers

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 1103 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1103. Changes to Segments for Expression Enhancements for the TPF Debuggers

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
TLDRMN	Offline	TPFLDR	Changed	Updated for the assembler debugger.
UCST	Real-Time Assembler	Not Applicable	New	Created for use by the common symbol table.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 1104. Changes to ECB User Exits for Expression Enhancements for the TPF Debuggers

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
Common Symbol Table	Not Applicable	UCST	New	This user exit allows you to add data macros (DSECTs) or any symbols that are considered common to real-time assembler programs to the common symbol table for each program. Use of the common symbol table eliminates the need for multiple copies of the symbol information for each real-time assembler program being retained and loaded to the TPF 4.1 system. Instead, only one copy of the common symbols are kept in the TPF 4.1 system.
User Global Symbol Table	Not Applicable	UGST	New	This user exit allows you to define global symbols that do not exist in a program for resolution. These definitions can be used as a valid expression request in both the assembler and C debuggers.
User Symbol Override Table	Not Applicable	USOT	New	This user exit allows you to define global symbols that override symbol definitions in the local symbol table or the common symbol table.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

There are no changes.

Messages and System Errors

Table 1105 on page 1058 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information,

the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1105. Changes to Messages and System Errors for Expression Enhancements for the TPF Debuggers

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
0ADB12	System Error	New
0ADB13	System Error	New
0ADB14	System Error	New
0ADB15	System Error	New
0ADB16	System Error	New
0ADB17	System Error	New
VAGE0001E	Offline	New
VAGE0002E	Offline	New
VAGE0003E	Offline	New
VAGE0004W	Offline	New
VAGE0005W	Offline	New
VAGE0007E	Offline	New
VAGE0008W	Offline	New
VAGE0009E	Offline	New
VAGE0010E	Offline	New
VAGE0011E	Offline	New
VAGE0012E	Offline	New
VAGE0013E	Offline	New
VAGE0014E	Offline	New
VAGE0015E	Offline	New
VAGE0016E	Offline	New
VAGE0017E	Offline	New
VAGE0018E	Offline	New
VAGE0019E	Offline	New
VAGE0020E	Offline	New
VAGE0021E	Offline	New
VAGE0022I	Offline	New
VAGE9091E	Offline	No Longer Supported
VAGE9092E	Offline	No Longer Supported

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1106 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1106. Changes to TPF Publications for Expression Enhancements for the TPF Debuggers

Publication Title	Softcopy File Name	Description of Change
<i>TPF Library Guide</i>	GTPDOC0F	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for expression enhancements for the TPF debuggers.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for expression enhancements for the TPF debuggers.
<i>TPF System Installation Support Reference</i>	GTPINR0F	Updated with information about new user exits for expression enhancements for the TPF debuggers.
<i>TPF System Generation</i>	GTPSYG0F	Updated with information about fixed file records for expression enhancements for the TPF debuggers.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before You Begin

Ensure that your TPF 4.1 system is at program update tape (PUT) 14 and that you have VisualAge for TPF corrective service diskette (CSD) 22 or later installed.

Use the following procedure to install expression enhancements for the TPF debuggers on your TPF 4.1 system.

1. Unpack PUT 15, which contains APAR PJ27905 for expression enhancements for the TPF debuggers. See *TPF Memo to Licensees* for more information about unpacking the tape.
2. Put the C/C++ language header files listed in Table 1094 on page 1051 and Table 1095 on page 1051 in your library system.
3. Install the following:
 - Copy members listed in Table 1094 on page 1051
 - Macros found in Macros on page 1055.
4. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
5. Run the CBLD program for the build scripts listed in Table 1093 on page 1050.
6. Reassemble or recompile the following:
 - Members listed in Table 1097 on page 1053
 - Segments listed in Table 1103 on page 1056.
7. Load the link-edited modules listed in Table 1096 on page 1052.
8. IPL your TPF 4.1 system.
9. Unpack the tar file provided if you want to build any of the object (OBJ) files and load modules yourself. The files created after extracting this tar file contain the following:
 - The LIBELF DLL and LIBDWARF DLL that are used by the TPFSYM offline program.
 - The CTLF DLL and CDWF DLL that are used by the assembler debugger.
 - The ELF and DWARF source code, which is found in the source/o1 directory.
 - Sample makefiles, which are found in the source/o1 directory. IBM does not, however, warrant that these makefiles will run in your development environment because these files may use tools that are not required for your TPF 4.1 system.

Notes:

- a. IBM ships the TPFSYM load module linked and ready for you to use. The ELF and DWARF source code and the sample makefiles are provided **for your information only**.
- b. If you want to build the TPFSYM load module and the OBJ files for the CUDASM, CUDAYC, CUDALX, CUDAPV, CUDD, and CUDE members (all of which are part of the CUDA DLL and shipped to you as part of this APAR), the ELF and DWARF C/C++ language header files are required. See Table 1094 on page 1051 for a list of these header files.
- c. The TPFSYM load module and the OBJ files for the CUDASM, CUDAYC, CUDALX, CUDAPV, CUDD, and CUDE members **must** be built in a hierarchical file system (HFS) environment.
- d. Create a libelf symbolic link in your include directory that points to the gp1/tpfelf subdirectory found in the tar file. Include the gp1/tpfelf and gp1/tpfdwarf subdirectories in the include search path when compiling your programs.

Secure Sockets Layer (SSL) Support (APAR PJ27863)

The following section discusses the migration considerations for SSL support.

Prerequisite APARs

See the APEDIT for APAR PJ27863 for information about prerequisite APARs.

Functional Overview

The SSL protocol, which was originally developed for Web browsers, is a set of rules governing authenticated and encrypted communication between Transmission Control Protocol/Internet Protocol (TCP/IP) clients and servers. SSL is widely used on the Internet by an increasing number of varied applications, especially for interactions that involve exchanging confidential information such as credit card numbers. SSL evolved into the Transport Layer Security (TLS) version 1 standard.

SSL is positioned as a protocol layer between the TCP layer and the application to form a secure connection between clients and servers so that they can communicate in a secure manner over a Transmission Control Protocol/Internet Protocol (TCP/IP) network by providing:

- Privacy, where data messages are encrypted so that only the two application endpoints understand the data
- Integrity, where message digests detect if any data was altered in flight
- Authentication, which verifies the identity of the remote application by using digital certificates.

Figure 11 shows an example of a TCP/IP network using SSL.

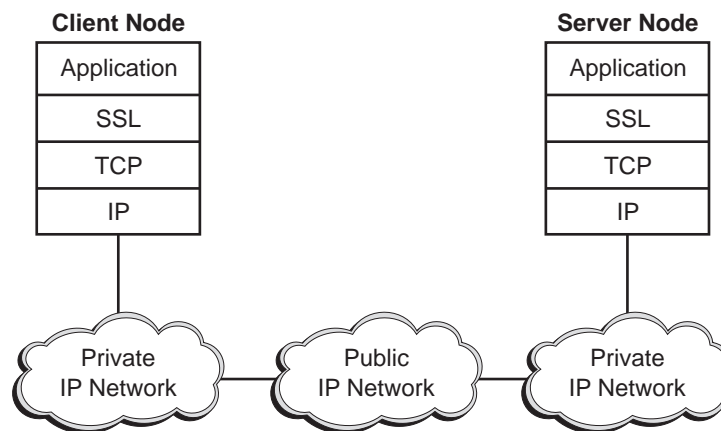


Figure 11. TCP/IP Network Using SSL

This type of secure connection ensures that all data exchanged between clients and servers is encrypted, and is therefore not readable by a third party on the Internet. SSL has gained popularity in the Internet industry primarily because of its use of public-key certificates as a means of authenticating principals. The *public-key certificates* are a type of security exchange to secure the TCP connection between clients and servers. The exchange occurs after the TCP connection is established and an SSL session is started.

To establish the connection, SSL requires a server certificate, at a minimum. As part of the initial *SSL handshake* process, the server presents its certificate to the client

to authenticate the server's identity. The authentication process uses *public-key encryption* and *digital signatures* to confirm that the server is, in fact, who the server claims to be (that is, that the server's certificate is valid). Once the server has been authenticated (that is, the client determines that the server's certificate is valid), the client and server use techniques of *symmetric-key encryption* to encrypt all the information they exchange for the remainder of the SSL session and message digests to detect any tampering that may have occurred. A different key is created for each client and server connection. As a result, even if unauthorized users intercept and decrypt a session key (which is unlikely), they cannot use it to monitor later SSL sessions.

SSL support on the TPF 4.1 system, which is based on the OpenSSL version 0.9.6 open source package, supports the following:

- SSL version 2, SSL version 3, and TLS version 1.
- Rivest-Shamir-Adelman (RSA) public key cryptography.
- Rivest's Cipher (RC) 2, RC4, Data Encryption Standard (DES), and Triple-DES ciphers.
- Message Digest Algorithm 5 (MD5) and Secure Hash Algorithm (SHA) digests.
- Client and server authentication using digital certificates.
- A single x509 certificate or chain of x509 certificates.
- Use of any SSL toolkit to create public and private keys and certificates (including OpenSSL on another platform). You can then use File Transfer Protocol (FTP) to send the key and certificate files to the TPF 4.1 system.
- Certificate revocation lists (CRLs).

The OpenSSL open source package is available at <http://www.openssl.org>. This code was modified to work with the TPF 4.1 system. Therefore, it is important that you use the code modified and shipped by IBM.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1107 on page 1063 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1107. Changes to General Use C/C++ Language Header Files for SSL Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
asn1.h	New	No	Not Applicable
bio.h	New	No	Not Applicable
blowfish.h	New	No	Not Applicable
bn.h	New	No	Not Applicable
buffer.h	New	No	Not Applicable
cast.h	New	No	Not Applicable
comp.h	New	No	Not Applicable
crypto.h	New	No	Not Applicable
des.h	New	No	Not Applicable
dh.h	New	No	Not Applicable
dsa.h	New	No	Not Applicable
e_os2.h	New	No	Not Applicable
evp.h	New	No	Not Applicable
lhash.h	New	No	Not Applicable
md2.h	New	No	Not Applicable
md4.h	New	No	Not Applicable
md5.h	New	No	Not Applicable
mdc2.h	New	No	Not Applicable
obj_mac.h	New	No	Not Applicable
objects.h	New	No	Not Applicable
opensslconf.h	New	No	Not Applicable
opensslv.h	New	No	Not Applicable
pem.h	New	No	Not Applicable
pem2.h	New	No	Not Applicable
pkcs7.h	New	No	Not Applicable
rc2.h	New	No	Not Applicable
rc4.h	New	No	Not Applicable
ripemd.h	New	No	Not Applicable
rsa.h	New	No	Not Applicable
safestack.h	New	No	Not Applicable
sha.h	New	No	Not Applicable
ssl.h	New	No	Not Applicable
ssl2.h	New	No	Not Applicable
ssl23.h	New	No	Not Applicable
ssl3.h	New	No	Not Applicable
stack.h	New	No	Not Applicable
synhacks.h	New	No	Not Applicable
tls1.h	New	No	Not Applicable
x509.h	New	No	Not Applicable
x509_vfy.h	New	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1108 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1108. Changes to Link-Edited Modules for SSL Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CRYP	New	Created for SSL support.
CRY1	New	Created for SSL support.
CRY2	New	Created for SSL support.
CSSL	New	Created for SSL support.

Members: There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1109 on page 1065 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1109. Changes to SIP Skeleton and Internal Macros for SSL Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1110 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1110. Changes to SIP Stage II Macros for SSL Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

There are no changes.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1111 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1111. Changes to TPF Publications for SSL Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for SSL support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Added the APIs for SSL support.
<i>SSL for the TPF 4.1 System: An Online User's Guide</i>	Not Applicable	Created for the delivery of information for SSL support on the TPF 4.1 system.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

SSL support provides several new APIs. Table 1112 lists these APIs in alphanumeric order.

To view information about these APIs, go to *SSL for the TPF 4.1 System: An Online User's Guide*.

Table 1112. APIs for SSL Support

SSL_accept	SSL_free	SSL_set_verify
SSL_check_private_key	SSL_get_cipher	SSL_shutdown
SSL_connect	SSL_get_error	SSL_use_certificate_file
SSL_CTX_check_private_key	SSL_get_peer_certificate	SSL_use_PrivateKey_file
SSL_CTX_free	SSL_get_verify_result	SSL_use_RSAPrivateKey_file
SSL_CTX_load_verify_locations	SSL_get_version	SSL_write
SSL_CTX_new	SSL_library_init	SSLv2_client_method
SSL_CTX_set_cipher_list	SSL_load_client_CA_file	SSLv2_server_method
SSL_CTX_set_client_CA_list	SSL_new	SSLv23_client_method
SSL_CTX_set_default_passwd_cb_userdata	SSL_pending	SSLv23_server_method
SSL_CTX_set_verify	SSL_read	SSLv3_client_method
SSL_CTX_use_certificate_chain_file	SSL_set_cipher_list	SSLv3_server_method
SSL_CTX_use_certificate_file	SSL_set_client_CA_list	TLSv1_client_method
SSL_CTX_use_PrivateKey_file	SSL_set_fd	TLSv1_server_method
SSL_CTX_use_RSAPrivateKey_file		

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install APAR PJ27863, which contains SSL support, on your TPF 4.1 system.

1. Be sure TCP/IP native stack support (APAR PJ26683) is installed on your TPF 4.1 system. See Chapter 13 in *TPF Migration Guide: Program Update Tapes* for more information.
2. Put the C/C++ language header files listed in Table 1107 on page 1063 in the \openssl\include subdirectory of your library system. You will need to use these header files to compile applications that use the SSL APIs.
3. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
4. Assemble the SIP Stage I deck to create a SIP Stage II deck.
5. Run SIP Stage II.
6. Load the link-edited modules listed in Table 1108 on page 1064.
7. IPL your TPF 4.1 system.
8. Enter **ZTMSL ADD IBMSSLPR MAXECB-9999 MAXTIME-0 MINSUSP-0 RUNTIME-100** to define the time-slice name used by SSL support.
9. If your TPF 4.1 system needs to send certificates to the remote application, do the following; otherwise, go to step 10.
 - a. Create the files that contain certain public key and private key pairs for your TPF 4.1 system from a remote platform. These files are known as *key files*.
 - b. Create the files that contain the certificates for your TPF 4.1 system from a remote platform. These files are known as *certificate files*.
 - c. Load the files created in steps 9a and 9b to your TPF 4.1 system. You can use File Transfer Protocol (FTP) to load this information to your TPF 4.1 system.
 - d. Define the file system permission bits for the key and certificate files so that the SSL applications can read these files. There are different ways to set the permission bits. For example, you can set permission bits so that all users can read the files, or define the files with specific user and group permissions and have the SSL applications define that user or group before issuing SSL API functions that read those files. Go to *SSL for the TPF 4.1 System: An Online User's Guide* for more information.
10. If you want your TPF 4.1 system to verify the identity of remote nodes when SSL connections are started, do one of the following. Otherwise, go to step 11 on page 1068.
 - Place all the certificate authority (CA) certificates in one certificate file and load that file (using FTP) to your TPF 4.1 system.
 - Keep each CA certificate in a separate file and load these files (using FTP) into one directory (subdirectory) on your TPF 4.1 system. You must also create a hash on a remote platform that supports EBCDIC and load (using FTP) it to your TPF 4.1 system:
 - a. Run the function on the remote platform that creates a hash number, for example 23.0. If you receive duplicate hash numbers, the extension is incremented by one; for example if hash number 23 is a duplicate, you will have 23.0 and 23.1.
 - b. Rename the CA certificate to the hash number you just created or you can create a symbolic link based on the hash number.
 - c. Repeat this process for each CA certificate you have.

11. Code your new applications to use the SSL APIs and convert existing TCP applications to use the SSL APIs, as appropriate.

Shared SSL Session Support (APAR PJ28118)

The following section discusses the migration considerations for shared SSL session support.

Prerequisite APARs

See the APEDIT for APAR PJ28118 for information about prerequisite APARs.

Functional Overview

Secure Sockets Layer (SSL) support (APAR PJ27863) on the TPF 4.1 system, which is based on the OpenSSL version 0.9.6 open source package, supported the following:

- SSL version 2, SSL version 3, and TLS version 1.
- Rivest-Shamir-Adelman (RSA) public key cryptography.
- Rivest's Cipher (RC) 2, RC4, Data Encryption Standard (DES), and Triple-DES ciphers.
- Message Digest Algorithm 5 (MD5) and Secure Hash Algorithm (SHA) digests.
- Client and server authentication using digital certificates.
- A single x509 certificate or chain of x509 certificates.
- Use of any SSL toolkit to create public and private keys and certificates (including OpenSSL on another platform). You can then use File Transfer Protocol (FTP) to send the key and certificate files to the TPF 4.1 system.
- Certificate revocation lists (CRLs).

See "Secure Sockets Layer (SSL) Support (APAR PJ27863)" on page 1061 for more information about SSL support.

Shared SSL session support provides the following enhancements to SSL support:

- Activate on receipt (AOR) capability for SSL through the SSL_aor function
- Secure Web server support
- Shared SSL sessions
- SSL diagnostic tools.

In addition, APAR PJ28021 adds support for the Berkeley Software Distribution (BSD) format of the select function through the tpf_select_bsd function. These functions are now supported:

- FD_CLR
- FD_COPY
- FD_ISSET
- FD_SET
- FD_ZERO.

Note: BSD select (APAR PJ28021) is only required for Secure Web Server support. BSD select is not needed for shared SSL session support.

See *TPF C/C++ Language Support User's Guide* for more information about these functions.

Activate on Receipt (AOR) Capability for SSL

The SSL_aor function is new to the TPF 4.1 system. This function allows you to have thousands of shared SSL sessions without having thousands of active entry

control blocks (ECBs). The SSL_aor function is modeled after the sockets activate_on_receipt function. Go to *SSL for the TPF 4.1 System: An Online User's Guide* for more information about these functions.

Secure Web Server Support

Support has been added for the mod_ssl module in Apache.

Shared SSL Sessions

Shared SSL sessions increase the scalability and usability of the code by allowing SSL sessions to be shared by ECBs in the TPF 4.1 system. For example, ECB 1 can read an input message on a shared SSL session and ECB 2 can send the output message across that same SSL session.

SSL Diagnostic Tools

SSL diagnostic tools provide statistical information about SSL sessions. You can display this statistical information by using the ZSSLD command. Go to *SSL for the TPF 4.1 System: An Online User's Guide* for more information about this command.

The following statistical information is maintained:

- The number of SSL sessions that were started in the last minute and the maximum number of SSL sessions that were started in a one-minute interval.
- The number of SSL_write calls issued in the last minute that resulted in data being sent and the maximum number of SSL_write calls that were issued in a one-minute interval
- The number of bytes of data that SSL applications sent across SSL sessions in the last minute and the maximum number of bytes sent across SSL sessions in a one-minute interval
- The number of SSL_read calls issued in the last minute that resulted in data being read and the maximum number of SSL_read calls that were issued in a one-minute interval
- The number of bytes of data that SSL applications read from SSL sessions in the last minute and the maximum number of bytes read across SSL sessions in a one-minute interval.
- The following information is maintained for each active SSL daemon process:
 - The SSL daemon process number
 - The number of threads currently processing an SSL API call in this SSL daemon process
 - The maximum number of threads that were concurrently processing SSL API calls in this SSL daemon process
 - The current number of shared SSL sessions owned by this SSL daemon process
 - The maximum number of shared SSL sessions owned by this SSL daemon process that were active.

Architecture

SSL support (APAR PJ27863) enabled TPF applications to use SSL. The OpenSSL version 0.9.6 open source package that was ported ties an SSL session to a specific process. For the TPF 4.1 system, this means a given SSL session is owned by a specific ECB and all information about that SSL session resides in heap storage associated with that ECB. This ECB is the only one that can issue any SSL APIs for that SSL session. If the ECB exits for any reason, the SSL session is ended.

In a distributed application environment that includes the TPF 4.1 system, multiple ECBs have the ability to share a TCP/IP socket. Shared SSL session support extends this capability to allow multiple ECBs to share an SSL session, or to have the ability to pass an SSL session from one ECB to another ECB. When the application creates an SSL session, the session can be defined as shared or not shared. For SSL sessions defined as not shared, there are no changes and the session is still tied to a single ECB. SSL daemon processes manage SSL sessions that are created as shared. Any application (ECB) can issue an SSL API for a shared SSL session. Shared SSL sessions are not tied to an application ECB, meaning that the SSL session can remain active even if there are no active application ECBs.

TCP/IP support created a unique socket API called `activate_on_receipt` (AOR) that allows the calling ECB to exit, a new ECB to be created, and the specified application to be activated when data arrives on the socket. No ECBs are tied up while waiting for data to arrive. Shared SSL session support provides a similar ability for SSL sessions. A new TPF-unique SSL API called `SSL_aor` is created that provides the same functions to SSL sessions that `activate_on_receipt` provides for sockets.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1113 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1113. Changes to Build Scripts for Shared SSL Session Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CTALBS	LLM	Changed	Updated for shared SSL session support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1123 on page 1075 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1114. Changes to General Use C/C++ Language Header Files for Shared SSL Session Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$ck2sn.h	Changed	No	Not Applicable
c\$eb0eb.h	Changed	No	Not Applicable

Table 1114. Changes to General Use C/C++ Language Header Files for Shared SSL Session Support (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
ssl.h	Changed	No	Not Applicable
sysapi.h	Changed	Yes	Any application that uses shared SSL session support.
sysgtime.h	Changed	No	Updated for APAR PJ28021 to add support for the BSD format of the select function through the tpf_select_bsd function.
time.h	Changed	No	Updated for APAR PJ28021 to add support for the BSD format of the select function through the tpf_select_bsd function.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1115 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1115. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for Shared SSL Session Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
i\$issl.h	New	No	Not Applicable

Library Interface Scripts: Table 1116 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 1116. Changes to Library Interface Scripts for Shared SSL Session Support

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
CTALXV	Changed	Updated for shared SSL session support.
C551	New	Updated for shared SSL session support.

Link-Edited Modules: Table 1117 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1117. Changes to Link-Edited Modules for Shared SSL Session Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CSSL	Changed	Updated for shared SSL session support.
CSL0	New	Created for shared SSL session support.
CSL1	New	Created for shared SSL session support.
CSL2	New	Created for shared SSL session support.
CSL3	New	Created for shared SSL session support.
CSL4	New	Created for shared SSL session support.
CSL5	New	Created for shared SSL session support.
CSL6	New	Created for shared SSL session support.

Table 1117. Changes to Link-Edited Modules for Shared SSL Session Support (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CSL7	New	Created for shared SSL session support.
CSL8	New	Created for shared SSL session support.
CSL9	New	Created for shared SSL session support.
CSLA	New	Created for shared SSL session support.

Members: Table 1118 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1118. Changes to Members for Shared SSL Session Support

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CMOVE2	CTAL	LLM	New	Real-Time Assembler	Created for shared SSL session support.
COFLOK	CISO	LLM	Changed	Object Code Only	Updated to add shared SSL session support.
C551	COMX	LLM	New	C++ Language	Created for shared SSL session support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes. Table 1119 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1119. Changes to Copy Members for Shared SSL Session Support

Copy Member	Type	New, Changed, or No Longer Supported?	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CCEB	Control Program	Changed	CCENBK	CPS0	Control Program	Updated to add shared SSL session support.
CICS	Control Program	Changed	CCNUCL	CPS0	Control Program	Updated to add shared SSL session support.
CISO	Control Program	Changed	CCISOC	CPS0	Control Program	Updated to add shared SSL session support.
CLHV	Control Program	Changed	CCSTOR	CPS0	Control Program	Updated to add shared SSL session support.
CTH0	Control Program	Changed	CCTHDS	CPS0	Control Program	Updated to add shared SSL session support.

Table 1119. Changes to Copy Members for Shared SSL Session Support (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CTH2	Control Program	Changed	CCTHDS	CPS0	Control Program	Updated to add shared SSL session support.
CTI2	Control Program	Changed	CCTCP2	CPS0	Control Program	Updated to add shared SSL session support.
CTSM	Control Program	Changed	CCTCP3	CPS0	Control Program	Updated to add shared SSL session support.
CTT6	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated to add shared SSL session support.
CT40	Control Program	Changed	CCCTIN	CPS0	Control Program	Updated to add shared SSL session support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 1120 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the SNA communication macro or statement.

Table 1120. Changes to Communication Macros and Statements for Shared SSL Session Support

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
SNAKEY	Changed	Yes	CTK2

Data Macros: Table 1121 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1121. Changes to Data Macros for Shared SSL Session Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
CK2SN	Changed	No	Not Applicable
IEQCE2	Changed	No	Not Applicable
ISOCK	Changed	No	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: Table 1122 on page 1075 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1122. Changes to Selected Equate Macros for Shared SSL Session Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
CZ1SE	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1123 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1123. Changes to SIP Skeleton and Internal Macros for Shared SSL Session Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1124 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1124. Changes to SIP Stage II Macros for Shared SSL Session Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 1125 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 1125. Changes to System Macros for Shared SSL Session Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
\$MOVEC	Changed	No	Not Applicable

System Macros (IBM Use Only): Table 1126 on page 1076 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 1126. Changes to System Macros (IBM Use Only) for Shared SSL Session Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
DLTEC	Changed	Yes	All segments that reference DLTEC.

Segments

Table 1127 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1127. Changes to Segments for Shared SSL Session Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCCTIN	CSECT	Not Applicable	No Changes – Must reassemble though because copy members in CCCTIN were updated.	Updated to add shared SSL session support.
CCENBK	CSECT	Not Applicable	Changed	Updated to add shared SSL session support.
CCNUCL	CSECT	Not Applicable	No Changes – Must reassemble though because copy members in CCNUCL were updated.	Updated to add shared SSL session support.
CCTCP1	CSECT	Not Applicable	No Changes – Must reassemble though because copy members in CCTCP1 were updated.	Updated to add shared SSL session support.
CCTCP2	CSECT	Not Applicable	No Changes – Must reassemble though because copy members in CCTCP2 were updated.	Updated to add shared SSL session support.
CCTCP3	CSECT	Not Applicable	No Changes – Must reassemble though because copy members in CCTCP3 were updated.	Updated to add shared SSL session support.
CCTHDS	CSECT	Not Applicable	No Changes – Must reassemble though because copy members in CCTHDS were updated.	Updated to add shared SSL session support.
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
csslac	C Language	Not Applicable	New	Created for shared SSL session support.
cssalo	C Language	Not Applicable	New	Created for shared SSL session support.
csslar	C Language	Not Applicable	New	Created for shared SSL session support.
csslcf	C Language	Not Applicable	New	Created for shared SSL session support.
csslch	C Language	Not Applicable	New	Created for shared SSL session support.

Table 1127. Changes to Segments for Shared SSL Session Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
csslcs	C Language	Not Applicable	New	Created for shared SSL session support.
csslcy	C Language	Not Applicable	New	Created for shared SSL session support.
csslgc	C Language	Not Applicable	New	Created for shared SSL session support.
csslls	C Language	Not Applicable	New	Created for shared SSL session support.
csslmg	C Language	Not Applicable	New	Created for shared SSL session support.
csslmt	C Language	Not Applicable	New	Created for shared SSL session support.
csslms	C Language	Not Applicable	New	Created for shared SSL session support.
csslnw	C Language	Not Applicable	New	Created for shared SSL session support.
csslqo	C Language	Not Applicable	New	Created for shared SSL session support.
csslqt	C Language	Not Applicable	New	Created for shared SSL session support.
csslrc	C Language	Not Applicable	New	Created for shared SSL session support.
csslrd	C Language	Not Applicable	New	Created for shared SSL session support.
csslrs	C Language	Not Applicable	New	Created for shared SSL session support.
csslrt	C Language	Not Applicable	New	Created for shared SSL session support.
csslr2	C Language	Not Applicable	New	Created for shared SSL session support.
csslsf	C Language	Not Applicable	New	Created for shared SSL session support.
csslsn	C Language	Not Applicable	New	Created for shared SSL session support.
csslus	C Language	Not Applicable	New	Created for shared SSL session support.
csslwb	C Language	Not Applicable	New	Created for shared SSL session support.
csslwr	C Language	Not Applicable	New	Created for shared SSL session support.
csslwt	C Language	Not Applicable	New	Created for shared SSL session support.
csslzd	C Language	Not Applicable	New	Created for shared SSL session support.
csslzs	C Language	Not Applicable	New	Created for shared SSL session support.
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTKR	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTSA	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTSC	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTSQ	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTS5	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTS6	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CTS8	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated to add shared SSL session support.
ssl_lib	C++ Language	Not Applicable	Changed	Updated to add shared SSL session support.
ssl_rsa	C++ Language	Not Applicable	Changed	Updated to add shared SSL session support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1128 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for more information about the ZNKEY command. Go to <http://www.ibm.com/tpf/pubs/tpfpubs.htm> and click **SSL for the TPF 4.1 System: An Online User's Guide** for more information about the ZSSLD command.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1128. Changes to Commands for Shared SSL Session Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZNKEY	Changed	Added the SSLPROC and SSLTHRD parameters. Updated the SOCKSWP parameter for the SSL socket sweeper.
ZSSLD	New	Created to manage SSL daemon processes.

Messages and System Errors

Table 1129 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. Go to *SSL for the TPF 4.1 System: An Online User's Guide* for more information about these messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1129. Changes to Messages and System Errors for Shared SSL Session Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
007820	System Error	New
SSLD0001I	Online	New
SSLD0002I	Online	New
SSLD0003I	Online	New
SSLD0004I	Online	New
SSLD0005I	Online	New
SSLD0007I	Online	New

Table 1129. Changes to Messages and System Errors for Shared SSL Session Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SSLD0008I	Online	New
SSLD0010I	Online	New
SSLD0011I	Online	New
SSLD0020E	Online	New
SSLD0021E	Online	New
SSLD0022E	Online	New
SSLD0023E	Online	New
SSLD0024E	Online	New
SSLD0025E	Online	New
SSLD0026E	Online	New
SSLD0030E	Online	New
SSLD0032E	Online	New
SSLD0040E	Online	New
SSLD0041E	Online	New
SSLD0050E	Online	New
SSLD0051E	Online	New
SSLD0052E	Online	New
SSLD0053E	Online	New
SSLD0054I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

The following updates may be needed:

- Increase the maximum number of 4-KB frames that an entry control block (ECB) can acquire for heap storage by entering the ZCTKA ALTER command with the MMHS parameter specified.
- Increase the maximum number of 4-KB frames that an ECB can acquire for its ISO-C stack by entering the ZCTKA ALTER command with the MSHS parameter specific.

See *TPF Operations* for more information about the ZCTKA ALTER command.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1130 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1130. Changes to TPF Publications for Shared SSL Session Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF0E	Updated the existing SNAKEY macro to include the new SSLPROC and SSLTHRD parameters. The existing SOCKSWP parameter was also updated.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0F	Added the new tpf_movec_EVM function and updated the existing tpf_movec function for shared SSL session support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for shared SSL session support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for shared SSL session support.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for shared SSL session support.
<i>TPF Program Development Support Reference</i>	GTPPDROF	Added the new SSL dump label for shared SSL session support.
<i>TPF System Macros</i>	GTPSYS0F	Updated the existing \$MOVEC macro for shared SSL session support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Added the APIs for shared SSL session support and updated SSL support APIs that were modified by shared SSL session support.
<i>SSL for the TPF 4.1 System: An Online User's Guide</i>	Not Applicable	Updated with information for shared SSL session support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Shared SSL session support provides the following new APIs:

- SSL_aor
- SSL_CTX_load_and_set_client_CA_list
- SSL_CTX_new_shared
- SSL_get_session
- SSL_load_and_set_client_CA_list
- SSL_renegotiate
- SSL_set_session
- tpf_movec_EVM.

Shared SSL session support updated the following APIs:

- SSL_CTX_check_private_key
- SSL_CTX_free
- SSL_CTX_load_verify_locations
- SSL_CTX_new
- SSL_CTX_set_cipher_list
- SSL_CTX_set_client_CA_list
- SSL_CTX_set_default_passwd_cb_userdata

- SSL_CTX_set_verify
- SSL_CTX_use_certificate_chain_file
- SSL_CTX_use_certificate_file
- SSL_CTX_use_PrivateKey_file
- SSL_CTX_use_RSAPrivateKey_file
- SSL_get_peer_certificate
- SSL_load_client_CA_file
- SSL_new
- SSL_read
- SSL_set_cipher_list
- SSL_set_client_CA_list
- SSL_use_certificate_file
- SSL_use_PrivateKey_file
- SSL_use_RSAPrivateKey_file
- SSL_write
- SSLv2_client_method
- SSLv2_server_method
- SSLv23_client_method
- SSLv23_server_method
- SSLv3_client_method
- SSLv3_server_method
- tpf_movec
- TLSv1_client_method
- TLSv1_server_method.

To view information about these APIs, go to *SSL for the TPF 4.1 System: An Online User's Guide*

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install APAR PJ28118, which contains shared SSL session support, on your TPF 4.1 system.

1. Ensure TCP/IP native stack support (APAR PJ26683) is installed on your TPF 4.1 system. See Chapter 13 in *TPF Migration Guide: Program Update Tapes* for more information.
2. Ensure SSL support (APAR PJ27863) is installed on your TPF 4.1 system. See Chapter 17 in *TPF Migration Guide: Program Update Tapes* for more information.

3. Put the C/C++ language header files listed in Table 1123 on page 1075 in the \openssl\include subdirectory of your library system. You will need to use these header files to compile applications that use the SSL APIs.
4. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
5. Assemble the SIP Stage I deck to create a SIP Stage II deck.
6. Run SIP Stage II.
7. Load the link-edited modules listed in Table 1117 on page 1072.
8. IPL your TPF 4.1 system.
9. Define the SSL daemon processes by coding the SSLPROC and SSLTHRD parameters on the SNAKEY macro in CTK2. See *TPF ACF/SNA Network Generation* for more information about these new parameters and the SNAKEY macro.
10. Enable threads on your TPF 4.1 system by doing the following:
 - Enter the ZCTKA ALTER command with the MTHD parameter specified to change the maximum number of threads allowed for a process. The value specified must be the value of the SSLTHRD parameter plus 1 or higher.
 - Enter the ZCTKA ALTER command with the TSTK parameter specified to change the number of 4-KB ISO-C stack frames for a thread.

See *TPF Operations* for more information about the ZCTKA ALTER command.

11. Load the updated CTK2 to your TPF 4.1 system.
12. Create the shared SSL configuration file, /etc/sslshared.txt, if you want to assign specific applications to one or more specific SSL daemon processes.
13. Modify any existing applications or code new applications to create shared SSL sessions using the SSL_CTX_new_shared function. You can optionally use the SSL_aor function. Go to *SSL for the TPF 4.1 System: An Online User's Guide* for more information about these new APIs.
14. Recompile any applications that were written using SSL support that issue the SSL_get_cipher function if, and only if, you want that application to use shared SSL sessions.

Simple Network Management Protocol Agent Support (APAR PJ27932)

The following section discusses the migration considerations for Simple Network Management Protocol (SNMP) agent support.

Prerequisite APARs

See the APEDIT for APAR PJ27932 for information about prerequisite APARs.

Functional Overview

SNMP is an industry-standard protocol that enables you to monitor and manage diverse and complex Transmission Control Protocol/Internet Protocol (TCP/IP) networks. SNMP is defined by a series of Request for Comments (RFC) documents that describe the flows and information that is communicated between the network management station and the different TCP/IP devices that are being managed. The SNMP architecture defines three entities:

- SNMP agents, which are network devices such as hosts, gateways, routers, or servers that receive requests from SNMP managers to retrieve or change Management Information Base (MIB) variables. SNMP agents then respond to these requests.
- An SNMP manager, which runs an application or suite of applications to manage and monitor TCP/IP networks.
- The MIB, which contains data that provides information about the SNMP agent and the TCP/IP network to the SNMP manager.

The TPF 4.1 system provides agent support for SNMP Version 1 with a standard set of MIB variables (MIB-II). This allows an SNMP manager to monitor and manage the TPF 4.1 system as an SNMP agent. SNMP agent support provides the following:

- A program interface to send enterprise-specific traps (unsolicited messages) to notify SNMP managers of significant system events
- A user exit to provide security by validating SNMP requests
- A user exit to retrieve your own enterprise-specific MIB variables.

Architecture

The SNMP architecture for standard TCP/IP network protocols is defined by the following RFC documents:

- RFC 1155 *Structure and Identification of Management Information for TCP/IP-based internets*
- RFC 1157 *A Simple Network Management Protocol (SNMP)*
- RFC 1213 *Management Information Base for Network Management of TCP/IP-based internets: MIB-II*
- RFC 2233 *The Interfaces Group MIB using SMIv2.*

Go to <http://www.ietf.org> for more information about these RFCs and any related extensions.

The SNMP architecture is further defined by using a subset of the basic encoding rules (BER), which are documented in ISO 8825 *Part 1: Basic Encoding Rules*. Go to <http://www.iso.ch/> to view ISO 8825.

Configuration Files

The SNMP architecture requires that you provide some information. This information is specified in the `snmp.cfg` SNMP configuration file. This file can be created on any platform and is placed in the basic subsystem (BSS) TPF `/etc` directory.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about the `/etc/snmp.cfg` SNMP configuration file and SNMP agent support.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with SNMP agent support, you must establish the required operating environment. The following section describes hardware and software requirements specific to SNMP agent support.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for TCP/IP-Based Communication: SNMP agent support requires an SNMP manager application that supports SNMP Version 1 on a remote platform.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1131 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1131. Changes to Build Scripts for SNMP Agent Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CNMABS	DLM	New	Created to start SNMP processing from the Internet daemon.
CNMPBS	DLL	New	Created for SNMP agent support.
CNMTBS	DLM	New	Created for SNMP trap processing.
CNM1BS	DLM	New	Created for the ZSNMP command.
UCOMBS	DLM	New	Created for the SNMP manager validation user exit (UCOM).
UMIBBS	DLM	New	Created for the SNMP enterprise-specific MIB retrieval user exit (UMIB).

Dynamic Load Module (DLM) Stubs: Table 1132 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 1132. Changes to Dynamic Load Module (DLM) Stubs for SNMP Agent Support

DLM Stub	New or No Longer Supported?
CNMT	New
UCOM	New
UMIB	New

General Use C/C++ Language Header Files: Table 1133 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1133. Changes to General Use C/C++ Language Header Files for SNMP Agent Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$ck2sn.h	Changed	No	Not Applicable
c\$snmp.h	New	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1134 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1134. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for SNMP Agent Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
i\$snmp.h	New	No	Not Applicable

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1135 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1135. Changes to Link-Edited Modules for SNMP Agent Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CNMA	New	Created for SNMP trap processing.
CNMP	New	Created for SNMP agent support.
CNMT	New	Created for SNMP trap processing.
CNM1	New	Created for the ZSNMP commnd.
UCOM	New	Created for the SNMP manager validation user exit (UCOM).
UMIB	New	Created for the SNMP enterprise-specific MIB retrieval user exit (UMIB).

Members: Table 1136 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1136. Changes to Members for SNMP Agent Support

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CDNSSI	CDNI	DLM	Changed	C++ Language	Updated to send LINKUP and LINKDOWN traps.
CNMA	CNMA	DLM	New	C++ Language	Created to start SNMP processing from the Internet daemon.
CNME	CNMP	DLL	New	C++ Language	Created for miscellaneous SNMP functions.
CNMF	CNMP	DLL	New	C++ Language	Created for SNMP file refresh processing.
CNMIF	CNMP	DLL	New	Real-Time Assembler	Created for SNMP MIB retrieval.
CNMIP	CNMP	DLL	New	Real-Time Assembler	Created for SNMP MIB retrieval.
CNMM	CNMP	DLL	New	C++ Language	Created for SNMP MIB retrieval.
CNMS	CNMP	DLL	New	C++ Language	Created for the SNMP request message parser.
CNMT	CNMT	DLM	New	C++ Language	Created for SNMP trap processing.
CNMTCP	CNMP	DLL	New	Real-Time Assembler	Created for SNMP MIB retrieval.
CNMUDP	CNMP	DLL	New	Real-Time Assembler	Created for SNMP MIB retrieval.
CNM1	CNM1	DLM	New	C++ Language	Created for the ZSNMP command.
C536	COMX	LLM	Changed	C Language	Updated for SNMP agent support.
UCOM	UCOM	DLM	New	C++ Language	Created for the SNMP manager validation user exit (UCOM).
UMIB	UMIB	DLM	New	C++ Language	Created for the SNMP enterprise-specific MIB retrieval user exit (UMIB).

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1137 on page 1087 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1137. Changes to Copy Members for SNMP Agent Support

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CTI1	Real-Time Assembler	Changed	CCTCP2	CPS0	Control Program	Updated for SNMP counter updates.
CTI2	Real-Time Assembler	Changed	CCTCP2	CPS0	Control Program	Updated for SNMP counter updates.
CTI3	Real-Time Assembler	Changed	CCTCP2	CPS0	Control Program	Updated for SNMP counter updates.
CTI4	Real-Time Assembler	Changed	CCTCP2	CPS0	Control Program	Updated for SNMP counter updates.
CTSM	Real-Time Assembler	Changed	CCTCP3	CPS0	Control Program	Updated for SNMP counter updates.
CTSS	Real-Time Assembler	Changed	CCTCP3	CPS0	Control Program	Updated for SNMP counter updates.
CTTO	Real-Time Assembler	Changed	CCTCP1	CPS0	Control Program	Updated for SNMP counter updates.
CTT5	Real-Time Assembler	Changed	CCTCP1	CPS0	Control Program	Updated to send LINKUP and LINKDOWN traps.
CTT6	Real-Time Assembler	Changed	CCTCP1	CPS0	Control Program	Updated for SNMP counter updates.
CTT8	Real-Time Assembler	Changed	CCTCP1	CPS0	Control Program	Updated for SNMP counter updates.
CTX2	Real-Time Assembler	Changed	CCTCP1	CPS0	Control Program	Updated to send LINKUP and LINKDOWN traps.
CT15	Real-Time Assembler	Changed	CCCTIN	CPS0	Control Program	Updated to carve out the SNMP table.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 1138 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1138. Changes to Data Macros for SNMP Agent Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
CK2SN	Changed	No	Not Applicable
IOSCR	Changed	No	Not Applicable
ISNMP	New	No	Not Applicable
ISTAK	Changed	Yes	COE7, CTF3, CTF4, CTF5, CTSI, CTSJ, CTSX, CTSZ, CTS1

General Macros: Table 1139 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 1139. Changes to General Macros for SNMP Agent Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
ITRPC	New	No	Not Applicable

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1140 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1140. Changes to SIP Skeleton and Internal Macros for SNMP Agent Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1141 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1141. Changes to SIP Stage II Macros for SNMP Agent Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): Table 1142 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 1142. Changes to System Macros (IBM Use Only) for SNMP Agent Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
DLTEC	Changed	No	Not Applicable

Segments

Table 1143 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1143. Changes to Segments for SNMP Agent Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CCOSAE	Object Code Only	CPS0	Changed	Updated for SNMP counter updates.
CMVW	Real-Time Assembler	Not Applicable	Changed	Updated to send LINKUP and LINKDOWN traps.
CMVX	Real-Time Assembler	Not Applicable	Changed	Updated to send LINKUP and LINKDOWN traps.
CNMR	Real-Time Assembler	Not Applicable	New	Created for the SNMP restart function.
COER	Real-Time Assembler	Not Applicable	Changed	Updated to call the SNMP restart function.
COE2	Real-Time Assembler	Not Applicable	Changed	Updated for SNMP interface indexing.
COE3	Real-Time Assembler	Not Applicable	Changed	Updated for SNMP interface indexing.
COE4	Real-Time Assembler	Not Applicable	Changed	Updated for SNMP interface indexing.
COE5	Real-Time Assembler	Not Applicable	Changed	Updated to send LINKUP and LINKDOWN traps.
COE9	Real-Time Assembler	Not Applicable	Changed	Updated for SNMP interface indexing.
CTF2	Real-Time Assembler	Not Applicable	Changed	Updated for SNMP interface indexing.
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated the cycle-up process to call the SNMP file refresh function.
CTSR	Real-Time Assembler	Not Applicable	Changed	Updated to call the SNMP restart function.
CTSW	Real-Time Assembler	Not Applicable	Changed	Updated the socket sweeper for SNMP agent support.
CTS2	Real-Time Assembler	Not Applicable	Changed	Updated for SNMP counter updates.
CTX3	Real-Time Assembler	Not Applicable	Changed	Updated to send LINKUP and LINKDOWN traps.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for the ZSNMP command.

System Equates

The are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 1144. Changes to ECB User Exits for SNMP Agent Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
UCOM	CNMS	UCOM	New	Created for the SNMP manager validation user exit (UCOM).
UMIB	CNMS	UMIB	New	Created for the SNMP enterprise-specific MIB retrieval user exit (UMIB).

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1145 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1145. Changes to Commands for SNMP Agent Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZSNMP	New	Created for SNMP agent support.

Messages and System Errors

Table 1146 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1146. Changes to Messages and System Errors for SNMP Agent Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SNMP0001I	Online	New
SNMP0002E	Online	New
SNMP0003E	Online	New
SNMP0004E	Online	New
SNMP0005E	Online	New
SNMP0006E	Online	New
SNMP0007E	Online	New

Table 1146. Changes to Messages and System Errors for SNMP Agent Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SNMP0008E	Online	New
SNMP0009E	Online	New
SNMP0010W	Online	New
SNMP0011E	Online	New
SNMP0012E	Online	New
SNMP0013E	Online	New
SNMP0014E	Online	New
SNMP0015E	Online	New
SNMP0016E	Online	New
SNMP0017E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1147 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1147. Changes to TPF Publications for SNMP Agent Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0D	Updated with the tpf_itrpc and tpf_snmp_BER_encode C functions that were added for SNMP agent support.
<i>TPF General Macros</i>	GTPGEN0C	Updated with the ITRPC macro that was added for SNMP agent support.
<i>TPF Library Guide</i>	GTPDOC0D	Updated with definitions for new terminology for SNMP agent support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for SNMP agent support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG203	Updated with migration considerations for SNMP agent support.
<i>TPF Operations</i>	GTPOPR0D	Updated with information about the ZSNMP command that was added for SNMP agent support.

Table 1147. Changes to TPF Publications for SNMP Agent Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Program Development Support Reference</i>	GTPPDR0D	Updated with main storage dump labels that were added for SNMP agent support.
<i>TPF System Installation Support Reference</i>	GTPINR0D	Updated with information about the user exits that were added for the SNMP agent support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW09	Updated with information about using SNMP agent support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

SNMP agent support provides the following new APIs:

- tpf_itrpc
- tpf_snmp_BER_encode

See *TPF C/C++ Language Support User's Guide* for more information about these APIs.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

To install SNMP agent support on your existing TPF 4.1 system, do the following:

1. Be sure TCP/IP native stack support (APAR PJ26683) is installed on your TPF 4.1 system. See "TCP/IP Native Stack Support (APAR PJ26683)" on page 626 for more information.
2. Install program update tape (PUT) 15.
3. IPL the TPF 4.1 system and cycle to NORM state.
4. Create the snmp.cfg SNMP configuration file and transfer (FTP) it into the /etc directory of the BSS file system.
5. From the BSS, enter **ZSNMP REFRESH** to refresh the /etc/snmp.cfg SNMP configuration file and copy it into core storage.
6. Define routing table entries, if necessary. See *TPF Transmission Control Protocol/Internet Protocol* for more information about defining routing table entries.
7. Code the UCOM user exit to provide security and the UMIB user exit for enterprise-specific MIB variables.
8. Define the SNMP server to the Internet daemon by entering the following command:

```
ZINET ADD SERVER-SNMP PGM-CNMA PROTOCOL-UDP MODEL-WAIT  
PORT-161
```

9. Enter **ZINET START SERVER-SNMP** to start the SNMP agent.

Additional Information:

- See *TPF Operations* for more information about the ZINET and ZSNMP commands.
- See *TPF System Installation Support Reference* for more information about the UCOM and UMIB user exits.
- See *TPF Transmission Control Protocol/Internet Protocol* for more information about SNMP agent support.

TCP/IP Enhancements for PUT 15 (APARs PJ28026, PJ28029, PJ28034, PJ28064, PJ28067, PJ28093, and PJ28087)

The following section discusses the migration considerations for TCP/IP enhancements for PUT 15.

Prerequisite APARs

See the APEDIT for APARs PJ28026, PJ28029, PJ28034, PJ28064, PJ28067, PJ28093, and PJ28087 for information about prerequisite APARs.

Functional Overview

TCP/IP enhancements for PUT 15 continue to build on the functions provided with TCP/IP native stack support, Open Systems Adapter (OSA)-Express support, and Domain Name System (DNS) support. See “TCP/IP Native Stack Support (APAR PJ26683)” on page 626, “OSA-Express Support (APAR PJ27333)” on page 907, and “Domain Name System (DNS) Support (APAR PJ27268)” on page 766 for more information.

TCP/IP enhancements for PUT 15 increase the usability and functionality of TCP/IP native stack support, OSA-Express support, and DNS support with the following APARs:

- Internet daemon listen backlog support (APAR PJ28026) allows you to specify a listen backlog value for TCP Internet server applications. A listen backlog value specifies the number of connection requests that can be queued for a TCP server before connection requests are rejected. Previously, this value was set to 5, which is the maximum value supported with TCP/IP offload support. With Internet daemon listen backlog support, you can use the BACKLOG parameter of the ZINET ADD or ZINET ALTER command to specify a listen backlog value up to 32 767 for Internet server applications running with TCP/IP native stack support.
- An operator interface to resolve host names and IP addresses (APAR PJ28029) allows you to resolve host names and IP addresses using a command interface. With the new NSLOOKUP parameter of the ZDTCP command, you can specify a host name or an IP address. The resulting display provides the host name, the IP addresses associated with that host name, and any host aliases that may exist.
- IP packet network prioritization (APAR PJ28034) allows you to define a type of service (TOS) value for the network priority of outbound TPF IP packets. Use the IPTOS parameter on the SNAKEY macro to define this value. You can also use the ZNKEY command to display or update the value.
- OSA-Express polling enhancements (APAR PJ28064) improves the efficiency of the OSA polling process to increase network throughput through OSA-Express connections. This enhancement also allows you to tune the number of OSA read buffers to maximize the message processing capacity of each OSA-Express connection. Use the OSABUFF parameter on the SNAKEY macro to define the number of OSA read buffers. You can also use the ZNKEY command to display this value.
- The OSA-Express gateway selection enhancement (APAR PJ28067) improves the way an OSA-Express gateway is selected during IP routing table processing. IP routing table processing has been enhanced to verify that the selected OSA gateway is active and, if not, to find a gateway that is active.
- DNS server wildcard support (APAR PJ28093) allows you to specify a wildcard character at the beginning of a host name in the `/etc/host.txt` file that is used

to build the TPF host name table. Using a wildcard character allows you to define multiple host names with a single entry in the `/etc/host.txt` file.

- Greater than 32 KB socket send support (APAR PJ28087) allows you to send up to 1 GB of data on a TCP socket with each send API call. Previously, you could send a maximum of 32 KB of data.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

To ensure that your TPF 4.1 system performs correctly with TCP/IP enhancements for PUT 15, you must establish the required operating environment. The following section describes hardware and software requirements specific to TCP/IP enhancements for PUT 15.

“Operating Environment Requirements and Planning Information” on page 35 provides information about the minimum system configuration requirements that are necessary to operate the TPF 4.1 system. You may find it helpful to review that chapter along with the following information.

Hardware

There are no hardware requirements.

Software (Programming Requirements)

The following section contains information about software requirements.

Communication: The following section summarizes the communication changes.

Operating Environment for TCP/IP-Based Communication: If your system is running on an IBM System/390 G5 or G6 processor, apply the OSA-Express polling enhancements (APAR PJ28064) with OSA-Express microcode level 4.19 or higher for optimal performance. You can apply APAR PJ28064 and the OSA-Express microcode independently.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1148 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1148. Changes to Build Scripts for TCP/IP Enhancements for PUT 15

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28029			
CLTNBS	DLM	Changed	Updated to support the operator interface to resolve host names and IP addresses.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1149 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1149. Changes to General Use C/C++ Language Header Files for TCP/IP Enhancements for PUT 15

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
APAR PJ28034			
c\$ck2sn.h	Changed	No	Not Applicable
APAR PJ28064			
c\$ck2sn.h	Changed	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1150 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1150. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TCP/IP Enhancements for PUT 15

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
APAR PJ28026			
i\$netd.h	Changed	No	Not Applicable

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1151 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1151. Changes to Link-Edited Modules for TCP/IP Enhancements for PUT 15

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28026		
CLTV	Changed	Updated for Internet daemon listen backlog support.
CLTX	Changed	Updated for Internet daemon listen backlog support.
APAR PJ28029		
CLTN	Changed	Updated to support the operator interface to resolve host names and IP addresses.
APAR PJ28093		
CDNF	Changed	Updated for DNS server wildcard support.
CDNS	Changed	Updated for DNS server wildcard support.

Members: Table 1152 on page 1097 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1152. Changes to Members for TCP/IP Enhancements for PUT 15

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
APAR PJ28026					
CINET1	CLTV	DLM	Changed	C Language	Updated for Internet daemon listen backlog support.
CINET4	CLTX	DLM	Changed	C Language	Updated for Internet daemon listen backlog support.
APAR PJ28029					
CLTL	CLTN	DLM	New	C Language	Added to support the operator interface to resolve host names and IP addresses.
CLTN	CLTN	DLM	Changed	C Language	Updated to support the operator interface to resolve host names and IP addresses.
APAR PJ28093					
CDNF	CDNF	DLM	Changed	C++ Language	Updated for DNS server wildcard support.
CDNS	CDNS	DLM	Changed	C++ Language	Updated for DNS server wildcard support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1153 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1153. Changes to Copy Members for TCP/IP Enhancements for PUT 15

Copy Member	Type	New, Changed, or No Longer Supported?	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
APAR PJ28034						
CTTO	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated for IP packet network prioritization.
APAR PJ28064						
CLHL	Control Program	Changed	CCCLHR	CPS0	Control Program	Updated for OSA-Express polling enhancements.
CTME	Control Program	Changed	CCNUCL	CPS0	Control Program	Updated for OSA-Express polling enhancements.
CT15	Control Program	Changed	CCCTIN	CPS0	Control Program	Updated for OSA-Express polling enhancements.
APAR PJ28067						
CTTO	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated for the OSA-Express gateway selection enhancement.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: Table 1154 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the SNA communication macro or statement.

Table 1154. Changes to Communication Macros and Statements for TCP/IP Enhancements for PUT 15

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
APAR PJ28034			
SNAKEY	Changed	Yes	CTK2
APAR PJ28064			
SNAKEY	Changed	Yes	CTK2

Data Macros: Table 1155 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1155. Changes to Data Macros for TCP/IP Enhancements for PUT 15

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
APAR PJ28034			
CK2SN	Changed	No	Not Applicable
APAR PJ28064			
CK2SN	Changed	No	Not Applicable
IOSAB	Changed	No	Not Applicable
IOSAD	Changed	No	Not Applicable
ISOCK	Changed	No	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1156 on page 1099 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1156. Changes to SIP Skeleton and Internal Macros for TCP/IP Enhancements for PUT 15

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
APAR PJ28029	
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: There are no changes.

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 1157 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1157. Changes to Segments for TCP/IP Enhancements for PUT 15

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28034				
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated for IP packet network prioritization.
APAR PJ28064				
CCOSAE	Object Code Only	CPS0	Changed	Updated for OSA-Express polling enhancements.
COES	Object Code Only	Not Applicable	Changed	Updated for OSA-Express polling enhancements.
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated for OSA-Express polling enhancements.
APAR PJ28087				
CTS8	Real-Time Assembler	Not Applicable	Changed	Updated for greater than 32 KB socket send support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1158 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1158. Changes to Commands for TCP/IP Enhancements for PUT 15

Command	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28026		
ZINET ADD	Changed	Updated to add the BACKLOG parameter.
ZINET ALTER	Changed	Updated to add the BACKLOG parameter.
ZINET DISPLAY	Changed	Updated the display messages to include the BACKLOG parameter.
APAR PJ28029		
ZDTCP	Changed	Updated to add the NSLOOKUP parameter.
APAR PJ28034		
ZNKEY	Changed	Updated to add the IPTOS parameter.
APAR PJ28064		
ZNKEY	Changed	Updated to add the OSABUFF parameter.

Messages and System Errors

Table 1159 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1159. Changes to Messages and System Errors for TCP/IP Enhancements for PUT 15

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
APAR PJ28026		
INET0119E	Online	New
INET0122E	Online	New
APAR PJ28029		
DTCP0007I	Online	New

Performance or Tuning Changes

For Internet daemon listen backlog support, use the BACKLOG parameter of the ZINET ADD or ZINET ALTER command to define the number of connection

requests that can be queued before being rejected. See *TPF Operations* for more information about the ZINET ADD and ZINET ALTER commands.

For OSA-Express polling enhancements, use the OSABUFF parameter on the SNAKEY macro to define the number of OSA read buffers associated with each OSA-Express connection. Determine the number of buffers to allocate based on the number of messages received per second and the average size of the messages. See *TPF Transmission Control Protocol/Internet Protocol* for more information about OSA read buffers. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

Storage Considerations and Changes

For OSA-Express polling enhancements, the amount of storage required for the OSA read buffers depends on the value specified for the OSABUFF parameter on the SNAKEY macro. See *TPF Transmission Control Protocol/Internet Protocol* for more information about OSA read buffers and the storage requirements. See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1160 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1160. Changes to TPF Publications for TCP/IP Enhancements for PUT 15

Publication Title	Softcopy File Name	Description of Change
APAR PJ28026		
<i>Messages (Online)</i>	Not Applicable	Updated with information about messages that were added, changed, and no longer supported for Internet daemon listen backlog support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for Internet daemon listen backlog support.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for Internet daemon listen backlog support.
APAR PJ28029		
<i>Messages (Online)</i>	Not Applicable	Updated with information about messages that were added, changed, and no longer supported for the operator interface to resolve host names and IP addresses.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for the operator interface to resolve host names and IP addresses.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for the operator interface to resolve host names and IP addresses.
APAR PJ28034		

Table 1160. Changes to TPF Publications for TCP/IP Enhancements for PUT 15 (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF ACF/SNA Network Generation</i>	GTPACF0E	Updated with information about changes to the SNAKEY macro for IP packet network prioritization.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for IP packet network prioritization.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for IP packet network prioritization.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Updated with information about IP packet network prioritization.
APAR PJ28064		
<i>TPF ACF/SNA Network Generation</i>	GTPACF0E	Updated with information about changes to the SNAKEY macro for OSA-Express polling enhancements.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for OSA-Express polling enhancements.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for OSA-Express polling enhancements.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Updated with information about OSA-Express polling enhancements.
APAR PJ28067		
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for the OSA-Express gateway selection enhancement.
APAR PJ28093		
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for DNS server wildcard support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Updated with information about DNS server wildcard support.
APAR PJ28087		
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for greater than 32 KB socket send support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Updated with information about greater than 32 KB socket send support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

With greater than 32 KB socket send support, the send, sendto, and write socket API functions were updated to support up to 1 GB of data on each send call. See *TPF Transmission Control Protocol/Internet Protocol* for more information about these socket functions.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TCP/IP enhancements for PUT 15 on your TPF 4.1 system:

1. Unpack program update tape (PUT) 15. See *TPF Memo to Licensees* for more information about unpacking the tape.
2. Install the following:
 - C/C++ language header files listed in Table 1149 on page 1096 and Table 1150 on page 1096
 - Copy members listed in Table 1153 on page 1097
 - Macros found in “Macros” on page 1098.
3. Run the system allocator (SALO) using SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
4. Assemble the SIP stage I deck to create a SIP stage II deck.
5. Run SIP stage II.
6. Run the CBLD program for the build scripts listed in Table 1148 on page 1095.
7. Reassemble or recompile the following:
 - Members listed in Table 1152 on page 1097
 - CSECTs listed in Table 1153 on page 1097
 - Segments listed in Table 1157 on page 1099.
8. For IP packet network prioritization (APAR PJ28034), define the IPTOS parameter on the SNAKEY macro.
9. For OSA-Express polling enhancements (APAR PJ28064), define the OSABUFF parameter on the SNAKEY macro.
10. Reassemble and load CTK2 to your TPF 4.1 system.
11. Load the link-edited modules listed in Table 1151 on page 1096.
12. IPL your TPF 4.1 system.
13. For Internet daemon listen backlog support (APAR PJ28026), use the BACKLOG parameter of the ZINET ADD or ZINET ALTER command to define a listen backlog value for your Internet server applications.

Additional Information:

- See *TPF ACF/SNA Network Generation* for more information about the SNAKEY macro.
- See *TPF Operations* for more information about the ZINET ADD and ZINET ALTER commands.
- See *TPF Transmission Control Protocol/Internet Protocol* for more information about TCP/IP enhancements for PUT 15.

TPF Internet Mail Server Enhancements for PUT 15 (APAR PJ27966)

The following section discusses the migration considerations for TPF Internet mail server enhancements for PUT 15.

Prerequisite APARs

See the APEDIT for APAR PJ27966 for information about prerequisite APARs.

Functional Overview

TPF Internet mail server enhancements for PUT 15 improve the performance and functionality of TPF Internet mail server support. See “TPF Internet Mail Server Support (APARs PJ27784 and PJ27865)” on page 973 for more information.

The enhancements provided with APAR PJ27966 include the following:

- The number of I/O requests and the path length for processing each piece of mail were reduced significantly, improving the overall performance of the TPF Internet mail servers.
- The SYSLOG parameter was added to the ZMAIL command to allow you to start or stop logging mail messages to the syslog daemon.
- The mail function was expanded to allow you to access Internet mail through the use of file addresses on the TPF database. Previously, you could only access mail through the use of files on the TPF file system. These changes make it easier for you to access Internet mail with TPF applications that are written in assembler language.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1161 on page 1105 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1161. Changes to General Use C/C++ Language Header Files for TPF Internet Mail Server Enhancements for PUT 15

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
tpf_mail.h	Changed	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1162 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1162. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF Internet Mail Server Enhancements for PUT 15

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
tpfmail.h	Changed	No	Not Applicable
tpfmaild.h	Changed	No	Not Applicable

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1163 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1163. Changes to Link-Edited Modules for TPF Internet Mail Server Enhancements for PUT 15

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CMNA	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMNC	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMNI	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMNM	New	Added for TPF Internet mail server enhancements for PUT 15.
CMNP	New	Added for TPF Internet mail server enhancements for PUT 15.
CMNS	New	Added for TPF Internet mail server enhancements for PUT 15.
CMNZ	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMN0	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMN1	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMN2	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMN3	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
CMN8	Changed	Updated for TPF Internet mail server enhancements for PUT 15.
COMX	Changed	Updated for TPF Internet mail server enhancements for PUT 15.

Members: Table 1164 on page 1106 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1164. Changes to Members for TPF Internet Mail Server Enhancements for PUT 15

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
C536	COMX	LLM	Changed	C Language	Updated for TPF Internet mail server enhancements for PUT 15.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: Table 1165 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1165. Changes to Selected Equate Macros for TPF Internet Mail Server Enhancements for PUT 15

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
CZ1SE	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1166 on page 1107 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1166. Changes to SIP Skeleton and Internal Macros for TPF Internet Mail Server Enhancements for PUT 15

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1167 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1167. Changes to SIP Stage II Macros for TPF Internet Mail Server Enhancements for PUT 15

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1168 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1168. Changes to Commands for TPF Internet Mail Server Enhancements for PUT 15

Command	New, Changed, or No Longer Supported?	Description of Change
ZMAIL	Changed	Added the SYSLOG parameter.

Messages and System Errors

Table 1169 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1169. Changes to Messages and System Errors for TPF Internet Mail Server Enhancements for PUT 15

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
09812D	System Error	New
IMAP0001E	Online	New
IMAP0002E	Online	New
IMAP0003E	Online	New
IMAP0004E	Online	New
POP30001E	Online	New
POP30002E	Online	New
POP30003E	Online	New
POP30004E	Online	New
SMTP0001E	Online	New
SMTP0002E	Online	New
SMTP0003E	Online	New
SMTP0004E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1170 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1170. Changes to TPF Publications for TPF Internet Mail Server Enhancements for PUT 15

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0F	Updated with changes to the mail function for TPF Internet mail server enhancements for PUT 15.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF Internet mail server enhancements for PUT 15.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for TPF Internet mail server enhancements for PUT 15.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for TPF Internet mail server enhancements for PUT 15.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Updated with information about TPF Internet mail server enhancements for PUT 15.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The mail function was updated to include options that allow you to access Internet mail by using a data level instead of a file name. These changes make it easier for you to process Internet mail with TPF applications that are written in assembler. See the *TPF C/C++ Language Support User's Guide* for more information about the mail function.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TPF Internet mail server enhancements for PUT 15 on your TPF 4.1 system:

1. Unpack PUT 15, which contains APAR PJ27966 for TPF Internet mail server enhancements for PUT 15. See *TPF Memo to Licensees* for more information about unpacking the tape.
2. Install the following:
 - C/C++ language header files listed in Table 1161 on page 1105 and Table 1162 on page 1105
 - Macros found in "Macros" on page 1106.

3. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
4. Assemble the SIP stage I deck to create a SIP stage II deck.
5. Run SIP stage II.
6. Reassemble or recompile the members listed in Table 1164 on page 1106.
7. Load the link-edited modules listed in Table 1163 on page 1105.
8. IPL your TPF 4.1 system.
9. On the mail subsystem, cycle the TPF 4.1 system to CRAS state or higher.
10. On the mail subsystem, enter the following commands to delete the TPF Internet mail servers from the Internet daemon configuration file (IDCF):

ZINET DELETE S-SMTP

ZINET DELETE S-IMAP

ZINET DELETE S-POP3

See *TPF Operations* for more information about the ZINET DELETE command.

11. On the mail subsystem, enter the following commands to add the TPF Internet mail servers to the Internet daemon configuration file (IDCF) again:

ZINET ADD S-SMTP PGM-CMNS MODEL-DAEMON ACT-OPER

ZINET ADD S-IMAP PGM-CMNM MODEL-DAEMON ACT-OPER

ZINET ADD S-POP3 PGM-CMNP MODEL-DAEMON ACT-OPER

See *TPF Operations* for more information about the ZINET ADD command.

12. On the mail subsystem, enter **ZMAIL START ALL** to start the TPF Internet mail servers.

The mail servers are now ready for you to use.

8-Byte File Address Support (APAR PJ28097)

The following section discusses the migration considerations for 8-byte file address support.

Prerequisite APARs

See the APEDIT for APAR PJ28097 for information about prerequisite APARs. In addition, TPF Database Facility (TPPDF) APAR PQ49400 is a corequisite APAR.

Functional Overview

Before 8-byte file address support, file address reference format 5 (FARF5) limited the address capacity of a TPF 4.1 system to a maximum of 2^{32} or 4.2 billion records. The fixed record limit prevented you from addressing the maximum amount of DASD that could be attached to a TPF subsystem. FARF6 is the exploitation of 7 of the 8 bytes in the file address field, which expands addressing capacity to a maximum of 64 petabytes, or PB (64 PB equals 72 057 594 037 927 936 records or 2^{56}). If your complex has large databases that are reaching the limit of the FARF5 addressing capacity, migrating to 8-byte file address support will be beneficial to you.

8-byte file address support incorporates two modes of file addressing:

- 4x4 format
4x4 format became available with TPF data event control block (DECB) support (APAR PJ27393). For more information, see “TPF Data Event Control Block Support (APAR PJ27393)” on page 923. 4x4 format is the migration mode that allows your 4-byte file addresses to become 8-byte file addresses. 4x4 format provides for standard 4-byte file addresses (FARF3, FARF4, and FARF5) to be stored in an 8-byte field. A 4-byte file address in 4x4 format resides in the low-order 4 bytes of the 8-byte field. The high-order 4 bytes of the 8-byte field contain an indicator (a fullword of zeros) that classifies it as a valid 4x4 format address. See *TPF Application Programming* for more information about 4x4 format.
- FARF6
FARF6 file addresses are only available for 4-K long-term duplicated pools. Fixed records, short-term pools, and 381- and 1055-byte long-term pools will **not** have FARF6 file addresses. No special mode for FARF6 will exist; FARF6 addresses can be used when the TPF 4.1 system is in either stage FARF3/4 or stage FARF4/5. A record can only be referenced by FARF3 and FARF4, or FARF4 and FARF5, or FARF6. For example, a record can be referenced by FARF3 and FARF4, but not FARF6. Likewise, a record can be referenced by FARF6, but not by FARF3 and FARF4. FARF6 coexists with FARF3, FARF4, and FARF5, it does not replace them.

Figure 12 shows the FARF6 address format:

SPARE	UFT	UFT	FTI	FTI/ORD	FTI/ORD	ORD	ORD
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7

Figure 12. FARF6 Format

The FARF6 address format has a spare byte in byte 0 reserved for use by IBM (which **must** be 0) and a fixed 2-byte universal format type (UFT) (bytes 1 and 2). The smallest format type indicator (FTI) size allowed is 8 bits, which allows a

4-byte ordinal number. The largest FTI size is 24 bits with a 2-byte ordinal number. These restrictions are necessary to allow code that manages the file address to use 32-bit instructions.

8-byte file address support also provides the following enhancements:

- An 8-byte standard header (`c$std8.h`)
The `c$std8.h` standard header file has been created for databases that use 8-byte file addresses. The 8-byte standard header reserves space for 8-byte forward and backward chain file address fields. The `ISTD8` structure (`istd8`) defines the 8-byte standard header.
- Application programming interface (API) support. See the *TPF C/C++ Language Support User's Guide* for more information about API support.
- Macro support:
 - General macros (see Table 1179 on page 1128 and *TPF General Macros* for more information)
 - System macros (see Table 1184 on page 1130 and *TPF System Macros* for more information)
 - SIP macros (see Table 1181 on page 1129, Table 1183 on page 1130, and *TPF System Generation* for more information).
- A new 4-K duplicated long-term FARF6 (4D6) pool type has been defined:
 - 4D6 can be coded on a RAMFIL statement.
 - Dispensing 4D6 pools is similar to dispensing existing pool types. A record ID for 4-K duplicated long-term FARF6 pools can be defined in the record ID attribute table (RIAT).
- Pool ordinal numbers (PSONS) and counts of available pools have been increased to 8 bytes:
 - Pool directory fields CY3BON and CY3ORD have been combined into an 8-byte field (CY3XORD).
 - Some commands that accept a record type ordinal number as input now require the input to be a hexadecimal number.
 - Some commands that display a record type ordinal number will display it as a hexadecimal number.
 - The display of the count of available pools will continue to be decimal. Because the decimal number can be very large, the format of the display for the ZDFPC command has been changed to enhance readability so that every third digit will have a space as a separator.
- Commands that handle file addresses and record type ordinals have been changed (see Table 1188 on page 1143 and *TPF Operations* for more information):
 - Both 4-byte and 8-byte file addresses will be accepted as input for commands.
 - Most commands will display only 8-byte file addresses. If the file address is originally 4-bytes, it will be converted to a 4x4 format 8-byte file address and displayed.
- The ZRTDM command has been changed to allow you to modify (and display) the pool characteristics for a specified record ID (RTP0 to RTP9). See *TPF Operations* for more information about the ZRTDM command.
- The ZDFAI command has been added to provide information about a specific file address. See *TPF Operations* for more information about the ZDFAI command.
- Recoup has been updated to handle databases that use either 4- or 8-byte file addresses.

- The recoup descriptors have indicators that recognize whether chains are using the 4- or 8-byte standard header and whether embedded file addresses are 4 or 8 bytes.
- The GROUP and INDEX macros now include a FAT (file address type) parameter to specify either a 4- or 8-byte file address. See *TPF System Macros* for more information about the GROUP and INDEX macros.
- TPF collection support (TPFCS) has been updated so you can create new collections using the 8-byte file address format. You must enter **ZMODE 6** to switch on 8-byte file addressing. For more information about TPFCS, see “Migrating TPF Collection Support (TPFCS)” on page 1164 and “Fallback and Coexistence” on page 1166.
- FACE table generator (FCTBG) changes:
 - The FCTBG now supports FCTBs larger than 16 MB in addition to the existing object file format. Generalized object file format (GOFF) is required to support FCTBs larger than 16 MB. See “Loading Process Changes” on page 1159 for more information about loading a FCTB created in GOFF format.
 - Support has been added to allow the job control language (JCL) console as well as the report listing to appear in the same file.
 - An optional input card (Path card) can now be included in the load deck portion of the offline loader JCL that is used to run the general file loader (ALDR) and the auxiliary loader (TLDR). This card will specify the hierarchical file system (HFS) location of the FACE table (FCTB) in program object format. Changes have also been made to the Load FCTB card to specify the HFS location of the FCTB in program object format. See *TPF System Installation Support Reference* for more information.
- Changes to offline procedures, including the addition of new parameters on the RAMFIL and UFTFTI SIP macros that allow you to define FARF6 file addresses.
- Fixed file record changes (see Table 1177 on page 1123 and *TPF System Generation* for more information).
- Changes for database reorganization (DBR) include support for the following:
 - 8-byte file addresses and ordinal numbers during DBR capture and restore
 - The use of DECBs for finding records during the capture phase and filing records during the input phase
 - Capturing the 4D6 pool type
 - 8-byte ordinal numbers in the exception records
 - Ordinal numbers to be handled as hexadecimal values instead of decimal values.
- Updates to continuous data collection (CDC) to add additional columns for 4D6 pools. See “Fallback and Coexistence” on page 1166 for more information.
- Changes to the format of the exception recording and logging tapes once SYSTC bit SB8BFAD is set to 1. Before FARF6, the tapes stored the file address at location 4 for 4 bytes and the time-of-day (TOD) and subsystem user (SSU) were located in a trailer following the data block. Once SB8BFAD is set to 1, location 4 in the block for 4 bytes will be set to zero and the trailer will be changed. The trailer will be a 32-byte field with the first 8 bytes containing the file address. The traditional TOD and SSU trailer will follow the 32-byte field.
- Support for the following test tools has been updated to process 8-byte file addresses:
 - Program test vehicle (PTV)
 - Real-time trace (RTT) system utility
 - Selective file dump and trace (SFDT).

See *TPF Program Development Support Reference* for more information.

Architecture

8-byte file address support is necessary if your complex will soon exceed the addressing capacity provided by FARF5 (4 GB in 4 bytes). Because pools use the most file addresses and grow at the fastest rate, a larger file address called FARF6 (8 bytes) will provide you with file address expansion. A 4-K duplicated FARF6 pool is supported with a full 8-byte file address. This support coexists with the existing FARF3, FARF4, and FARF5 addressing.

See *TPF Database Reference* for more information about FARF6.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1171 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1171. Changes to Build Scripts for 8-Byte File Address Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CDCOBS	DLM	Changed	Updated for 8-byte file address support.
CDCPBS	DLM	Changed	Updated for 8-byte file address support.
CJ00BS	LLM	Changed	Updated for 8-byte file address support.
CLM8BS	DLM	Changed	Added for 8-byte file address support.
CTADBS	DLL	Changed	Updated for 8-byte file address support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1172 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1172. Changes to General Use C/C++ Language Header Files for 8-Byte File Address Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$b10rp.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$brkc.h	Changed	No	Not Applicable

Table 1172. Changes to General Use C/C++ Language Header Files for 8-Byte File Address Support (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$cf1p.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$cinfc.h	Changed	No	Not Applicable
c\$cy1k.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$cy7p.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$czx1.h	Changed	No	Not Applicable
c\$czx2.h	Changed	No	Not Applicable
c\$dadfq.h	Changed	No	Not Applicable
c\$fbd0.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$fbd1.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$fctb.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$fgn0.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$fps0.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$fps1.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$fps2.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$frg0.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$frg1.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$ftd1.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$fva0.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$ifc2.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$ifc3.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$ifc4.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$miob.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$prml.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$rhtb.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$sonf.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$srck1p.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$std8.h	New	No	Not Applicable
c\$syseq.h	Changed	No	Not Applicable
c\$systc.h	Changed	No	Not Applicable

Table 1172. Changes to General Use C/C++ Language Header Files for 8-Byte File Address Support (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$to2.h	Changed	No	Not Applicable
c\$vfac.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
i\$tmcr.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
sysapi.h	Changed	No	Not Applicable
tpfapi.h	Changed	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1173 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1173. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for 8-Byte File Address Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$bk0rp.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$icdc.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
c\$to2b.h	Changed	No	Not Applicable
i\$dlok.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.
i\$rccr.h	New	No	Not Applicable
i\$repc.h	Changed	Yes	See Table 1191 on page 1161 for a complete list.

Library Interface Scripts: There are no changes.

Link-Edited Modules: There are no changes.

Members: Table 1174 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1174. Changes to Members for 8-Byte File Address Support

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
BBUILD	BBLD	DLM	Changed	C Language	Updated for 8-byte file address support.
BEWB	BEWA	DLM	Changed	C Language	Updated for 8-byte file address support.
BEWC	BEWA	DLM	Changed	C Language	Updated for 8-byte file address support.
BEWF	BEWA	DLM	Changed	C Language	Updated for 8-byte file address support.

Table 1174. Changes to Members for 8-Byte File Address Support (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
BJ09	BJ09	DLM	Changed	C++ Language	Updated for 8-byte file address support.
BJ10	BJ10	DLM	Changed	C++ Language	Updated for 8-byte file address support.
BOF1	BOF1	DLM	Changed	C Language	Updated for 8-byte file address support.
BOFI	BOF1	DLM	Changed	C Language	Updated for 8-byte file address support.
BRR2	BRR1	DLM	Changed	C Language	Updated for 8-byte file address support.
BRR3	BRR1	DLM	Changed	C Language	Updated for 8-byte file address support.
BRR4	BRR1	DLM	Changed	C Language	Updated for 8-byte file address support.
CDCO	CDCO	DLM	Changed	Object Code Only	Added for 8-byte file address support.
CDCQ	CDCO, CDCP	DLM	Changed	Object Code Only	Added for 8-byte file address support.
CDCOM1	CDCO, CDCP	DLM	New	Object Code Only	Added for 8-byte file address support.
CDCP	CDCP	DLM	Changed	C Language	Added for 8-byte file address support.
CDCR	CDCP	DLM	Changed	Real-Time Assembler	Added for 8-byte file address support.
CFL5	CFL5	DLM	Changed	C Language	Updated for 8-byte file address support.
CFL7	CFL6	DLM	Changed	C Language	Updated for 8-byte file address support.
CFLA	CFLA	DLM	Changed	C Language	Updated for 8-byte file address support.
CFLB	CFLB	DLM	Changed	C Language	Updated for 8-byte file address support.
CFLIPA	CFLG	DLM	Changed	C Language	Updated for 8-byte file address support.
CFLIPM	CFLG	DLM	Changed	C Language	Updated for 8-byte file address support.
CFLO	CFLK	DLM	Changed	C Language	Updated for 8-byte file address support.
CFM8	CLM8	DLM	Changed	Real-Time Assembler	Added for 8-byte file address support.
CJ007	CJ00	LLM	New	Assembler	Added for 8-byte file address support.
CJ02	CJ01	DLM	Changed	Assembler	Updated for 8-byte file address support.
CJ105	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CJ106	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CJ107	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CJ109	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.

Table 1174. Changes to Members for 8-Byte File Address Support (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CJ110	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CJ111	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CJ112	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CJ113	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CJ114	CJ10	DLM	Changed	C Language	Updated for 8-byte file address support.
CL40	CL40	DLM	Changed	C Language	Updated for 8-byte file address support.
CL4A	CL40	DLM	Changed	C Language	Updated for 8-byte file address support.
CL4D	CL40	DLM	Changed	C Language	Updated for 8-byte file address support.
CL4R	CL4R	DLM	Changed	C Language	Updated for 8-byte file address support.
CLM8	CLM8	DLM	No Longer Supported	C Language	Updated for 8-byte file address support.
CLM8LK	CLM8	DLM	New	C++ Language	Added for 8-byte file address support.
CTADOV	CTAD	DLL	Changed	C++ Language	Updated for 8-byte file address support.
CRLCH8	CTAD	DLL	New	Real-Time Assembler	Added for 8-byte file address support.
CCREED	CTAD	DLL	New	Real-Time Assembler	Added for 8-byte file address support.
CCRETD	CTAD	DLL	New	Real-Time Assembler	Added for 8-byte file address support.
CSWISD	CTAD	DLL	New	Real-Time Assembler	Added for 8-byte file address support.
CXPCMT	CTAL	LLM	Changed	Real-Time Assembler	Updated for 8-byte file address support.
CXPRLB	CTAL	LLM	Changed	C Language	Updated for 8-byte file address support.
CVXS	CVXS	DLM	Changed	C Language	Updated for 8-byte file address support.
CVXS4	CVXS	DLM	Changed	Assembler	Updated for 8-byte file address support.
CVXS6	CVXS	DLM	Changed	Assembler	Updated for 8-byte file address support.
CVXS8	CVXS	DLM	Changed	Assembler	Updated for 8-byte file address support.
CZXG	CZXG	DLM	Changed	C Language	Updated for 8-byte file address support.
CZXH	CZXG	DLM	Changed	C Language	Updated for 8-byte file address support.
CZXK	CZXK	DLM	Changed	C Language	Updated for 8-byte file address support.
CZXL	CZXK	DLM	Changed	C Language	Updated for 8-byte file address support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

Table 1175 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 1175. Changes to CINFC Tags for 8-Byte File Address Support

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?
CMMZF8	363	New
CMMRRT	364	New
CMMRLC	392	New

Copy Members

Table 1176 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1176. Changes to Copy Members for 8-Byte File Address Support

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CCE4	Control Program	Changed	CCIIISC	Not Applicable	Control Program	Updated for 8-byte file address support.
CCEB	Control Program	Changed	CCENBK	Not Applicable	Control Program	Updated for 8-byte file address support.
CEDI	Control Program	Changed	CCNUCL	Not Applicable	Control Program	Updated for 8-byte file address support.
CEDM	Control Program	Changed	CCMCDC	Not Applicable	Control Program	Updated for 8-byte file address support.
CEFE	Control Program	Changed	CCTAPE	Not Applicable	Control Program	Updated for 8-byte file address support.
CEFH	Control Program	Changed	CCSONA	Not Applicable	Control Program	Updated for 8-byte file address support.
CEFI	Control Program	Changed	CCFADC	Not Applicable	Control Program	Updated for 8-byte file address support.
CEFJ	Control Program	Changed	CCFADC	Not Applicable	Control Program	Updated for 8-byte file address support.
CEFL	Control Program	Changed	CCFADC	Not Applicable	Control Program	Updated for 8-byte file address support.
CFAC	Control Program	Changed	CCDBAF	Not Applicable	Control Program	Updated for 8-byte file address support.
CFL1	Control Program	Changed	CCCFLC	Not Applicable	Control Program	Updated for 8-byte file address support.
CFL2	Control Program	Changed	CCCFLC	Not Applicable	Control Program	Updated for 8-byte file address support.
CFL3	Control Program	Changed	CCCFLC	Not Applicable	Control Program	Updated for 8-byte file address support.
CHIM	Control Program	Changed	CCNUCL	Not Applicable	Control Program	Updated for 8-byte file address support.

Table 1176. Changes to Copy Members for 8-Byte File Address Support (continued)

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CICR	Control Program	Changed	CCNUCL	Not Applicable	Control Program	Updated for 8-byte file address support.
CJ002	Real-Time Assembler	Changed	CJ000, CJ003, CJ004, CJ005, CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ101	Real-Time Assembler	Changed	CJ100	CJ10	DLM	Updated for 8-byte file address support.
CJ103	Real-Time Assembler	Changed	CJ100	CJ10	DLM	Updated for 8-byte file address support.
CJ302	Real-Time Assembler	Changed	CJ000	CJ00	LLM	Updated for 8-byte file address support.
CJ311	Real-Time Assembler	Changed	CJ000	CJ00	LLM	Updated for 8-byte file address support.
CJ312	Real-Time Assembler	Changed	CJ000	CJ00	LLM	Updated for 8-byte file address support.
CJ321	Real-Time Assembler	Changed	CJ005	CJ00	LLM	Updated for 8-byte file address support.
CJ322	Real-Time Assembler	Changed	CJ005	CJ00	LLM	Updated for 8-byte file address support.
CJ327	Real-Time Assembler	Changed	CJ005	CJ00	LLM	Updated for 8-byte file address support.
CJ328	Real-Time Assembler	Changed	CJ005	CJ00	LLM	Updated for 8-byte file address support.
CJ330	Real-Time Assembler	Changed	CJ005	CJ00	LLM	Updated for 8-byte file address support.
CJ334	Real-Time Assembler	Changed	CJ000	CJ00	LLM	Updated for 8-byte file address support.
CJ341	Real-Time Assembler	Changed	CJ005	CJ00	LLM	Updated for 8-byte file address support.
CJ351	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ361	Real-Time Assembler	Changed	CJ000	CJ00	LLM	Updated for 8-byte file address support.
CJ372	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ373	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ401	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ461	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ463	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ465	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ471	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ475	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ481	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.

Table 1176. Changes to Copy Members for 8-Byte File Address Support (continued)

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CJ491	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ501	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ521	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ523	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ561	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ562	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ566	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ567	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ576	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ582	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ585	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ592	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ594	Real-Time Assembler	Changed	CJ004	CJ00	LLM	Updated for 8-byte file address support.
CJ721	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ722	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ723	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ724	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ762	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ763	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ766	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ767	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ768	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ769	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ772	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ773	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.

Table 1176. Changes to Copy Members for 8-Byte File Address Support (continued)

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CJ776	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ782	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ783	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ784	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ785	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ792	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ793	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ794	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ868	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ877	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ887	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ897	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ901	Real-Time Assembler	Changed	CJ006	CJ00	LLM	Updated for 8-byte file address support.
CJ928	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ930	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJ933	Real-Time Assembler	New	CJ007	CJ00	LLM	Added for 8-byte file address support.
CJIE	Control Program	Changed	CCSONS	Not Applicable	Control Program	Updated for 8-byte file address support.
CJIP	Control Program	Changed	CCSONS	Not Applicable	Control Program	Updated for 8-byte file address support.
CJIQ	Control Program	Changed	CCSONS	Not Applicable	Control Program	Updated for 8-byte file address support.
CJIU	Control Program	Changed	CCSONS	Not Applicable	Control Program	Updated for 8-byte file address support.
CJIW	Control Program	Changed	CCSONS	Not Applicable	Control Program	Updated for 8-byte file address support.
CJIZ	Control Program	Changed	CCSONA	Not Applicable	Control Program	Updated for 8-byte file address support.
CL10	Control Program	Changed	CCTLOG	Not Applicable	Control Program	Updated for 8-byte file address support.
CPSF	Control Program	Changed	CCCPSF	Not Applicable	Control Program	Updated for 8-byte file address support.
CRTT	Control Program	Changed	CCUTIL	Not Applicable	Control Program	Updated for 8-byte file address support.

Table 1176. Changes to Copy Members for 8-Byte File Address Support (continued)

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CT00	Control Program	Changed	CCCTIN	Not Applicable	Control Program	Updated for 8-byte file address support.
CT01	Control Program	Changed	CCCTIN	Not Applicable	Control Program	Updated for 8-byte file address support.
CT41	Control Program	Changed	CCCTIN	Not Applicable	Control Program	Updated for 8-byte file address support.
CTIN	Control Program	Changed	CCCTIN	Not Applicable	Control Program	Updated for 8-byte file address support.
CTSF	Control Program	Changed	CCUTIL	Not Applicable	Control Program	Updated for 8-byte file address support.
CVF3	Control Program	Changed	CCVFAC	Not Applicable	Control Program	Updated for 8-byte file address support.
DBAC	Control Program	Changed	CCDBAF	Not Applicable	Control Program	Updated for 8-byte file address support.
DBAD	Control Program	Changed	CCDBAF	Not Applicable	Control Program	Updated for 8-byte file address support.
DBAP	Control Program	Changed	CCDBAF	Not Applicable	Control Program	Updated for 8-byte file address support.
DBAS	Control Program	Changed	CCDBAF	Not Applicable	Control Program	Updated for 8-byte file address support.
GRFS	Control Program	Changed	CCSONP	Not Applicable	Control Program	Updated for 8-byte file address support.
IB05	Control Program	Changed	IPLB	Not Applicable	Control Program	Updated for 8-byte file address support.
MPTV	Control Program	Changed	CCUTIL	Not Applicable	Control Program	Updated for 8-byte file address support.
RTCU	Control Program	Changed	CCDBAF	Not Applicable	Control Program	Updated for 8-byte file address support.

Fixed File Records

Table 1177 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 1177. Changes to Fixed File Records for 8-Byte File Address Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#BREATB8	New	Added for 8-byte file address support. This replaces #BREATBL.
#BREATBL	No Longer Supported	This fixed file record has been replaced by #BREATB8.
#BRHIST8	New	Added for 8-byte file address support. This replaces #BRHIST.
#BRHIST	No Longer Supported	This fixed file record has been replaced by #BRHIST8.
#BRIDDE8	New	Added for 8-byte file address support. This replaces #BRIDDEA.
#BRIDDEA	No Longer Supported	This fixed file record has been replaced by #BRIDDE8.
#BRIDSA8	New	Added for 8-byte file address support. This replaces #BRIDSAV.
#BRIDSAV	No Longer Supported	This fixed file record has been replaced by #BRIDSA8.
#BRIDTB8	New	Added for 8-byte file address support. This replaces #BRIDTBL.
#BRIDTBL	No Longer Supported	This fixed file record has been replaced by #BRIDTB8.
#BRLOTB8	New	Added for 8-byte file address support. This replaces #BRLOTBL.
#BRODTBL	No Longer Supported	This fixed file record has been replaced by #BRLOTB8.

Table 1177. Changes to Fixed File Records for 8-Byte File Address Support (continued)

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#BRIDTO8	New	Added for 8-byte file address support. This replaces #BRIDTOT.
#BRIDTOT	No Longer Supported	This fixed file record has been replaced by #BRIDTO8.
#IBMM4	Changed	Updated for 8-byte file address support.
#IBMMP4	New	Added for 8-byte file address support.
#IDFC4	Changed	Updated for 8-byte file address support. This is a TPFDF fixed file record.
#PSTCUR	No Longer Supported	This fixed file record has been replaced by #PSTXCUR.
#PSTNEW	No Longer Supported	This fixed file record has been replaced by #PSTXNEW.
#PSTXCUR	New	Added for 8-byte file address support. This replaces #PSTCUR.
#PSTXNEW	New	Added for 8-byte file address support. This replaces #PSTNEW.
#SONSKP	New	Added for 8-byte file address support. This replaces #SONSP.
#SONSP	No Longer Supported	This fixed file record has been replaced by #SONSKP.
#SRM31A8	New	Added for 8-byte file address support. This replaces #SRM31A. This is a TPFDF fixed file record.
#SRM31A	No Longer Supported	This fixed file record has been replaced by #SRM31A8. This is a TPFDF fixed file record.
#SRM41A8	New	Added for 8-byte file address support. This replaces #SRM41A. This is a TPFDF fixed file record.
#SRM41A	No Longer Supported	This fixed file record has been replaced by #SRM41A8. This is a TPFDF fixed file record.
#SRM51A8	New	Added for 8-byte file address support. This replaces #SRM51A. This is a TPFDF fixed file record.
#SRM51A	No Longer Supported	This fixed file record has been replaced by #SRM51A8. This is a TPFDF fixed file record.
#SRM61A8	New	Added for 8-byte file address support. This replaces #SRM61A. This is a TPFDF fixed file record.
#SRM61A	No Longer Supported	This fixed file record has been replaced by #SRM61A8. This is a TPFDF fixed file record.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 1178 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1178. Changes to Data Macros for 8-Byte File Address Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
BC0SA	Changed	Yes	See Table 1191 on page 1161 for a complete list.

Table 1178. Changes to Data Macros for 8-Byte File Address Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
BCPBC	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BK0RP	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BK1RP	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BL0RP	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BR0ID	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BR1ID	Changed	Yes	See Table 1191 on page 1161 for a complete list.
C404C	Changed	Yes	See Table 1191 on page 1161 for a complete list.
C50C5	Changed	Yes	See Table 1191 on page 1161 for a complete list.
CY0PD	Changed	Yes	See Table 1191 on page 1161 for a complete list.
CY1KR	Changed	Yes	See Table 1191 on page 1161 for a complete list.
CY3DR	Changed	No	Not Applicable
CY5GT	Changed	Yes	See Table 1191 on page 1161 for a complete list.
CY5PA	Changed	Yes	See Table 1191 on page 1161 for a complete list.
CY6TR	Changed	No	Not Applicable
CY7PL	Changed	Yes	See Table 1191 on page 1161 for a complete list.
CY8TB	Changed	Yes	See Table 1191 on page 1161 for a complete list.
DB0DB	Changed	Yes	See Table 1191 on page 1161 for a complete list.
DBRREC	Changed	Yes	See Table 1191 on page 1161 for a complete list.
DCTBPK	Changed	No	Not Applicable

Table 1178. Changes to Data Macros for 8-Byte File Address Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
DCTMIO	Changed	Yes	See Table 1191 on page 1161 for a complete list.
DCTPFX	Changed	No	Not Applicable
DCTRIT	Changed	Yes	See Table 1191 on page 1161 for a complete list.
DCTSON	Changed	Yes	See Table 1191 on page 1161 for a complete list.
DCTSTK	Changed	No	Not Applicable
E80E8	Changed	Yes	See Table 1191 on page 1161 for a complete list.
FC0TB	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ICDCC	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ICFLP	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ICRCR	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ICY7PR	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ICY8CS	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ICYCWB	Changed	Yes	See Table 1191 on page 1161 for a complete list.
IDSCFW	Changed	Yes	See Table 1191 on page 1161 for a complete list.
IDSDBH	Changed	Yes	See Table 1191 on page 1161 for a complete list.
IDSRHT	Changed	Yes	See Table 1191 on page 1161 for a complete list.
IDY9AR	Changed	No	Not Applicable. You do not need to reassemble programs, but you might want to check to see if changes are necessary.
IFC2SC	Changed	Yes	See Table 1191 on page 1161 for a complete list.

Table 1178. Changes to Data Macros for 8-Byte File Address Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
IPART	Changed	Yes	See Table 1191 on page 1161 for a complete list.
IRCCR	New	No	Not Applicable
IRECBK	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ISFDT	Changed	No	Not Applicable
ISTD8	New	No	Not Applicable
ITO2	Changed	No	See Table 1191 on page 1161 for a complete list.
ITSWB	Changed	Yes	See Table 1191 on page 1161 for a complete list.
L80L8	Changed	Yes	See Table 1191 on page 1161 for a complete list.
LTDRT	Changed	Yes	See Table 1191 on page 1161 for a complete list.
MS0UT	Changed	Yes	See Table 1191 on page 1161 for a complete list.
MV0LKC	Changed	Yes	See Table 1191 on page 1161 for a complete list.
RECOUP	Changed	Yes	See Table 1191 on page 1161 for a complete list.
RTTEQ	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SR54BA	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SRCK1P	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SRM31A	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SRM41A	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SRM51A	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SRM61A	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SYSTG	Changed	No	Not Applicable

Table 1178. Changes to Data Macros for 8-Byte File Address Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
VF0AC	Changed	Yes	See Table 1191 on page 1161 for a complete list.
ZR0ZR	Changed	Yes	See Table 1191 on page 1161 for a complete list.

General Macros: Table 1179 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 1179. Changes to General Macros for 8-Byte File Address Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
ADDDLC	Changed	No	Not Applicable. Prolog updates only; there are no updates to <i>TPF General Macros</i> .
BPKDC	Changed	No	Not Applicable
CINFC	Changed	No	Not Applicable. Code updates only; there are no updates to <i>TPF General Macros</i> .
CREEC	Changed	No	Not Applicable
CRETC	Changed	No	Not Applicable
RLCHA	Changed	No	Not Applicable
SONIC	Changed	No	Not Applicable
WTOPC	Changed	No	Not Applicable. This is a book only change; there is no code change.

Selected Equate Macros: Table 1180 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1180. Changes to Selected Equate Macros for 8-Byte File Address Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
BRPEQ	Changed	No	Not Applicable
CZ1GF	Changed	No	Not Applicable
CZ1SE	Changed	No	Not Applicable
CZOCP	Changed	No	Not Applicable
DADFQ	Changed	No	Not Applicable
RITEQ	Changed	Yes	See Table 1191 on page 1161 for a complete list.
SYSEQ	Changed	No	Not Applicable

Table 1180. Changes to Selected Equate Macros for 8-Byte File Address Support (continued)

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
TAPEQ	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1181 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1181. Changes to SIP Skeleton and Internal Macros for 8-Byte File Address Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
CKTYPC	Changed
GENR	Changed
SPCDRV	Changed
SKSYCN	Changed
SPGLB	Changed
SPLED	Changed
SPPGML	Changed
SPRIAT	Changed

System Initialization Program (SIP) Stage I Macros and Statements:

Table 1182 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck

See “System Initialization Program (SIP) and System Generation Changes” on page 1158 for a description of other system generation changes you must make.

Table 1182. Changes to SIP Stage I Macros and Statements for 8-Byte File Address Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
GENSIP	Changed
RAMFIL	Changed
SKBXAX	Changed
UFTFTI	Changed

System Initialization Program (SIP) Stage II Macros: Table 1183 on page 1130 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1183. Changes to SIP Stage II Macros for 8-Byte File Address Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed
RIATA	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 1184 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 1184. Changes to System Macros for 8-Byte File Address Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
\$TCPLC	Changed	No	Not Applicable
BBEWP	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BBPDH	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BBWRT	Changed	Yes	See Table 1191 on page 1161 for a complete list.
BCRUS	No Longer Supported	No	Not Applicable
BFIND	No Longer Supported	No	Not Applicable
BLOAD	No Longer Supported	No	Not Applicable
BRPRO	Changed	No	Not Applicable
BRSTR	Changed	No	Not Applicable
BSAVE	Changed	No	Not Applicable
BSTAK	New	No	Not Applicable
BTEST	No Longer Supported	No	Not Applicable
ECBLC	Changed	No	Not Applicable
ESFAC	Changed	No	Not Applicable. This is a book only change; there is no code change.
FACZC	Changed	No	Not Applicable. This is a book only change; there is no code change.
GROUP	Changed	No	Not Applicable
GRRTC	New	No	Not Applicable
INDEX	Changed	No	Not Applicable
RITID	Changed	No	Not Applicable
SWISC	Changed	No	Not Applicable

System Macros (IBM Use Only): Table 1185 on page 1131 summarizes system macro changes that are for IBM use only. This information is presented in alphabetic order by the name of the system macro.

Table 1185. Changes to System Macros (IBM Use Only) for 8-Byte File Address Support

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
BPK1C	Changed	No	Not Applicable
WTO3C	Changed	No	Not Applicable
WTO6C	Changed	No	Not Applicable

Segments

Table 1186 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1186. Changes to Segments for 8-Byte File Address Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
ACPF	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
ALDR	Offline Assembler	TPFLDR	Changed	Updated for 8-byte file address support.
ARD8	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
ARD9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B0BK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B0P0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B0P5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B0PE	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B0SH	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1A4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1A5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1A6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1A7	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1A8	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1A9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1AA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B1BK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BAM0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BAM1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BAM3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BAM5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCAI	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCC0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCC1	Real-Time Assembler	Not Applicable	No Longer Supported	Removed for 8-byte file address support.
BCC2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCC3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCC5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCP0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCP1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCP2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCP3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCP6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCPE	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCPU	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCPY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BCPZ	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDB1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDB2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDB3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDB4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDB5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBC	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBD	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBE	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBF	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BDBG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBI	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBJ	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBL	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBM	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBN	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBP	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBR	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BDBY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BEWP	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BGAQ	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BJ11	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKA0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKA1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKB0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKC0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKC1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKDY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKP0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKP4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BKP5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BLOG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BMD0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BMD1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BMD3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BMD4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BMD5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BMT6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BNDR	Offline Assembler	TPFLDR	New	Added for 8-byte file address support.
BOF2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOF3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOF4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOF6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOF7	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOF8	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOF9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOFA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOFB	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOFF	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOFJ	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOFK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BOFL	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
BOFM	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BPDH	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BPM0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BPM1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BPR0	Offline Assembler	BPR0	Changed	Updated for 8-byte file address support.
BR0I	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRFA	Offline Assembler	BRFA	Changed	Updated for 8-byte file address support.
BRB4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRCQ	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRCP	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BRCS	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRDP	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BREP	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRFM	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRID	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRIE	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRMK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRPA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRPB	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRPE	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRPI	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRPK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRPT	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
B RTP	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRSH	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRSI	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRTD	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRT O	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRTV	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRUB	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BRV6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV7	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV8	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRV9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRYA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRYD	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRYG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRYL	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRYO	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BRYU	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BS0C	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BSSC	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BSSD	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
BSSU	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BSSX	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BWRA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BWRF	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BWRT	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXA1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXAG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXAM	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXAY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXBA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXBG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXBR	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXBV	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BXCL	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXDG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXDP	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXDY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXEY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXFY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXGY	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXPC	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXPR	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
BXXX	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CBPE	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
CBPK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CFAI	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
CFD1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CIPZ	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CL11	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CL41	Real-Time Assembler	Not Applicable	Changed	Updated to add a comment to the prolog for 8-byte file address support. There are no code changes.
CL22	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CL24	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CL31	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLC8	Real-Time Assembler	Not Applicable	New	Updated for 8-byte file address support.
CLM3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMB	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMC	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMD	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CLME	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMF	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMH	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMI	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMK	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLML	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CLMN	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CPSR	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CRZ1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CTK9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVA0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVB1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVBA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVBB	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVBC	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVF4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVF7	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CVF8	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYA0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYA1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYA2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYA7	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYA9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYAB	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYAR	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYB0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYB6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYBA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYBD	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYC0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYC1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYC2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYC3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYC4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYC6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYD0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYD1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYD2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYD3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYD4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYE2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYF1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYF2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYF4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYF6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYF7	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYF8	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYF9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYGM	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CYGR	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYIO	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CZXD	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
CZXE	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
CZXF	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CZXM	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CZXT	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
CZXU	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DFAD	Offline Assembler	DFAD	Changed	Updated for 8-byte file address support.
DRD0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DRD1	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DRD2	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DRD3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DRD4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DRD5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DRD6	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYD3	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYD4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYD5	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYD7	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYD8	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYD9	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDA	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDC	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDE	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDG	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDI	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
DYDL	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDN	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDO	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDQ	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDS	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDU	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
DYDV	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
DYDW	Real-Time Assembler	Not Applicable	New	Added for 8-byte file address support.
FTBD00	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD01	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD02	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD05	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD06	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD07	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD08	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD09	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTBD10	Offline C Language	FCTBG-Generated	Changed	Added for 8-byte file address support.
FTBD11	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTER00	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTGN00	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTPS03	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTPS07	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTRG05	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTRG06	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTRG07	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTTD01	Offline C Language	FCTBG-Generated	New	Added for 8-byte file address support.
FTVA01	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTVA02	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
FTVA03	Offline C Language	FCTBG-Generated	Changed	Updated for 8-byte file address support.
GOGO	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
GTSZ	Offline C Language	GTSZ	Changed	Updated for 8-byte file address support.
JCD4	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
JCS0	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
JRA1	Offline PL/I	DATAREAD	Changed	Updated for 8-byte file address support.
JRA2	Offline PL/I	DATAREAD	Changed	Updated for 8-byte file address support.
JRS3	Offline PL/I	DATAREAD	Changed	Updated for 8-byte file address support.

Table 1186. Changes to Segments for 8-Byte File Address Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
PRSR	Offline Assembler	PRSR	No Longer Supported	Removed for 8-byte file address support.
PTVE	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
PTVS	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
PTVX	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
RLCH	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
STPP	Offline Assembler	PPCP	Changed	Updated for 8-byte file address support.
TLDR	Offline Assembler	TPFLDR	Changed	Updated for 8-byte file address support.
TLDRMN	Offline C Language	TPFLDR	Changed	Updated for 8-byte file address support.
UBWR	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.
UBRS	Real-Time Assembler	Not Applicable	Changed	Updated for 8-byte file address support.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 1187 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 1187. Changes to SYSEQ Tags for 8-Byte File Address Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#BKPZ	28	New
#E81E8	125	No Longer Supported
#E88E8	168	New
#L81L8	124	No Longer Supported
#L88L8	167	New
#@SR54BA	10	No Longer Supported
#@SR54B8	11	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1188 on page 1143 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1188. Changes to Commands for 8-Byte File Address Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZAFIL	Changed	Updated for 8-byte file address support.
ZAREC	Changed	Updated for 8-byte file address support.
ZBROW DISPLAY	Changed	Updated for 8-byte file address support.
ZBROW PATH	Changed	Updated for 8-byte file address support.
ZDCDO	Changed	Updated for 8-byte file address support.
ZCHCH	Changed	Updated for 8-byte file address support.
ZCSON	Changed	Updated for 8-byte file address support.
ZDADD	Changed	Updated for 8-byte file address support.
ZDBRI RESTART	Changed	Updated for 8-byte file address support.
ZDBRO BYPASS	Changed	Updated for 8-byte file address support.
ZDBRO DISPLAY	Changed	Updated for 8-byte file address support.
ZDBRO RESET	Changed	Updated for 8-byte file address support.
ZDBRO RESTART	Changed	Updated for 8-byte file address support.
ZDBRO START	Changed	Updated for 8-byte file address support.
ZDBRO STATUS	Changed	Updated for 8-byte file address support.
ZDBRO SWITCH	Changed	Updated for 8-byte file address support.
ZDBSI RESTART	Changed	Updated for 8-byte file address support.
ZDBSO BYPASS	Changed	Updated for 8-byte file address support.
ZDBSO DISPLAY	Changed	Updated for 8-byte file address support.
ZDBSO RESET	Changed	Updated for 8-byte file address support.
ZDBSO RESTART	Changed	Updated for 8-byte file address support.
ZDBSO START	Changed	Updated for 8-byte file address support.
ZDBSO STATUS	Changed	Updated for 8-byte file address support.
ZDEAC	No Longer Supported	Removed for 8-byte file address support.
ZDECB	Changed	Updated for 8-byte file address support.
ZDFAI	New	Added for 8-byte file address support.
ZDFIL	Changed	Updated for 8-byte file address support.
ZDFPC	Changed	Updated for 8-byte file address support.
ZDLCK DELETE	Changed	Updated for 8-byte file address support.
ZDLCK DISPLAY	Changed	Updated for 8-byte file address support.
ZDREC	Changed	Updated for 8-byte file address support.
ZDUPD	Changed	Updated for 8-byte file address support.
ZFRST LOG	Changed	Updated for 8-byte file address support.
ZFRST XCP	Changed	Updated for 8-byte file address support.
ZGAFI	Changed	Updated for 8-byte file address support.
ZGFSP Alter Allowed Use	Changed	Updated for 8-byte file address support.
ZGFSP Alter Minimum Count	Changed	Updated for 8-byte file address support.
ZGFSP Alter Pool Parameters	Changed	Updated for 8-byte file address support.
ZGFSP DSP	Changed	Updated for 8-byte file address support.
ZGFSP FLB	Changed	Updated for 8-byte file address support.
ZGFSP OPT	Changed	Updated for 8-byte file address support.
ZGFSP RTO	Changed	Updated for 8-byte file address support.

Table 1188. Changes to Commands for 8-Byte File Address Support (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZGFSP SET	Changed	Updated for 8-byte file address support.
ZINET ADD	Changed	Updated for 8-byte file address support.
ZINET ALTER	Changed	Updated for 8-byte file address support.
ZMCHR	Changed	Updated for 8-byte file address support.
ZMODE	Changed	Updated for 8-byte file address support.
ZOODB DISPLAY	Changed	Updated for 8-byte file address support.
ZPOOL DISPLAY	Changed	Updated for 8-byte file address support.
ZPOOL GENERATION	Changed	Updated for 8-byte file address support.
ZPOOL INIT	Changed	Updated for 8-byte file address support.
ZRECP CONTINUE	Changed	Updated for 8-byte file address support.
ZRECP DISPLAY	Changed	Updated for 8-byte file address support.
ZRECP IGNORE	Changed	Updated for 8-byte file address support.
ZRECP NOREBUILD	Changed	Updated for 8-byte file address support.
ZRECP OFLMR	Changed	Updated for 8-byte file address support.
ZRECP ONEL	Changed	Updated for 8-byte file address support.
ZRECP PROCEED	Changed	Updated for 8-byte file address support.
ZRECP PROFILE	Changed	Updated for 8-byte file address support.
ZRECP PROTECT	Changed	Updated for 8-byte file address support.
ZRECP REBUILD	Changed	Updated for 8-byte file address support.
ZRECP RESUME	Changed	Updated for 8-byte file address support.
ZRECP VERIFY	Changed	Updated for 8-byte file address support.
ZRFPC	Changed	Updated for 8-byte file address support.
ZRHLD DELETE	Changed	Updated for 8-byte file address support.
ZRHLD DISPLAY	Changed	Updated for 8-byte file address support.
ZRPDU CREATE	Changed	Updated for 8-byte file address support.
ZRPDU DISP	Changed	Updated for 8-byte file address support.
ZRPDU OFLMR	Changed	Updated for 8-byte file address support.
ZRTDM DISPLAY	Changed	Updated for 8-byte file address support.
ZRTDM MODIFY	Changed	Updated for 8-byte file address support.
ZSELD	Changed	Updated for 8-byte file address support. See <i>TPF Operations</i> for more information.
ZTRAC	Changed	Updated for 8-byte file address support. See <i>TPF Operations</i> for more information.
ZTRCE	Changed	Updated for 8-byte file address support. See <i>TPF Operations</i> for more information.
ZVFAC FLUSH	Changed	Updated for 8-byte file address support.
ZVFAC LOCATE	Changed	Updated for 8-byte file address support.
ZVFAC PURGE	Changed	Updated for 8-byte file address support.

Messages and System Errors

Table 1189 on page 1145 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on

the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000000000 DYDK - EOJ	Online	No Longer Supported
000000000 DYDK - FACE ERR, JOB ABORTED	Online	No Longer Supported
000000000 DYDK - I/O ERR, JOB ABORTED	Online	No Longer Supported
000000000 DYDK - START OF DIRECTORY CAPTURE	Online	No Longer Supported
0000D0	System	Changed. This is a book only change; there is no code change.
000038	System	Changed. This is a book only change; there is no code change.
000581	System	Changed
007910	System	New
007911	System	New
04120C	System	Changed. This is a book only change; there is no code change.
04120F	System	Changed. This is a book only change; there is no code change.
04121D	System	Changed. This is a book only change; there is no code change.
04121E	System	Changed. This is a book only change; there is no code change.
041260	System	New
041261	System	New
041262	System	New
044000	System	No Longer Supported
888001	System	Changed. This is a book only change; there is no code change.
888002	System	Changed. This is a book only change; there is no code change.
888003	System	Changed. This is a book only change; there is no code change.
AFIL0010I	Online	No Longer Supported. This message has been replaced by AFIL0011I.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
AFIL0011I	Online	New. This message replaces AFIL0010I.
AREC0010I	Online	No Longer Supported. This message has been replaced by AREC0011I.
AREC0011I	Online	New. This message replaces AREC0010I.
B1AA0011E	Online	Changed. This is a book only change; there is no code change.
B1AA0012E	Online	Changed. This is a book only change; there is no code change.
B1A50002E	Online	Changed. This is a book only change; there is no code change.
B1A50007W	Online	Changed. This is a book only change; there is no code change.
B1A50015E	Online	Changed. This is a book only change; there is no code change.
B1A50016E	Online	Changed. This is a book only change; there is no code change.
BBLD0007E	Online	Changed
BCP10014I	Online	No Longer Supported. This message has been replaced by BCP10016I.
BCP10016I	Online	New. This message replaces BCP10014I.
BCP30001E	Online	Changed. This is a book only change; there is no code change.
BCP30002E	Online	Changed. This is a book only change; there is no code change.
BCPE0001E	Online	No Longer Supported. This message has been replaced by BCPE0007E.
BCPE0004I	Online	No Longer Supported. This message has been replaced by BCPE0010I.
BCPE0006I	Online	No Longer Supported. This message has been replaced by BCPE0011I.
BCPE0007E	Online	New. This message replaces BCPE0001E.
BCPE0010I	Online	New. This message replaces BCPE0004I.
BCPE0011I	Online	New. This message replaces BCPE0006I.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BOF20003I	Online	No Longer Supported. This message has been replaced by BOF20013I.
BOF20004I	Online	No Longer Supported. This message has been replaced by BOF20014I.
BOF20005I	Online	No Longer Supported. This message has been replaced by BOF20015I.
BOF20006I	Online	No Longer Supported. This message has been replaced by BOF20016I.
BOF20007I	Online	No Longer Supported. This message has been replaced by BOF20017I.
BOF20008I	Online	No Longer Supported. This message has been replaced by BOF20018I.
BOF20013I	Online	New. This message replaces BOF20003I.
BOF20014I	Online	New. This message replaces BOF20004I.
BOF20015I	Online	New. This message replaces BOF20005I.
BOF20016I	Online	New. This message replaces BOF20006I.
BOF20017I	Online	New. This message replaces BOF20007I.
BOF20018I	Online	New. This message replaces BOF20008I.
BOF30001E	Online	No Longer Supported. This message has been replaced by BOF30007E.
BOF30002E	Online	No Longer Supported. This message has been replaced by BOF30008E.
BOF30003E	Online	No Longer Supported. This message has been replaced by BOF30009E.
BOF30007E	Online	New. This message replaces BOF30001E.
BOF30008E	Online	New. This message replaces BOF30002E.
BOF30009E	Online	New. This message replaces BOF30003E.
BOF40001E	Online	No Longer Supported. This message has been replaced by BOF40017E.
BOF40002E	Online	No Longer Supported. This message has been replaced by BOF40018E.
BOF40003E	Online	No Longer Supported. This message has been replaced by BOF40019E.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BOF40004E	Online	Changed. This is a book only change; there is no code change.
BOF40007A	Online	No Longer Supported
BOF40017E	Online	New. This message replaces BOF40001E.
BOF40018E	Online	New. This message replaces BOF40002E.
BOF40019E	Online	New. This message replaces BOF40003E.
BOFA0001I	Online	No Longer Supported. This message has been replaced by BOFA0018I.
BOFA0018I	Online	New. This message replaces BOFA0001I.
BOFI0001I	Online	No Longer Supported. This message has been replaced by BOFI0026I.
BOFI0007I	Online	No Longer Supported. This message has been replaced by BOFI0027I.
BOFI0009I	Online	No Longer Supported. This message has been replaced by BOFI0028I.
BOFI0010I	Online	No Longer Supported. This message has been replaced by BOFI0029I.
BOFI0026I	Online	New. This message replaces BOFI0001I.
BOFI0027I	Online	New. This message replaces BOFI0007I.
BOFI0028I	Online	New. This message replaces BOFI0009I.
BOFI0029I	Online	New. This message replaces BOFI0010I.
BOFJ0005E	Online	Changed
BOFJ0007E	Online	New
BOFK0003I	Online	No Longer Supported. This message has been replaced by BOFK0008I.
BOFK0008I	Online	New. This message replaces BOFK0003I.
BOFM0001A	Online	Changed. This is a book only change; there is no code change.
BRB40000I	Online	No Longer Supported. This message has been replaced by BRB40007I.
BRB40007I	Online	New. This message replaces BRB40000I.
BRID0007E	Online	No Longer Supported
BRID0008E	Online	Changed

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BROW0701I	Online	Changed. This is a book only change; there is no code change.
BRTV0002I	Online	No Longer Supported. This message has been replaced by BRTV0003I.
BRTV0003I	Online	New. This message replaces BRTV0002I.
BRV10002E	Online	No Longer Supported. This message has been replaced by BRV10008E.
BRV10003E	Online	No Longer Supported. This message has been replaced by BRV10009E.
BRV10008E	Online	New. This message replaces BRV10002E.
BRV10009E	Online	New. This message replaces BRV10003E.
BRV30005E	Online	No Longer Supported. This message has been replaced by BRV30014E.
BRV30006E	Online	No Longer Supported. This message has been replaced by BRV30015E.
BRV30008E	Online	No Longer Supported. This message has been replaced by BRV30016E.
BRV30009E	Online	No Longer Supported. This message has been replaced by BRV30017E.
BRV30011E	Online	Changed. This is a book only change; there is no code change.
BRV30014E	Online	New. This message replaces BRV30005E.
BRV30015E	Online	New. This message replaces BRV30006E.
BRV30016E	Online	New. This message replaces BRV30008E.
BRV30017E	Online	New. This message replaces BRV30009E.
BRV50005E	Online	No Longer Supported. This message has been replaced by BRV50016E.
BRV50006E	Online	No Longer Supported. This message has been replaced by BRV50017E.
BRV50008E	Online	No Longer Supported. This message has been replaced by BRV50018E.
BRV50009E	Online	No Longer Supported. This message has been replaced by BRV50019E.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BRV50010I	Online	No Longer Supported. This message has been replaced by BRV50023I.
BRV50011I	Online	No Longer Supported. This message has been replaced by BRV50022I.
BRV50012E	Online	No Longer Supported. This message has been replaced by BRV50020E.
BRV50013E	Online	No Longer Supported. This message has been replaced by BRV50021E.
BRV50016E	Online	New. This message replaces BRV50005E.
BRV50017E	Online	New. This message replaces BRV50006E.
BRV50018E	Online	New. This message replaces BRV50008E.
BRV50019E	Online	New. This message replaces BRV50009E.
BRV50020E	Online	New. This message replaces BRV50012E.
BRV50021E	Online	New. This message replaces BRV50013E.
BRV50022I	Online	New. This message replaces BRV50011I.
BRV50023I	Online	New. This message replaces BRV50010I.
BRV60001I	Online	No Longer Supported. This message has been replaced by BRV60015I.
BRV60002I	Online	No Longer Supported. This message has been replaced by BRV60016I.
BRV60011E	Online	Changed
BRV60012E	Online	Changed
BRV60015I	Online	New. This message replaces BRV60001I.
BRV60016I	Online	New. This message replaces BRV60002I.
BRV80000E	Online	Changed. This is a book only change; there is no code change.
BRV80001I	Online	No Longer Supported. This message has been replaced by BRV80007I.
BRV80002I	Online	Changed. This is a book only change; there is no code change.
BRV80003I	Online	Changed. This is a book only change; there is no code change.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
BRV80005E	Online	Changed. This is a book only change; there is no code change.
BRV80007I	Online	New. This message replaces BRV80001I.
BRV90002E	Online	No Longer Supported
BRV90004E	Online	Changed
BRV90004I	Online	No Longer Supported. This message has been replaced by BRV90009I.
BRV90005E	Online	Changed. This is a book only change; there is no code change.
BRV90006E	Online	Changed. This is a book only change; there is no code change.
BRV90009I	Online	New. This message replaces BRV90004I.
BWRA0401E	Online	No Longer Supported. This message has been replaced by BWRA0501E.
BWRA0501E	Online	New. This message replaces BWRA0401E.
BWRF0007E	Online	Changed
BWRF0008E	Online	Changed
CDCO0032I	Online	New
CDCO0033E	Online	New
CFAI0002I	Online	New
CFAI0003I	Online	New
CFAI0004I	Online	New
CFAI0050E	Online	New
CFAI0051E	Online	New
CFAI0052E	Online	New
CFAI0053E	Online	New
CLM80006E	Online	No Longer Supported
CRZ10001I	Online	No Longer Supported. This message has been replaced by CRZ10015I.
CRZ10002I	Online	No Longer Supported. This message has been replaced by CRZ10011I.
CRZ10003I	Online	No Longer Supported. This message has been replaced by CRZ10012I.
CRZ10005E	Online	No Longer Supported
CRZ10006E	Online	No Longer Supported
CRZ10011I	Online	New. This message replaces CRZ10002I.
CRZ10012I	Online	New. This message replaces CRZ10003I.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CRZ10013E	Online	New
CRZ10014E	Online	New
CRZ10015I	Online	New. This message replaces CRZ10001I.
CSON0001I	Online	No Longer Supported. This message has been replaced by CSON0002I.
CSON0002I	Online	New. This message replaces CSON0001I.
CSON0051E	Online	No Longer Supported
CSON0052E	Online	Changed. This is a book only change; there is no code change.
CSON0053E	Online	New
CSON0054E	Online	New
CYA90004I	Online	Changed. This is a book only change; there is no code change.
CYAR0083E	Online	Changed. This is a book only change; there is no code change.
CYAR0089E	Online	Changed. This is a book only change; there is no code change.
CYB00082E	Online	Changed. This is a book only change; there is no code change.
CYEM0099E	Online	No Longer Supported. This message has been replaced by CYEM0100E.
CYEM0100E	Online	New. This message replaces CYEM0099E.
CYGM0001W	Online	No Longer Supported. This message has been replaced by CYGM0006W.
CYGM0002W	Online	No Longer Supported. This message has been replaced by CYGM0011W.
CYGM0003W	Online	No Longer Supported. This message has been replaced by CYGM0007W.
CYGM0004W	Online	No Longer Supported. This message has been replaced by CYGM0008W.
CYGM0006W	Online	New. This message replaces CYGM0001W.
CYGM0007W	Online	New. This message replaces CYGM0003W.
CYGM0008W	Online	New. This message replaces CYGM0004W.
CYGM0009W	Online	New
CYGM0010W	Online	New

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CYGM0011W	Online	New. This message replaces CYGM0002W.
DADD0001I	Online	No Longer Supported. This message has been replaced by DADD0004I.
DADD0002I (not documented, but in code)	Online	No Longer Supported. This message has been replaced by DADD0005I.
DADD0004I	Online	New. This message replaces DADD0001I.
DADD0005I	Online	New. This message replaces DADD0002I.
DADD0055E	Online	No Longer Supported. This message has been replaced by DADD0061E.
DADD0061E	Online	New. This message replaces DADD0055E.
DADD0062E	Online	New
DADF0065E	Online	New
DBRI0022I	Online	No Longer Supported. This message has been replaced by DBRI0032I.
DBRI0023E	Online	No Longer Supported. This message has been replaced by DBRI0040E.
DBRI0029I	Online	No Longer Supported. This message has been replaced by DBRI0058I.
DBRI0032I	Online	New. This message replaces DBRI0022I.
DBRI0040E	Online	New. This message replaces DBRI0023E.
DBRI0058I	Online	New. This message replaces DBRI0029I.
DBRO0014I	Online	No Longer Supported. This message has been replaced by DBRO0062I.
DBRO0053E	Online	No Longer Supported. This message has been replaced by DBRO0065E.
DBRO0072E	Online	No Longer Supported. This message has been replaced by DBRO0066E.
DBRO0080I	Online	No Longer Supported. This message has been replaced by DBRO0067I.
DBRO0081I	Online	No Longer Supported. This message has been replaced by DBRO0068I.
DBRO0082I	Online	No Longer Supported. This message has been replaced by DBRO0069I.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DBRO0083I	Online	No Longer Supported. This message has been replaced by DBRO0077I.
DBRO0062I	Online	New. This message replaces DBRO0014I.
DBRO0065E	Online	New. This message replaces DBRO0053E.
DBRO0066E	Online	New. This message replaces DBRO0072E.
DBRO0067I	Online	New. This message replaces DBRO0080I.
DBRO0068I	Online	New. This message replaces DBRO0081I.
DBRO0069I	Online	New. This message replaces DBRO0082I.
DBRO0077I	Online	New. This message replaces DBRO0083I.
DECB0002I	Online	No Longer Supported. This message has been replaced by DECB0014I.
DECB0003I	Online	No Longer Supported. This message has been replaced by DECB0012I.
DECB0004I	Online	No Longer Supported. This message has been replaced by DECB0013I.
DECB0012I	Online	New. This message replaces DECB0003I.
DECB0013I	Online	New. This message replaces DECB0004I.
DECB0014I	Online	New. This message replaces DECB0002I.
DFIL0010I	Online	No Longer Supported. This message has been replaced by DFIL0011I.
DFIL0011I	Online	New. This message replaces DFIL0010I.
DFPC0001I	Online	No Longer Supported. This message has been replaced by DFPC0011I.
DFPC0011I	Online	New. This message replaces DFPC0001I.
DREC0010I	Online	No Longer Supported. This message has been replaced by DREC0012I.
DREC0012I	Online	New. This message replaces DREC0010I.
DYD50001T	Online	Changed
DYD50002T	Online	Changed
DYD80009T	Online	Changed

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
DYD80010T	Online	Changed. This is a book only change; there is no code change.
DYD80012T	Online	Changed
DYD80013T	Online	Changed. This is a book only change; there is no code change.
DYD80014T	Online	Changed. This is a book only change; there is no code change.
DYD80015T	Online	Changed. This is a book only change; there is no code change.
DYD80016T	Online	Changed. This is a book only change; there is no code change.
DYD80017T	Online	Changed. This is a book only change; there is no code change.
DYD80021T	Online	Changed
DYD80022W	Online	New
DYDA0001I	Online	Changed
DYDA0002E	Online	New
DYDA0003E	Online	New
DYDA0004E	Online	New
DYDE0001E	Online	No Longer Supported. This message has been replaced by DYDE0011E.
DYDE0011E	Online	New. This message replaces DYDE0001E.
DYDK0020A	Online	No Longer Supported
DYDK0085E	Online	No Longer Supported
DYDO0001I	Online	No Longer Supported. This message has been replaced by DYDO0007I.
DYDO0007I	Online	New. This message replaces DYDO0001I.
DYO01000W	Offline	Changed. This is a book only change; there is no code change.
FECB0007I	Online	No Longer Supported
FFFFFC	System	Changed. This is a book only change; there is no code change.
GAFI0001I	Online	No Longer Supported. This message has been replaced by GAFI0008I.
GAFI0002T	Online	No Longer Supported. This message has been replaced by GAFI0009T.
GAFI0003T	Online	No Longer Supported

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
GAFI0004T	Online	No Longer Supported. This message has been replaced by GAFI0010T.
GAFI0005T	Online	No Longer Supported. This message has been replaced by GAFI0011T.
GAFI0007T	Online	No Longer Supported
GAFI0008I	Online	New. This message replaces GAFI0001I.
GAFI0009T	Online	New. This message replaces GAFI0002T.
GAFI0010T	Online	New. This message replaces GAFI0004T.
GAFI0011T	Online	New. This message replaces GAFI0005T.
GFSP0001I	Online	No Longer Supported. This message has been replaced by GFSP0005I.
GFSP0002I	Online	No Longer Supported. This message has been replaced by GFSP0006I.
GFSP0005I	Online	New. This message replaces GFSP0002I.
GFSP0006I	Online	New. This message replaces GFSP0002I.
GFSP0066E	Online	New
GFSP0067E	Online	New
GFSP0075E	Online	New
HOLD0001W	Online	No Longer Supported. This message has been replaced by HOLD0002W.
HOLD0002W	Online	New. This message replaces HOLD0001W.
MODE0001I	Online	No Longer Supported. This message has been replaced by MODE0009I.
MODE0002E	Online	No Longer Supported. This message has been replaced by MODE0010E.
MODE0002I	Online	No Longer Supported
MODE0003E	Online	Changed. This is a book only change; there is no code change.
MODE0005E	Online	New
MODE0006E	Online	New
MODE0007E	Online	New
MODE0008E	Online	New
MODE0009I	Online	New. This message replaces MODE0001I.
MODE0010E	Online	New. This message replaces MODE0002E.

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MODE0011I	Online	New
MODE0012I	Online	New
RECP0007W	Online	No Longer Supported. This message has been replaced by RECP0009W.
RECP0009W	Online	New. This message replaces RECP0007W.
RECP0395I	Online	New
RECP0397I	Online	New
RECP0417I	Online	Changed
RECP0418I	Online	New
RECP0422I	Online	No Longer Supported. This message has been replaced by RECP0433I.
RECP0424E	Online	No Longer Supported. This message has been replaced by RECP0434E.
RECP0425E	Online	No Longer Supported. This message has been replaced by RECP0435E.
RECP0426E	Online	No Longer Supported. This message has been replaced by RECP0436E.
RECP0427E	Online	No Longer Supported. This message has been replaced by RECP0437E.
RECP0428E	Online	No Longer Supported. This message has been replaced by RECP0438E.
RECP0433I	Online	New. This message replaces RECP0422I.
RECP0434E	Online	New. This message replaces RECP0424E.
RECP0435E	Online	New. This message replaces RECP0425E.
RECP0436E	Online	New. This message replaces RECP0426E.
RECP0437E	Online	New. This message replaces RECP0427E.
RECP0438E	Online	New. This message replaces RECP0428E.
RHLD0028E	Online	No Longer Supported. This message has been replaced by RHLD0040E.
RHLD0040E	Online	New. This message replaces RHLD0028E.
RHLD0110I	Online	No Longer Supported. This message has been replaced by RHLD0111I.
RHLD0111I	Online	New. This message replaces RHLD0110I.
RTDM0097E	Online	New

Table 1189. Changes to Messages and System Errors for 8-Byte File Address Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
TPFL0006W	Offline	New
TPFL0007W	Offline	New
TPFL0008W	Offline	New
TPFL2001T	Offline	New
TPFL2002T	Offline	New
TPFL2003T	Offline	New
TPFL2004T	Offline	New
TPFL2005T	Offline	New
VFAC0009I	Online	No Longer Supported. This message has been replaced by VFAC0111I.
VFAC0010I	Online	No Longer Supported. This message has been replaced by VFAC0112I.
VFAC0012I	Online	No Longer Supported. This message has been replaced by VFAC0113I.
VFAC0052E	Online	No Longer Supported. This message has been replaced by VFAC0114E.
VFAC0110W	Online	No Longer Supported. This message has been replaced by VFAC0115W.
VFAC0111I	Online	New. This message replaces VFAC0009I.
VFAC0112I	Online	New. This message replaces VFAC0010I.
VFAC0113I	Online	New. This message replaces VFAC0012I.
VFAC0114E	Online	New. This message replaces VFAC0052E.
VFAC0115W	Online	New. This message replaces VFAC0110W.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

The following steps will enable you to incorporate the changes that were made to SIP and system generation for 8-byte file address support:

1. Update the SIP Stage 1 deck to include the new RAMEND and UFTEND macros. You must include these macros even if you do not plan to use FARF6 file addresses. The RAMEND macro must be placed after the last RAMFIL macro in the Stage 1 deck. The UFTEND macro must be placed after the

UFTFTI macro. These macros allow the assembler to understand the RAMFIL and UFTFTI macros, which might have coded parameters that exceed 255 characters.

2. Update the JCL deck (for compiling and link-editing the FCTBG program) to compile and link-edit segment FTTD01.

See *TPF System Generation* for more information about SIP and system generation changes.

Loading Process Changes

If you want to load an FCTB that was created in GOFF format, you will need to link it with the Program Object Binder to create a program object that must reside in the hierarchical file system (HFS) under OS/390 UNIX System Services (OS/390 UNIX) on the same system where the offline loader runs. TPFLDR JCL must be updated to include a Path card and you must specify the path name on the Load FCTB card. The primary reason for creating an FCTB in GOFF format is to support FCTBs larger than 16 MB.

Online System Load Changes

There are no changes.

Publication Changes

Table 1190 summarizes changes to the books in the TPF library. This information is presented in alphabetic order by the book title. See the *TPF Library Guide* for more information about the TPF library.

Table 1190. Changes to TPF Publications for 8-Byte File Address Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Application Programming</i>	GTPAPP0E	Updated with information about 8-byte file address support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0F	Updated with information about the C functions that were changed for 8-byte file address support.
<i>TPF Concepts and Structures</i>	GTPCON0C	Updated with information about 8-byte file address support.
<i>TPF Database Reference</i>	GTPDBR0D	Updated with information about 8-byte file address support.
<i>TPF General Macros</i>	GTPGEN0E	Updated with information about the general macros that were changed for 8-byte file address support.
<i>TPF Library Guide</i>	GTPDOC0F	Updated with definitions for new terminology in the master glossary.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for 8-byte file address support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for 8-byte file address support.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for 8-byte file address support.
<i>TPF Program Development Support Reference</i>	GTPPDR0F	Updated with information about 8-byte file address support.
<i>TPF System Generation</i>	GTPSYG0F	Updated with new or changed information for 8-byte file address support.
<i>TPF System Installation Support Reference</i>	GTPINR0F	Updated with new or changed information for 8-byte file address support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR0E	Updated with information about 8-byte file address support.
<i>TPF System Macros</i>	GTPSYS0F	Updated with information about the system macros that were changed for 8-byte file address support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Applications that call the following functions (using 8-byte file addresses or DECBs instead of ECB data levels) must be compiled with the C++ compiler:

- `attac_id`
- `creec, __CREEC`
- `cretc_level, __CRETCL`
- `detac_id`
- `rlcha`

See the *TPF C/C++ Language Support User's Guide* for more information about these functions.

Database Changes

If TPF Internet mail server support is installed in your complex, recoup descriptors BKD1 and BKDY must be moved into their current slots before you run recoup for the first time after installing 8-byte file address support. To move BKD1 and BKDY, enter the ZRBKD command and specify the MOVE parameter. See the following:

- *TPF Operations* for more information about the ZRBKD command
- *TPF Database Reference* for more information about how to run recoup
- *TPF Transmission Control Protocol/Internet Protocol* for more information about BKD1.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

This section provides the following information to help you add 8-byte file address support to your current TPF 4.1 system:

- What you need to do before you begin the migration
- The steps for migrating to 8-byte file address support
- How to migrate TPF collection support (TPFCS)
- An example of how to migrate an existing database
- An example of how to migrate a dynamic database
- Fallback and coexistence considerations.

Before You Begin Migrating to 8-Byte File Address Support

Before you begin the migration to 8-byte file address support, do the following:

1. Use the OS/390 C/C++ compiler version 2.6 or higher to compile the FCTB compile.
2. Update the recoup descriptors using the GROUP and INDEX macros only if you are converting databases to use 8-byte file addresses. The GROUP and INDEX

macros now include a FAT (file address type) parameter that specifies a 4- or 8-byte file address. See *TPF System Macros* for more information.

3. Reassemble all E-type programs that issue the ESFAC macro because changes were made to the DCTSON data macro.

Migrating to 8-Byte File Address Support

To add 8-byte file address support to your current TPF 4.1 system, do the following:

1. Unpack program update tape (PUT) 15, which contains APAR PJ28097 for 8-byte file address support.
2. Put the C/C++ language header files listed in Table 1172 on page 1114 and Table 1173 on page 1116 in your library system.
3. Install the following:
 - Copy members listed in Table 1176 on page 1119
 - Macros listed in the following tables:
 - Table 1178 on page 1124
 - Table 1179 on page 1128
 - Table 1184 on page 1130
 - Table 1185 on page 1131.
4. Update the SIP RAMFIL macro input statements to the FCTBG:
 - a. Add RAMFIL statements, specifying the #SONSPK record type in the RECID parameter.

Note: Ensure that the required number of ordinals is specified. See *TPF System Generation* for more information about the #SONSPK fixed record type and the RAMFIL macro.

- b. Ensure that the subsystem users (SSUs), processors, and I-streams correspond correctly with the fixed file record types in the USER parameter. See Table 1177 on page 1123 for the fixed file record type.
5. Run the FCTBG to create a new FACE table.
6. Assemble the SIP stage I deck to create a SIP stage II deck.
7. Run SIP to verify the new fixed file records. See Table 1177 on page 1123 for more information about fixed file records.
8. Reassemble or recompile the following:
 - DLM members listed in Table 1174 on page 1116
 - Segments listed in Table 1176 on page 1119
 - Macros listed in Table 1178 on page 1124
 - Programs listed in Table 1184 on page 1130
 - Programs listed in Table 1185 on page 1131
 - Segments listed in Table 1186 on page 1131.
9. Reassemble or recompile the following programs that did not have code changes:

Table 1191. Programs without Code Changes to Reassemble or Recompile

BCXM	BDBO	BEWA	BEWD
BEWE	BKD1	BMT3	BMT5
BMT8	BMTA	BMTC	BMTD
BMTE	BMTG	BOF0	BRYA
BXA2	BXA5	BXA7	BXA8
BXAA	BXAB	BXAC	BXAD

Table 1191. Programs without Code Changes to Reassemble or Recompile (continued)

BXAE	BXAF	BXAI	BXAJ
BXAK	BXAL	BXAN	BXAR
BXAT	BXAU	BXAV	BXAW
BXAZ	BXBB	BXBC	BXBJ
BXBK	BXBL	BXBM	BXBN
BXBW	BXCB	BXCC	BXCG
BXCK	BXCM	BXCV	BXDC
BXDK	BXDL	BXEB	BXEL
BXET	BXUB	CCOMIC	CCCCP1
CCCFLC	CCCPSE	CCCPSF	CCCTIN
CCCWTN	CCDBAF	CCDCOL	CCENBK
CCFADC	CCIISC	CCMDCD	CCMCKH
CCMPIF	CCNUCL	CCRCSC	CCSNA1
CCSONA	CCSONP	CCSONS	CCTAPE
CCTCP1	CCTLOG	CCUTIL	CCVFAC
CJ000	CJ003	CJ004	CJ005
CJ006	CJ100	CL12	CL13
CL14	CL15	CL16	CL21
CL26	CL42	CL80	CLM0
CLM1	CMQPCM	CMQQUE	CMQRM
COS9	COTG	COTS	COTT
CPAA	CPAI	CSAV	CTMCCR
CTMPRP	CTKR	CTKT	CVAX
CVF2	CVF9	CVFS	CVFX
CVIA	CXACMT	CXAEND	CXAPRP
CXARCV	CXARLB	CXASTR	CXQCMT
CXQPRP	CXQRCV	CXQRLB	CXPRCV
CYA3	CYA4	CYEB	CYF0
CYF3	CYH0	CYH1	CYH4
CYH6	CYPL	CYSA	CYSM
CZSA	CZXI	IPLB	JCF0

10. Link-edit CPS0.
11. Run the system allocator (SALO) using IBMPAL and SPPGML additions for newly created segments to create an updated program allocation table (PAT) and SAL table. See Table 1174 on page 1116 and Table 1186 on page 1131 for more information about new segments.
12. Run CBLD for build scripts listed in Table 1171 on page 1114.
13. Assemble the following offline and online segments that were modified:
 - IPLB
 - STPP.
14. Link-edit the following:
 - a. The PPCP offline program. PPCP must be used for all SFDT, RTT, ZSELD, and recoup phase 6 postprocessing when the real-time tape (RTA) and real-time log tape (RTL) are created on a TPF 4.1 system with PUT 15 applied.
 - b. The DLMS, DLLs, and LLMs listed in Table 1174 on page 1116.

- c. CL12 to CL16 and CL42. There were no code changes to these programs, but they were recompiled or reassembled.
 - d. The BPR0 offline program (include BPR0 changes). BPR0 must be used for recoup phase 7 when the RTA and RTL are created on a TPF 4.1 system with PUT 15 applied.
 - e. TPFLDR.
 - f. BRPA and BRFA offline recoup programs.
15. Load the updated object code to your TPF 4.1 system.
 16. Enter **ZFRST CLEAR** on **each** CPU in the complex to initialize the new checkpoint records (#IBMMP4 ordinal number 28) before using capture and restore.
 17. If TPFDF is installed in your complex, enter each of the following commands **twice** in succession before running recoup to initialize the new databases:
 - a. **ZUDFM INIT Fddb** to initialize #IDFC4 ordinal 11
 - b. **ZUDFM INIT FDDC** to initialize #SRM31A
 - c. **ZUDFM INIT FDDD** to initialize #SRM51A
 - d. **ZUDFM INIT FDDE** to initialize #SRM41A
 - e. **ZUDFM INIT FDE1** to initialize #SRM61A.
- Note:** The first recoup following the installation of 8-byte file address support might report lost addresses for record IDs Fddb, FDDC, FDDD, FDDE, and FDE1 because ordinal numbers have been changed.
18. Enter **ZCDCO MIGRATE RDB-rdbname** (where *rdbname* is the 1- to 18-character alphanumeric name) before running continuous data collection to migrate a preexisting database (one created before applying PUT 15 to your TPF 4.1 system) to the new format.
 19. Enter **ZDBRO INIT** or **ZDBSO INIT** to initialize control records before using database reorganization (DBR).
 20. Enter **ZPMIG CONVERT** on all processors to convert the pool data structures from the pool format currently defined in your complex.
 21. Enter **ZMODE 6** to switch on the SB8BFAD SYSTC bit to allow FARF6 addresses to be dispensed and to actually begin using 8-byte file addressing.
 22. Enter the following series of commands to do pool reallocation before dispensing or using 8-byte pools:
 - a. **ZPOOL GENERATION CREATE**
 - b. **ZPOOL GENERATION RECONFIGURE**
 - c. **ZPOOL GENERATION UPDATE**
 - d. **ZPOOL GENERATION ONLINE CONTINUE**
 - e. **ZPOOL INIT PSDIR**.
 23. Load 8-byte file address support code to all processors and all subsystems before running recoup. The first recoup may result in some additional lost addresses that have been skipped by pool processing caused by changing record type #SONSP to #SONSKP. After loading 8-byte file address support code to all processors and subsystems, #SONSP can be removed.
 24. IPL the TPF 4.1 system.
 25. Cycle the TPF 4.1 system to NORM state before running any application programs.

See *TPF Operations* and *TPFDF Utilities* for more information about the commands used in this procedure.

Migrating TPF Collection Support (TPFCS)

For TPFCS, migration means allowing new collections to use 8-byte file address formats and eventually FARF6 pool addresses. If TPFCS is installed on your TPF 4.1 system, follow these steps to migrate collections from 4-byte file addresses to 8-byte file addresses:

1. Add 8-byte file address support to your TPF 4.1 system by following the steps listed in “Before You Begin Migrating to 8-Byte File Address Support” on page 1160 and “Migrating to 8-Byte File Address Support” on page 1161. When the installation is completed, existing collections that use 4-byte file addresses will continue to be processed as normal. New collections will still be created using 4-byte addresses.
2. Create new collections using 8-byte file address format by entering **ZMODE 6** to set on the SB8BFAD SYSTC switch (do **not** do this unless 8-byte file address support has been loaded to all processors). Once this switch is set on, all new collections will be built with the 8-byte file address format.
3. Do a pool reallocation to add 4D6 pools. See *TPF Operations* for more information about the ZPOOL GENERATION and ZPOOL INIT commands. See *TPF Database Reference* for more information about pool reallocation.
4. Convert to FARF6 pools by changing the RIAT secondary definition to indicate the FARF6 pool type. Collections that use 4-byte file addresses retrieve pool addresses based on RIAT primary definitions. Collections using 8-byte formats will use the RIAT secondary definitions.
5. Migrate existing collections that use 4-byte file addresses to use 8-byte file addresses by entering the ZOODB MIGRATE command for system collection datastores and the ZBROW COLLECTION command with the MIGRATE parameter specified for individual collections. For more information about these commands, see *TPF Operations*.

For more information about TPFCS, see:

- “TPF Collection Support (APAR PJ25098)” on page 403
- “TPF Collection Support Enhancements (APAR PJ25332)” on page 526
- “TPF Collection Support Enhancements (APAR PJ26143)” on page 566
- “TPFCS Recoup Index Command Support (APAR PJ26887)” on page 717.

Migrating Existing Databases — An Example

Use the following example as a guideline to help you convert existing traditional TPF databases (non-TPFDF, noncollection) to 8-byte file address support:

1. Identify specific databases that you want to migrate to FARF6. Include the following:
 - All records in a specific database
 - All programs that access these records.
2. Update programs to use DECBs for all FIND, FILE, GETFC, and RELFC macros that access the database you are migrating.
3. Migrate the database to use 8-byte file addresses by doing the following:
 - a. Change the database structures (or DSECTs) to reserve space for the 8-byte standard header. Save location X'10' – X'1F' for the 8-byte forward chain and backward chain. This will require you to move back your data by X'10' bytes.
 - b. Change any fields in the structure that contain file addresses (embedded file addresses) to 8 bytes in length.
 - c. Change the pool records to 4 K if the record was a 381- or 1055-byte pool record (if possible, use all of the 4 K (pack the records)).

- d. Determine how to implement changes to the database and the programs that access the database. For example, to control access, you can use a single indicator for static data or multiple indicators for dynamic data (which is more complex). You may also need to use a utility to move the data.
- e. Make changes to application programs by using the new data structure and modified macros such as RLCHA and FAC8C.
- f. Load the program changes.
- g. Move the location of the data to make room for 8-byte file addresses.
- h. Update recoup descriptors to indicate that this database is now using 8-byte file addresses.
- i. Define FARF6 pools and do a pool reallocation.
- j. Modify the RIAT entry for the record IDs in the database to use FARF6 pools.

Migrating a Dynamic Database — An Example

Migrating a dynamic database is complex because each TPF database is unique and must be investigated individually. Use the following example as a guideline to help you convert dynamic databases to 8-byte file address support:

1. Define the record chain level indicator. This could be located in the header of each record, perhaps as a different record code check (RCC). The following are the possible settings:
 - Use the 4-byte standard header (the current database should have this set)
 - Use both the 4- and 8-byte standard header
 - Use the 8-byte standard header.
2. Application programs interrogate the record chain indicator when:
 - Accessing the data:
 - When the indicator states to use 4-byte, the old data structure will be used.
 - When the indicator states to use both or to use 8-byte, the new data structure will be used.
 - Setting forward or backward chains:
 - When the indicator states to use 4-byte, fill in only the 4-byte standard header. The file address must only be 4 bytes.
 - When the indicator states to use both, fill in both the 4- and 8-byte standard header. The file address must be in 4x4 format.
 - When the indicator states to use 8-byte, fill in only the 8-byte standard header. The file address can be 4x4 or FARF6 format.
 - Release chains:
 - When the indicator states to use 4-byte, call RLCHA with TYPE=4 (this is the default).
 - When the indicator states to use both 4- or 8-byte, call RLCHA with TYPE=8.
3. Develop a move utility to copy data from the current location to the new location in the new format:
 - a. Code the utility (if possible) so that the move utility can run while the system is in NORM state and taking traffic.
 - b. Migrate embedded file addresses and their chains first; start at the lowest level and work up.
 - c. Turn on the indicator in each record that is migrated, specifying both 4- and 8-byte.

- d. Run a utility that will turn on the 8-byte indicator without copying the records (once all of the database is converted and verified).
4. Include additional logic in application programs:
 - a. If the head of chain indicator states to use both or to use 8-byte, new chains will then use the new 8-byte data structure.
 - b. If the head of chain indicator states to use both and a GETFC macro returns a FARF6 address (not 4x4 format), turn on the 8-byte indicator and do not fill in the 4-byte standard header.

Fallback and Coexistence

When using 8-byte file address support, consider the following fallback and coexistence information:

- TPFCS will continue to support all collections that have been created using the 4-byte file address format. New collections will be created using 8-byte file address support. Do not activate 8-byte file address support until all processors in the loosely coupled complex have been upgraded with the new code. Once there is no possibility of fallback, the SB8BFAD SYSTC switch is set to 1 so that new collections can be created using 8-byte file address format. Fallback at this point would mean that the newly created collections would be lost because previous PUTs did not support 8-byte file address format.
- Before 8-byte file address support, the pool monitor had one monitor value per pool type, which it used to compare for each of the pool sections. With 8-byte file address support, you can change the monitor value for each pool section instead of allowing just one value for all four sections (DEVA–DEVD). Therefore, LLT DEVA will have a value that the pool monitor will use and LLT DEVB will have a separate value. The ability to update the monitor values for each pool section is provided by the ZGFSP ALTER command. If these values are not updated by the ZGFSP ALTER command, the pool monitor will initialize the pool section values from the previous pool type values. For example, if the minimum available value for LLT pool type is 1 000 000, FARF6 pool monitor logic will set the minimum available value for LLT DEVA to 1 000 000, for LLT DEVB to 1 000 000, for LLT DEVC to 1 000 000, and for LLT DEVD to 1 000 000.
- The format of the exception recording and logging tapes will change once SYSTC bit SB8BFAD is set to 1. Before 8-byte file address support, the tapes stored the file address at location 4 for 4 bytes and the time-of-day (TOD) and subsystem user (SSU) were located in a trailer following the data block. Once SB8BFAD is set to 1, location 4 in the block for 4 bytes will be set to 0 and the trailer is changed. The trailer will be a 32-byte field with the first 8 bytes containing the file address. The traditional TOD and SSU trailer will follow the 32-byte field.
- The offline loader (TPFLDR) is entirely backward compatible. Unchanged JCL that is used to run TPFLDR will run the same way by loading the FCTB as a load module from the data sets specified on the ALDRCPD DD statement. The only difference in output is a new informational message in the output report indicating that TPFLDR could not attempt to load the FCTB as a program object. Whether the FCTB is loaded in program object format or load module format, there is no change to the contents of the output created by TPFLDR. Therefore, there are no changes to online loader processing.
- If your complex has been using continuous data collection (CDC), you will need to migrate the remote database to add additional columns for 4D6 pools. To migrate the remote database, enter the ZCDCO command specifying the MIGRATE parameter. Once the database has been migrated, it will still be compatible with PUT 14 in case fallback is necessary. Any remote database created with CDC after 8-byte file address support (PJ28097) is applied, will not

be compatible with any prior PUT. The latest version of the CDC graphical user interface (GUI) will work with any database. For example, the CDC GUI will work with one created before PJ28097 is applied, one migrated to PJ28097, and one created after PJ28097 is applied. See *TPF Operations* for more information about the ZCDCO command.

- The #PSTCUR and #PSTNEW fixed file records that are built during the pool generation process and describe the pool configuration on the TPF 4.1 system are being converted to the expanded #PSTXCUR and #PSTXNEW records respectively. The #PSTCUR and #PSTNEW fixed file records are built during the first IPL after PUT 15 is applied to your TPF 4.1 system. These records are initialized from the FCTB in the same way that they are initialized if you enter ZPOOL GENERATION INIT.

Notes:

1. You do not need to enter ZPOOL GENERATION INIT unless a new pool generation needs to be done.
 2. #PSTXNEW and #PSTXCUR fixed file records **must** be allocated before migration.
 3. You cannot make changes in the pool configuration at the same time as the 8-byte file address support migration. Pool definitions in the FCTB must match the current pool configuration. You must not have pools defined in the FCTB for a future pool reallocation at implementation time.
 4. If migration to 8-byte file address support is completed, fallback and a pool reallocation is completed. Before migrating again, reset the #PSTXCUR and #PSTXNEW fixed file records to a record ID of X'0000' to ensure they will be initialized correctly.
- When a file fails to both the prime and duplicate copy, routine CJPXEMTR in CJIP gains control. An ECB is created and segment CPSR is invoked. If the SB8BFAD SYSTC bit is switched on, the 8-byte file address will always be stored at EBW000. If the entry in field CE1FMO for 4 bytes is 0, the file address will be at EBW000 for 8 bytes. If the entry in field CE1FMO is not 0, the entry is the file address. You might have to update your EPC1 program to load an 8-byte file address from the ECB work area if you intend to use FARF6 addresses.
 - Several TPF and TPFDF databases have been replaced. See Table 1177 on page 1123 and *TPF System Generation* for more information.
 - The BKDY and BKD1 recoup descriptors must be moved before you run recoup for the first time. For more information about moving BKDY and BKD1, see the ZRBKD command in *TPF Operations*.
 - The first recoup run following the installation of 8-byte file address support may report lost addresses for the following record IDs:
 - FC32 Caused by changing ordinal number #E80E8 to #E88E8 for the erroneously available record.
 - FC35 Caused by changing ordinal number #L80L8 to #L88L8 for the lost address record.
 - CD Caused by changing record type #SONSP to #SONSKP.

32-Way Loosely Coupled Processor Support (APAR PJ27785)

The following section discusses the migration considerations for 32-way loosely coupled processor support.

Prerequisite APARs

See the APEDIT for APAR PJ27785 for information about prerequisite APARs.

Functional Overview

32-way loosely coupled processor support provides the additional capacity needed to support application workload growth by allowing as many as 32 processors in a loosely coupled complex. The functions necessary to provide this capability have been implemented over several program update tape (PUT) releases. This release provides the functions necessary to make this support a reality.

The following functional areas and constraints are addressed:

- Multi-Processor Interconnect Facility (MPIF)
MPIF allows cooperative processing between TPF systems and currently uses two fixed record types (#CB8HD and #PDREC) that have been modified and enhanced as follows:
 - #CB8HD records: MPIF hardware definition records that are used to save information about each device connected to the TPF systems have been moved to a new record type, #HDREC, to allow the expansion of the number of records and fields that contain processor information.
 - #PDREC records: MPIF path definition records (PDRs) that contain definitions of the attributes of each path class have been expanded with additional ordinals to support additional processors and are enhanced with a processor unique record type, #PDREU, which contains the processor unique information that was in the #PDREC records.
The ZMPIF PDR command with the INIT parameter specified has been modified to initialize PDR records for the processor on which it is entered and to only initialize those records that have not already been initialized. An additional optional subparameter (ALL) has been added to the INIT parameter that causes PDR records for all processors to be initialized.
- Internet daemon (INETD)
The INETD uses the Internet daemon configuration file (IDCF) to hold configuration information. The IDCF has been expanded to support additional processors by moving the information from the #IBMM4 fixed file record type to its own fixed file record type (#IDCF1).
- Transmission Control Protocol/Internet Protocol (TCP/IP) offload support
TCP/IP offload support uses processor shared #IBMM4 fixed file records to store the CLAW device table (CDT) and the TCP/IP configuration table (ITCPC). Both the CDT and the ITCPC have been moved to the processor unique #IBMMP4 fixed file record type to support additional processors.
- Routing Control Application Table Initialization (RCIT) Record
The processor field in the RCIT record has been expanded to support 32 processors.
- Node Control Block (NCB)
Reserved bytes in each NCB entry have been used to create a new processor mask that supports 32 processors.
- SNA Dynamic Resource Definition

All processor mask fields have been expanded to support 32 processors.

- Keypoint I (CTKI)

The subsystem state table contained in CTKI has been moved to its own fixed file record type, #CN1ST, with 64 ordinals. This allows expansion to 32 processors.

- Keypoint C (CTKC)

CTKC maintains a table of terminals used in the TPF complex. The table has been expanded to allow additional entries for functional support consoles and alternate consoles to be defined for 32 processors.

- Global Storage Allocator (GOA) Records

The super GOA records currently support as many as 12 processors with each processor running as many as 16 I-streams. 32-way loosely coupled processor support increases the super GOA support to as many as 32 processors with 16 I-streams each.

- General File (GF) and General Data Set (GDS)

To support 32-way loosely coupled processors, general file and GDS control structures have been moved from processor shared fixed file records to processor unique fixed file records. General file moved from the #IBMM4 record type to the #IBMMP4 record type, and GDS moved from the #DSCRI record type to the #DSCRU record type.

- Commit and Rollback

Commit and rollback have been extended by increasing the number of #IBMM4 fixed file records for the control table (CRTB) checkpoint area and by increasing the number of log fixed file records to 32 (#RLOG1 – #RLOG32).

- Interprocessor Communications (IPC)

IPC has been changed from using 8-bit masks for representing destination processors to using lists of processors, and by extending the list support implemented for the internal event facility (IEF) to support IPC. The following application interfaces and functions have been modified for list support:

- The GENLC (generate data list) assembler macro includes inactive processors in the processor list.
- The tpf_genlc (generate a data list) function includes an option to include inactive processors in the processor list.
- The SIPCC (system interprocessor/inter-I-stream communication) assembler macro includes a LIST parameter for specifying the destination processor list.
- The sipcc (system interprocessor communication) function includes a list pointer parameter to identify the list of processors.

See *TPF General Macros*, *TPF System Macros*, and the *TPF C/C++ Language Support User's Guide* for more information about the IPC and list macros and functions.

- Keypoint Accessing

Keypoint accessing has been extended for 32 processors as follows:

- The keypoint ordinal table in the #CTKX record type has been expanded to support additional processors.
- The keypoint status table that is maintained in the keypoint control records has been reformatted with entries reduced to 16 bytes so that additional processors can be supported.
- The fallback keypoint extent areas have been moved to their own fixed file record types (#KFBX0 – *nnn*) and a keypoint pointer record has been created in ordinal 0 of each record type. This allows an increase in the number of

fallback keypoint copies supported and allows the allocation of more than one file extent for fallback keypoint space as processors are added to the TPF complex,

The ZKPTR command has been added to allow the keypoint pointer record to be updated during system restart.

- **Recoup**

To support 32-way loosely coupled processors, the number of FC33 records has been increased and the @@32BUSED field was defined. In addition, #SONRPE processor unique fixed file records have been replaced with #SONRPE0 – #SONRPE7 processor shared fixed file records.

Coexistence

To ease migration to 32-way loosely coupled processors, processors running with 32-way loosely coupled processor support and processors running at a back-level of support can coexist in the same loosely coupled complex. When operating in coexistence mode, you must observe the following restrictions:

- There must be eight or fewer processors in the loosely coupled complex. Before the ninth processor is added to the complex, all processors must have 32-way loosely coupled processor support installed and running and the migration process described in “Migration and Fallback” on page 1171 must be completed.
- To ensure that your applications run in a loosely coupled complex operating in coexistence mode, review the following considerations:
 - All applications written in assembler that run on processors with 32-way loosely coupled processor support must be migrated. Assembler applications that run only on back-level processors should run unchanged. Applications that do not run correctly must be migrated.
 - Applications using IPC written in C/C++ language can be run on any processor as long as they do not use the new processor list function and do not reference SIPCC_PARM_MAX, which is defined in sysapi.h.

See “Migration and Fallback” on page 1171 for more information about migrating applications.

- While recoup may be run during coexistence mode, you must first initialize the new FC33 records by entering the ZMIGR command with the RECOUP and INIT parameters specified. Enter this command when the first processor is IPLed with 32-way loosely coupled processor support.

Any recoup run must include only processors that have 32-way loosely coupled processor support installed or include only processors that do not have 32-way loosely coupled processor support installed. A recoup run may **not** include processors at both PUT levels.

- Do not make any updates to MPIF hardware or path definition records (by entering the ZMPIF DEFINE DEVICE and ZMPIF DEFINE PATH commands).

Any updates made to back-level processors are not recognized on processors with 32-way loosely coupled processor support and must be entered again when 32-way loosely coupled processor support is installed on the processor.

Any updates made on a processor with 32-way loosely coupled processor support are not recognized by a back-level processor and would be lost on the processor if you fall back to the previous level of support. The updates would be restored automatically when the processor is migrated to 32-way loosely coupled processor support again.

- Do not use the PROCID parameter with the Internet daemon configuration file (IDCF) commands (ZINET DISPLAY, ZINET ADD, and ZINET ALTER) during coexistence mode. Use of this parameter could cause incomplete data to be displayed or saved.

If you use the ZINET ADD or ZINET ALTER commands on a back-level processor, you must enter the command again when 32-way loosely coupled processor support is installed on that processor.

If you use the ZINET ADD or ZINET ALTER commands on a processor with 32-way loosely coupled processor support, the data is not available to back-level processors.

If you fall back to the back-level support, any data entered is lost while operating at the back-level. The data is automatically restored when you again migrate to 32-way loosely coupled processor support.

- The super GOA records currently support as many as 12 processors. While in coexistence mode, the super GOA records are used by 32-way loosely coupled processor support in their current format.

Migration and Fallback

When migrating to 32-way loosely coupled processor support, you must observe the following considerations and restrictions:

- The installation and migration process must be completed before a ninth processor can be added to the loosely coupled complex.
- Once a ninth processor has been added to the loosely coupled complex, you may not fall back to a loosely coupled configuration that contains processors running a back-level TPF 4.1 system.
- If you use the Virtual Machine (VM) product or the Processor Resource/System Manager (PR/SM) without a Sysplex Timer (STR) to test your TPF environment before migrating your loosely coupled complex, be aware of the following:
 - To exploit 32-way loosely coupled processor support in a test system environment using lock facility (LKFAC) simulation support, VM must support multi-path lock facility (MPLF) locking configurations of 32 processors. This support was initially provided with z/VM.
 - In a test environment without a Sysplex Timer, the TPF 4.1 system is only capable of synchronizing clocks with one of the first eight processors generated (CPU ordinals 0-7) because the TOD Synchronization RPK supports only eight processors, and the TPF code uses the SIPCC macro with bit masks to communicate clock synchronization values with the first eight processors only. Therefore, you must have at least two processors with CPU ordinal values below 8 in the complex when testing processors with CPU ordinals of 8 or higher.

To complete clock restart, every processor IPLed after the first must be able to communicate with at least one of the first eight processors. If a processor with a CPU ordinal below 8 is re-IPLed, it must be able to find another active processor with an ordinal of 0 – 7. That is why at least two active processors (rather than just one) must have CPU ordinals in the range 0 to 7. If none of the first eight processors are active, a processor being IPLed will wait indefinitely in restart for clock confirmation. If this occurs, you must re-IPL two of the first 8 processors.

- Before the installation and migration process is completed, you may operate your loosely coupled complex in coexistence mode where some processors are running 32-way loosely coupled processor support and others are not. See “Coexistence” on page 1170 for more information.

- Applications must be migrated to 32-way loosely coupled processor support as follows:
 - For applications that use interprocessor communications (IPC):
 - Applications written in C/C++ language that do not require the use of the processor list facility should not require migration. However, examine applications that reference #DEFINE value SIPCC_PARM_MAX, defined in `sysapi.h`, because the maximum parameter list size for the `sipcc` function has been increased to add one parameter for the processor destination list.
 - If you want to use the list function in your C/C++ applications, use the `tpf_genlc` function to generate the processor list and modify your calls to use the `sipcc` function. See the *TPF C/C++ Language Support User's Guide* for more information about these functions.
 - Applications written in assembler that will only be run on a back-level processor do not need to be migrated.
 - For applications written in assembler that are to be run on processors with 32-way loosely coupled processor support, do the following:
 1. Reassemble all applications written in assembler language to identify instances of interprocessor communications (IPC) that reference SI3CT macro label SI3DEST. This field has been renamed SI3DSTN to force assembler errors, which can be used to identify applications that use IPC. The IPC interface (SIPCC macro) has been changed to use processor ordinal numbers and counts instead of processor ordinal bit masks.

IPC applications should also be analyzed to identify changes to the following:
 - Label references to the IPC control area data mapping in SI3CT
 - PIDT label references to fields that previously defined processor bit mask.

Note: The new IPC interface is the only IPC interface supported by 32-way loosely coupled processor support.
 2. If the application uses IPC to do anything other than broadcast messages, you must modify the application to use the updated SIPCC macro interface. If the application specifies multiple destination processors for messages (other than broadcast messages), you must use the new SIPCC macro LIST parameter option to specify the destination processors. The GENLC macro must be used to generate the destination processor list.

See *TPF General Macros* for more information about the GENLC macro and see *TPF System Macros* for more information about the SIPCC macro.
 - For applications that use the processor ID table (PIDT), you must modify the code as required to accommodate the following changes in the PI1DT data macro or `c$pi1dt.h` header file:
 - PI1GPA (active processor bit mask) has been replaced by PI1APC (active processor count).
 - PI1GPS and PI1SND (SIPCC sender bit masks) have been deleted.
 - Section 2 of PI1DT has been expanded from 8 to 32 processors.
 - Modify applications that use keypoint I (CTKI) and refer to the IC0CK data macro or `c$ic0ck.h` header file for the following:
 - The IC0PRC table has been expanded from 8 to 32 processor entries.

- The IC0SST table has been moved from CTKI and now resides in 64 ordinals of record type #CN1ST. Modify your code to use segment CYYF to find and file the #CN1ST ordinals.
- Assemble or compile applications written in assembler or C/C++ that have not already been addressed on a TPF 4.1 system with 32-way loosely coupled processor support installed to detect any references to label identifiers that have been changed or removed.

After making any modifications or updates to your applications, the applications must be assembled or compiled on a TPF 4.1 system with 32-way loosely coupled processor support installed.

- After all processors in the loosely coupled complex have 32-way loosely coupled processor support installed and IPLed, you must complete the migration process by using the ZMIGR command to convert record structures and data to 32-way loosely coupled processor support format. See “To Migrate Your Complex to 32-Way Loosely Coupled Processor Support” on page 1210 for more information about these steps and see *TPF Operations* for information about the ZMIGR command.
- Keypoint I (CTKI) contains a flag field that is used to indicate whether CTKI has been converted to 32-way loosely coupled format. This flag field is set by entering the ZMIGR command with the CTKI and CONVERT or FALLBACK parameters specified. Any new TPF 4.1 systems that are generated after the conversion process is completed must code the system initialization program (SIP) CONFIG macro so that the flag is set during system generation. This is done by setting the CTKI32LC parameter of the CONFIG macro to YES. See *TPF System Generation* for information about the CONFIG macro.
- Keypoint C (CTKC) contains a flag field that is used to indicate whether CTKC has been converted to 32-way loosely coupled format. This flag field is set by entering the ZMIGR command with the CTKC and CONVERT or FALLBACK parameters specified. Any new TPF 4.1 systems that are generated after the conversion process is completed must code the SIP CRAFTB macro so that the flag is set during system generation. This is done by setting the CTKC32LC parameter of the CRAFTB macro to YES. See *TPF System Generation* for information about the CRAFTB macro.
- The global storage allocation records (Globals) need to be updated by doing the following:
 - Update the data record information library (DRIL) with the new global fields GO2DSP, GO2CEC, GO2CID, GO2IID, and GO2IS. See the data macro GO1GO for more information on these fields, and see *TPF Application Programming*, *TPF Operations*, and *TPF Program Development Support Reference* for more information about the DRIL.
 - Once all processors have been migrated, update the super global storage allocation (GOA) records for 32-way loosely coupled processor support. To define the super GOA records, edit the pilot tape (PILOTA) load deck, replacing labels GO1DSP, GO1CID, GO1IID, and GO1IS with labels GO2DSP, GO2CID, GO2IID, and GO2IS respectively. The GO2 fields provide support for 32-way loosely coupled processors with as many as 16 I-streams on each processor.

For all super GOA records where GO2DSP is used, the GO1CHN field must be coded with the value X'40'. This GO1CHN value informs the online system that the super GOA records are coded using the GO2 labels.

Once the pilot tape load deck is edited, use the system test compiler (STC) to create a PILOTA tape and use the ZSLDR command to load the tape to the system.

See *TPF System Installation Support Reference* for more information about globals, super GOAs, and the PILOTA load deck and tape. See *TPF Operations* for more information about the ZSLDR command.

- When you have completed migration to 32-way loosely coupled processor support and have no requirement to fall back to a coexistence environment, do the following:
 - Delete the #CB8HD, #SONRPE, and #DSCRI records from the TPF 4.1 system.
 - Set #IBMM4 ordinal X'A9' and X'AA' records in the save areas for #PDREC ordinal 2 and 3 records to zeros.
 - Delete #PDREC record ordinals 4 and higher from the TPF 4.1 system.
 - Set the old IDCf records in #IBMM4 ordinals 158 – 161 to zeros.
 - Set the record IDs for the old CLAW device table (CDT) in #IBMM4 ordinals 109 – 116 to zeros.
 - Set the record IDs for the old TCP/IP configuration table (ITCPC) in #IBMM4 ordinals 150 – 157 to zeros.
 - Set the record IDs for the old general file control records in #IBMM4 ordinals 101 – 108 to zeros.

After you have migrated to 32-way loosely coupled processor support, but have not yet added a ninth processor to the loosely coupled complex, you can fall back to a TPF 4.1 system image without 32-way loosely coupled processor support on one or more processors in the complex. If you do, be aware of the following:

- You must be sure to fall back all data structures by entering the ZMIGR command before IPLing a back-level system.
- You must reset the migrated status indicator for any processor that you want to IPL with a back-level system by entering ZPSMS command to deactivate the processor.
- Once you have completed a fallback, the restrictions for operating in a mixed environment apply. See “Coexistence” on page 1170 for more information about coexistence.
- If you plan to generate any new TPF 4.1 systems while operating in an environment that includes back-level systems, make sure that the CTKI32LC parameter of the SIP CONFIG macro and the CTKC32LC parameter of the SIP CRAFTB macro are set to NO.
- If you have loaded a PILOTA tape defining the super GOA records for 32-way loosely coupled processor support, you must load the previous PILOTA tape by using the ZSLDR command.

See “Falling Back from 32-Way Loosely Coupled Processor Support” on page 1214 for more information about the steps required for falling back.

Architecture

A number of functions and data structures were modified and enhanced to support 32-way loosely coupled processors. The following describes the design considerations for these changes.

Data Structures

A number of fields and data structures that are used throughout the TPF 4.1 system are limited to an 8-way loosely coupled processor complex. Many of these fields and structures use 1-byte bit masks to represent the processors in the complex. The following describes the changes to the data structures and fixed file record formats to support 32-way loosely coupled processors:

MPIF Hardware Definition Record

This record is currently supported using the #CB8HD fixed file record. The CB8CONx field in this record needs to be expanded to 32 bytes, increasing the item length for each hardware definition record to 64 bytes (including spare bytes for future expansion). The increased item length results in the requirement for additional records to hold the hardware definitions.

To ease migration, record type #HDREC has been created to support the increased data size and number of records. The hardware definitions are copied to the new record type the first time a processor with 32-way loosely coupled processor support is IPLed.

In coexistence mode, processors running a back-level TPF 4.1 system continue to access the old records. Once migration is completed and there is no requirement to run a back-level processor, the #CB8HD records are removed from the TPF 4.1 system.

MPIF Path Definition Record

The path definition record is currently maintained in processor shared #PDREC records. The first two of these records, ordinals 0 and 1, hold shared information about the processors while the remaining ordinals are assigned to unique processors in order. The 32-way loosely coupled processors increase both the number of processor unique records required and the possible number of path combinations between processors.

Because most of the data is processor unique and to ease migration, the processor unique information has been moved to a new record type, #PDREU. The processor shared information remains in ordinals 0 and 1 of the #PDREC records. When an existing processor is IPLed for the first time with 32-way loosely coupled processor support, the processor unique data for that processor is migrated from the #PDREC record type to the #PDREU record type. When a new processor is added to the loosely coupled complex, the operator is prompted to enter the ZMPIF PDR INIT command during TPF 4.1 system restart. This command will initialize the #PDREU data for the new processor.

In coexistence mode, processors running a back-level TPF 4.1 system continue to access the old records. Once migration is completed, #PDREC ordinals 2 and 3 are used for future expansion of processor shared information and ordinals 4 and higher should be removed from the TPF 4.1 system.

INETD Configuration File (IDCF)

The IDCF currently uses four #IBMM4 fixed file records, ordinals 158 – 161. With 32-way loosely coupled processors, each processor would be limited to three entries in the table. This is too few and, with the amount of expansion required, record type #IDCF1 was created to hold this information.

The first time a ZINET command is entered that accesses the #IDCF1 record type, the data is moved from the old records to the new record type. Subsequently, any processor that is IPLed with 32-way loosely coupled processor support will access the new IDCF record type.

In coexistence mode, processors running a back-level TPF 4.1 system continue to access the old records. Once migration is completed, the #IBMM4 records that contain the old IDCF information can be set to zero to avoid future error conversions.

CLAW Device Table (CDT) and TCP/IP Configuration Table (ITCPC)

The CDT currently uses eight #IBMM4 fixed file records (ordinals 109 – 116) that are indexed by processor ordinal, and the ITCPC uses eight #IBMM4 fixed file records (ordinals 150 – 157) that are indexed by processor ordinal. With 32-way loosely coupled processors, these tables have been moved to #IBMMP4 processor unique records.

If CLAW support and TCP/IP support are defined in the TPF 4.1 system, the CDT and ITCPC records are moved to the #IBMMP4 records the first time an existing processor is IPLed with 32-way loosely coupled processor support. For a new processor being added to the loosely coupled complex, the CDT and ITCPC records are initialized the first time the TPF 4.1 system is IPLed.

In coexistence mode, processors running a TPF 4.1 system without 32-way loosely coupled processor support continue to access the CDT and ITCPC in the #IBMM4 records.

RCAT Initialization (RCIT) Record

The current RCIT record has a 1-byte field, RC1FLD, that is used as a switch to determine if a processor needs to do a fresh load of the routing control application table (RCAT). With 32-way loosely coupled processor support, this field has been moved to the end of the RCIT record and expanded to 4 bytes so that it can support 32-way loosely coupled processors.

Node Control Block (NCB)

The current NCB uses a 1-byte bit mask to represent processors. With 32-way loosely coupled processor support, this field has been expanded to 4 bytes using reserved space in the record. Because of the large number of entries, the NCBs will be migrated as they are used and the TPF 4.1 system will update both fields.

SNA Dynamic Resource Definition

Currently there are six 1-byte bit masks used to represent processors. With 32-way loosely coupled processor support, these fields have been expanded to 4 bytes each using reserved space in the record. Four of the masks (DLRIND5, DLRIND6, DLRIND7, and DRLFLBK) have been expanded in place; two others (DLRIND2 and DLRPREV) have been moved to an area in the record with available space.

Keypoint I (CTKI)

CTKI currently maintains a table of cycle indicators called a subsystem state table (SST) at tag IC0SST. This table is defined by data macro CN1ST. To expand this table to support 32-way loosely coupled processors, the data has been moved to FACE fixed file record type #CN1ST, with 64 ordinals. Segment CYYF has been created, similar to CYYA and CYYM, to handle file input and output for the new records. When the loosely coupled complex is operating in coexistence mode, segment CYYF supports access to the old subsystem state table in CTKI by processors with 32-way loosely coupled processor support installed by accessing the data in CTKI and reformatting it so that it appears to be in 32-way loosely coupled format.

Keypoint C (CTKC)

CTKC maintains a table of terminals used in the TPF complex. To expand this table for 32-way loosely coupled processors, the CK8KE macro and the data in CTKC have been expanded. Segments CYYK and CYYL have been added and are called by segments CYYA and CYYM to handle file input and output for CTKC. When the loosely coupled complex is operating in coexistence mode, CTKC (including the

CK8KE macro) is loaded in main storage and formatted to 32-way loosely coupled format. CTKC and CK8KE are formatted back to 8-way loosely coupled format before being filed.

General File

General file support currently uses one ordinal from the #IBMM4 record type for each processor in the TPF complex to hold the associated general file control record (GFCR). #IBMM4 records, ordinal numbers 101 – 108, are used to support the current maximum 8-way loosely coupled complex. With 32-way loosely coupled processor support, the GFCR is allocated as a single ordinal number (29) in processor unique record type #IBMMP4.

Migration to the #IBMMP4 processor unique record type occurs during general file restart. Each processor migrates or initializes only its own records. General file restart does the following:

1. If keypoint B is loaded and indicates that the GFCR should be loaded from premounts, the GFCR in the #IBMMP4 record is initialized from the premount record in segment CVZD.
2. If the GFCR was not initialized from the premount record and a record ID (RID) or record control check (RCC) error occurs while attempting to access the GFCR in the #IBMMP4 record, general file restart copies the GFCR information from the GFCR in the #IBMM4 records to the #IBMMP4 record type.
3. If a new processor is added to the loosely coupled complex with 32-way loosely coupled processor support, general file restart initializes the GFCR in the #IBMMP4 record type using premount information in segment CV2D.

The GFCR information in the #IBMM4 records is not changed.

General Data Set (GDS)

GDS support currently uses ordinal numbers from processor shared fixed record type #DSCRI for restart control records (RCRs). The logical ordinal number mapping for a processor is based on the assignment of every eighth ordinal because a maximum of eight processors are allowed. With 32-way loosely coupled processor support, the general data set RCRs are allocated to processor unique record type #DSCRU.

Migration to the #DSCRU processor unique record type occurs during GDS restart. Each processor migrates or initializes only its own records. GDS restart does the following:

1. If the RCC has a value of X'FE', the RCRs are initialized in the #DSCRU records from the premount information in segments CVZE and CVZF.
2. If the RCRs were not initialized from the premount information and the processor being IPLed is an existing processor, the #DSCRI records for that processor are copied to the #DSCRU records type.
3. If the TPF 4.1 system is unable to read the RCR in the first #DSCRI record or if this is a new processor with 32-way loosely coupled processor support being added to the loosely coupled complex, the premount information in segments CVZE and CVZF is used to initialize the #DSCRU records.

The RCR information in the #DSCRI records is not changed.

Interprocessor Communications (IPC)

IPC uses an 8-bit mask to represent the processors in the loosely coupled complex. To support 32-way loosely coupled processors, IPC has been extended to use the list facility originally implemented for the internal event facility (IEF).

The list facility allows an IPC transmission to specify the following processor groupings as a destination:

- Single processors
- All active processors
- Any subset of active processors.

Keypoint Accessing

32-way loosely coupled processor support for keypoint accessing addresses the following three areas:

Keypoint Ordinals

The keypoint ordinal table (CX0KPO) is expanded in place to support the additional processors. Equates CXPR0 – CXPR7 are removed, with equate SAMXPRO replacing the function of the CXPR7 equate.

Keypoint Status

The status table for keypoints loaded in the TPF 4.1 system is kept in the keypoint control records located in ordinal 0 of the #KBA and #KSA1 – #KSA8 records, and in #KPTCNTL (#IBMM4 ordinal 54). The status is indexed in the table by keypoint and processor.

To support 32-way loosely coupled processors using the same records, the table entry size has been reduced to 16 bytes and indexing into the table has been changed to use the keypoint ordinal in CX0KPO.

During coexistence, the record retriever function converts the status table to its new format when reading from file. When all processors are using 32-way loosely coupled processor support, use the ZMIGR command to convert the table to the new format on file. See *TPF Operations* for more information about the ZMIGR command.

#KEYPT

Because the location of keypoint fallback extents depends on the number of processors that are defined, there are problems with existing valid keypoint fallback extents when new processors are added to the TPF complex. Additionally, the records defined by #KEYPT to store the copies cannot be relocated because they may be followed by other record types that cannot be relocated.

To resolve these problems, keypoint fallback extents have been moved to their own record type, #KFBX0 – #KFBX nnn . To allow expansion as new processors are added to the TPF complex, a keypoint pointer record has been created in ordinal 0 for #KEYPT ordinals #KFBX0 – #KFBX nnn that allows the keypoint to be stored in multiple file extents (multiple RAMFIL statements along with the PRIOR parameter can be used to define these record types).

The new keypoint pointer record is created and updated during TPF 4.1 system restart. The ZKPTR command has been implemented so that you can control how system restart processes the keypoint pointer records if an error occurs. See *TPF Operations* for more information about the ZKPTR command.

Recoup

To save system resources and allow for future expansion, the #SONRPE records that were used for recoup chain chasing are being replaced with processor shared fixed file records #SONRPE x , where x is the ordinal number for the processor for which the record is used.

For a base-only system, the only record required is #SONRPE0. For a loosely coupled complex, each of the first eight processors requires a record. All processors after the first eight do not require a #SONRPEx record. For example, if there are eight processors, the #SONRPEx records that are used are shown in Table 1192.

Table 1192. #SONRPEx Records for an Eight-Processor Loosely Coupled Complex with 32-Way Loosely Coupled Processor Support

Processor ID	Processor Ordinal	#SONRPEx Used
B	0	#SONRPE0
C	1	#SONRPE1
D	2	#SONRPE2
E	3	#SONRPE3
F	4	#SONRPE4
G	5	#SONRPE5
Z	6	#SONRPE6
0	7	#SONRPE7

To handle the additional processors in a 32-way loosely coupled complex, the number of #FC33 fixed file records is increased from 65 to 257. The @@BUSED field, which contains bit maps used to track use of #FC33 records, has been replaced by the @@BUSED32 field, which supports 32 processors..

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1193 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1193. Changes to Build Scripts for 32-Way Loosely Coupled Processor Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CIKFBS	DLM	New	Keypoint control record conversion utility for 32-way loosely coupled processor support.
CIKZBS	DLM	New	Adds the KEYPOINT parameter to the ZMIGR command for 32-way loosely coupled processor support.
CVZ5BS	DLM	New	Read and validate keypoint pointer record for 32-way loosely coupled processor support.
CVZ6BS	DLM	New	System restart keypoint pointer record validation and update for 32-way loosely coupled processor support.
CVZ7BS	DLM	New	Provides the ZKPTR command for 32-way loosely coupled processor support.

Table 1193. Changes to Build Scripts for 32-Way Loosely Coupled Processor Support (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CVZ8BS	DLM	New	Builds the keypoint pointer record extent table for 32-way loosely coupled processor support.

Dynamic Load Module (DLM) Stubs: Table 1194 summarizes changes to the dynamic load module (DLM) stubs. This information is presented in alphabetic order by the name of the DLM stub. See *TPF Application Programming* for more information about the DLM stubs.

Table 1194. Changes to Dynamic Load Module (DLM) Stubs for 32-Way Loosely Coupled Processor Support

Name of DLM Stub	New or No Longer Supported?
CIKF	New
CVZ4	New
CVZ5	New
CVZ8	New

General Use C/C++ Language Header Files: Table 1195 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1195. Changes to General Use C/C++ Language Header Files for 32-Way Loosely Coupled Processor Support

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$cf1v.h	Not Changed	Yes	User-defined segments that reference c\$cf1v.h.
c\$cx0ck.h	Changed	Yes	Programs included in Table 1208 on page 1193.
c\$fb00.h	Changed	Yes	FTBD00, FTSP03, FTVA01.
c\$fer0.h	Changed	No	Not Applicable.
c\$fva0.h	Changed	Yes	Programs included in Table 1208 on page 1193.
c\$ic0ck.h	Changed	Yes	User-defined segments only.
c\$idskpt.h	Changed	Yes	Programs included in Table 1208 on page 1193.
c\$pi1dt.h	Changed	Yes	User-defined segments only.
c\$si3ct.h	Changed	Yes	User-defined segments that reference SI3DEST and programs included in Table 1208 on page 1193.
c\$syseq.h	Changed	Yes	Programs included in Table 1208 on page 1193.
c\$tg1b.h	Changed	Yes	User-defined segments that reference c\$tg1b.h, segments in Table 1208 on page 1193, and CFL5, CFL6, CFL7, CFLE, CLM8LK. Link-edit DLMs CFL5, CFL6, CFLE, and CLM8.

Table 1195. Changes to General Use C/C++ Language Header Files for 32-Way Loosely Coupled Processor Support (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
c\$vfac.h	Not Changed	Yes	User-defined segments that reference c\$vfac.h.
sysapi.h	Changed	Yes	User-defined segments only.
tpfapi.h	Changed	Yes	User-defined segments only.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1196 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1196. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for 32-Way Loosely Coupled Processor Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
i\$dlok.h	Changed	No	Not Applicable
i\$kpitr.h	New	No	Not Applicable.
i\$mqrt.h	Changed	Yes	CMQCKP, CMQGRU, CMQRCV, CMQMRRM, CMQXRM.
i\$netd.h	Changed	Yes	CINET1, CINET3, CINET4, CINET5, CINET6, CINET7, CINET8, CINETA, CINETN, and programs included in Table 1208 on page 1193.
i\$tmcr.h	Changed	Yes	CL15, CXPRCV, CXQRCV.
zimag.h	Changed	Yes	Programs included in Table 1208 on page 1193.
zimageq.h	Changed	Yes	Programs included in Table 1208 on page 1193.
zimagmsg.h	Changed	Yes	CIMO, CIMP, CIMQ, CIMU and programs included in Table 1208 on page 1193.
ztpld.h	Changed	Yes	CIL0, CIL1, CIL2, CIL3, CIL4, CIL5, CIL6, CIL7, CILA, CILB, CILD, CILF, CILO, CILX.

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1197 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1197. Changes to Link-Edited Modules for 32-Way Loosely Coupled Processor Support

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CDCP	Not Changed	References equate macro file TPFGLB.
CDNF	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CFL5	Not Changed	References C header file c\$tg1b.h.
CFL6	Not Changed	References C header file c\$tg1b.h.

Table 1197. Changes to Link-Edited Modules for 32-Way Loosely Coupled Processor Support (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CFLE	Not Changed	References C header file c\$tblb.h.
CFLK	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CIKB	Not Changed	Changes to ZIMAG command for 32-way loosely coupled processor support.
CIKF	New	Keypoint control record conversion utility for 32-way loosely coupled processor support.
CIKZ	New	Adds the KEYPOINT parameter to the ZMIGR command for 32-way loosely coupled processor support.
CILA	Not Changed	Updates to members for 32-way loosely coupled processor support.
CILB	Not Changed	Updates to members for 32-way loosely coupled processor support.
CILO	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CIMA	Not Changed	Updates to members for 32-way loosely coupled processor support.
CIMN	Not Changed	Updates to members for 32-way loosely coupled processor support.
CIMU	Not Changed	Updates to members for 32-way loosely coupled processor support.
CL15	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CL40	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CL4B	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CLM8	Not Changed	References C header file c\$tblb.h.
CLTW	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CLTX	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CLTZ	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CMQM	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CMQX	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CRPC	Not Changed	Members recompiled because of updates for 32-way loosely coupled processor support.
CTFT	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CTUU	Not Changed	Members CTU1, CTU2, and CTU4 changed for 32-way loosely coupled processor support.
CTXO	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CUIU	Not Changed	Members need to be recompiled because of updates for 32-way loosely coupled processor support.
CVZ5	New	Reads and validates keypoint pointer record for 32-way loosely coupled processor support.
CVZ6	New	System restart validate and update keypoint pointer record for 32-way loosely coupled processor support.

Table 1197. Changes to Link-Edited Modules for 32-Way Loosely Coupled Processor Support (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CVZ7	New	Adds the ZKPTR command for 32-way loosely coupled processor support.
CVZ8	New	Builds the keypoint pointer record extent table for 32-way loosely coupled processor support.

Members: Table 1198 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1198. Changes to Members for 32-Way Loosely Coupled Processor Support

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CCOMIC	CTAL	LLM	Changed	C Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CDNSSC	CDNC	DLM	Changed	C Language	Updated IPC base support and user level for 32-way loosely coupled processor support.
CEL5	CEL5	DLM	Changed	C Language	Updated for PIDT mask usage changes.
CFDSC	CFLY	DLM	Changed	C Language	Updated for PIDT mask usage changes.
CFLW	CFLK	DLM	Changed	Assembler	Updated IPC base support and user level for 32-way loosely coupled processor support.
CGENLC	CTAL	LLM	Changed	Assembler	Changes to the <code>tpf_genlc</code> function.
CIKA	CIMA	DLM	Changed	C Language	Make keypoint control items keypoint ordinal indexed and split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records.
CIKB	CIKB	DLM	Changed	C Language	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records.
CIKF	CIKF	DLM	New	C Language	Keypoint control record conversion utility for 32-way loosely coupled processor support.
CIKZ	CIKZ	DLM	New	C Language	Added support for the KEYPOINT parameter of the ZMIGR command.
CIL0	CILA	DLM	Changed	C Language	Use the SAMXPRO equate value for the maximum number of processors and make keypoint control items keypoint ordinal indexed.
CIL5	CILA	DLM	Changed	C Language	Make keypoint control items keypoint ordinal indexed; and convert keypoint control record to 32-way loosely coupled format when read, and back to the previous format when filed.

Table 1198. Changes to Members for 32-Way Loosely Coupled Processor Support (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CILB	CILB	DLM	Changed	C Language	Make keypoint control items keypoint ordinal indexed and add a new message.
CIMN	CIMN	DLM	Changed	C Language	Convert keypoint control record to 32-way loosely coupled format when read, and back to the previous format when filed.
CIMO	CIMA	DLM	Changed	C Language	Use the SAMXPRO equate value for the maximum number of processors, and split #KEYPT support between #KEYPT and #KFBXn fixed file records.
CIMQ	CIMA	DLM	Changed	C Language	Use the SAMXPRO equate value for the maximum number of processors, and split #KEYPT support between #KEYPT and #KFBXn fixed file records.
CIMT	CIMA	DLM	Changed	C Language	Use the SAMXPRO equate value for the maximum number of processors, make keypoint control items keypoint ordinal indexed, and split #KEYPT support between #KEYPT and #KFBXn fixed file records.
CINET2	CDNS, CLTV, CLTY, CMAT	DLM	Changed	C Language	New Internet daemon (INETD) record type.
CL12	CL12	DLM	Changed	C Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CL13	CL13	DLM	Changed	C Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CL14	CL14	DLM	Changed	C Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CL16	CL16	DLM	Changed	C Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CL40	CL40	DLM	Changed	C Language	Removed check on HALF_MEG for base only path.
CL42	CL42	DLM	Changed	C Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CL4A	CL40	DLM	Changed	C Language	Added merged file address table full to deadlock detection and replaced hardcoded '8' processors with TPFGLB equate SAMXPRO.
CL4B	CL4B	DLM	Changed	C Language	Replace hardcoded '8' processors with TPFGLB equate SAMXPRO.
CL4D	CL40	DLM	Changed	C Language	Added merged file address table full to deadlock detection.
CLCC	CLCC	DLM	Changed	C Language	New Common Link Access to Workstation (CLAW) record type.
CLCD	CLCD	DLM	Changed	C Language	New CLAW record type.
CLTR	CLTR	DLM	Changed	C Language	New CLAW record type.

Table 1198. Changes to Members for 32-Way Loosely Coupled Processor Support (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CLTU	CLTN	DLM	Changed	C Language	New CLAW record type.
CMQRM	CMQS	DLL	Changed	C++ Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CSIPCC	CTAL	LLM	Changed	Assembler	Updated to support 32-way loosely coupled processors.
CTU1	CTUU	DLM	Changed	C Language	Updated for 32-way loosely coupled processor support.
CTU2	CTUU	DLM	Changed	C Language	Updated for 32-way loosely coupled processor support.
CTU4	CTUU	DLM	Changed	C Language	Updated for 32-way loosely coupled processor support.
CVZ5	CVZ5	DLM	New	C Language	Read and validate keypoint pointer record.
CVZ6	CVZ6	DLM	New	C Language	Validate and update keypoint pointer record during system restart.
CVZ7	CVZ7	DLM	New	C Language	Adds support for the ZKPTR command.
CVZ8	CVZ8	DLM	New	C Language	Builds the keypoint pointer record extent table.
CVZ9	CVZ8	DLM	New	Assembler	Gets DASD constants for the keypoint record build extent table function.
CXACMT	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXAEND	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXAPRP	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXARCV	CTAL	LLM	Changed	C Language	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CXARLB	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXASTR	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXPCMT	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXPRLB	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXQCMT	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXQPRP	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.
CXQRLB	CTAL	LLM	Changed	Assembler	Updated to point to 32-way loosely coupled processor table.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

I

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1199 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1199. Changes to Copy Members for 32-Way Loosely Coupled Processor Support

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CDC1	CP	Changed	CCDCOL	CPS0	Control Program	Updated for changes to the SIPCC macro interface.
CICR	CP	Changed	CCNUCL	CPS0	Control Program	Changes to comments only.
CICS	CP	Changed	CCNUCL	CPS0	Control Program	Updated for 32-way loosely coupled processor support.
CIEF	CP	Changed	CCCIEF	CPS0	Control Program	Changes to the GENLC macro.
CJ341	Real-Time Assembler	Changed	CJ005	CJ00	LLM	Changes to interprocessor communications (IPC) user level.
CL10	CP	Changed	CCTLOG	CPS0	Control Program	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CL20	CP	Changed	CCTLOG	CPS0	Control Program	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CL30	CP	Changed	CCTLOG	CPS0	Control Program	Use new commit and rollback control table pointer for 32-way loosely coupled processor support.
CNOM	CP	Changed	CCSICF	CPS0	Control Program	Changes to the SIPCC macro.
CNP0	CP	Changed	CCSICF	CPS0	Control Program	Changes to the SIPCC macro.
CNP6	CP	Changed	CCSICF	CPS0	Control Program	Changes to the SIPCC macro.
CT09	CP	Changed	CCCTIN	CPS0	Control Program	Added support for #RLOG9 – 32.
CT41	CP	Changed	CCCTIN	CPS0	Control Program	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records.
IB01	Real-Time Assembler	Changed	IPLB	Not Applicable	Not Applicable	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records, and added new fallback extent support.

Table 1199. Changes to Copy Members for 32-Way Loosely Coupled Processor Support (continued)

Copy Member	Type	New, Changed, or No Longer Supported	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
IB02	Real-Time Assembler	Changed	IPLB	Not Applicable	Not Applicable	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records, added new fallback extent support, and updated for CTKC coexistence.
IB03	Real-Time Assembler	Changed	IPLB	Not Applicable	Not Applicable	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records, and added new fallback extent support.
IB07	Real-Time Assembler	Changed	IPLB	Not Applicable	Not Applicable	Updated for CTKI coexistence.
IBF1	Real-Time Assembler	Changed	IPLB	Not Applicable	Not Applicable	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records, and added new fallback extent support.
IBF2	Real-Time Assembler	Changed	IPLB	Not Applicable	Not Applicable	Updated for PIDT mask usage.

Fixed File Records

Table 1200 summarizes fixed file record changes. This information is presented in alphabetic order by the name of the fixed file record.

Table 1200. Changes to Fixed File Records for 32-Way Loosely Coupled Processor Support

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#BRIDCOR	Changed	Increased required minimum number of ordinals to 256.
#CB8HD	No Longer Supported	Replaced by fixed file record #HDREC.
#CN1ST	New	Expanded subsystem state table (CN1ST) to support 32-way loosely coupled processors.
#DSCRI	No Longer Supported	Replaced by #DSCRU to support 32-way loosely coupled processors.
#DSCRU	New	General data set (GDS) support, replacing #DSCRI.
#HDREC	New	New record to expand multi-processor interconnect facility (MPIF) hardware definition to support 32-way loosely coupled processors.
#IBMMP4	Changed	Increased the required minimum number of ordinals to 100.
#IBMMS	Changed	Increased the minimum number of ordinals to 60.
#IDCF1	New	New record to expand Internet daemon configuration file (IDCF) to support 32-way loosely coupled processors.
#KBA	Changed	Reduced minimum number of ordinals to $(\text{number_of_processor-unique_keypoints} \times \text{number_of_processors}) + \text{number_of_processor-shared_keypoints} + 1$.
#KEYPT	Changed	Changed to allow multiple keypoint fallback extents (more than one on RAMFIL statement).
#KFBX0 – 254	New	New records to support keypoint fallback extents for 32 loosely coupled processors.

Table 1200. Changes to Fixed File Records for 32-Way Loosely Coupled Processor Support (continued)

Fixed File Record	New, Changed, or No Longer Supported?	Description of Change
#KSA1 – #KSA8	Changed	Reduced minimum number of ordinals to $(number_of_processor_unique_keypoints \times number_of_processors) + number_of_processor_shared_keypoints + 1$.
#PDREC	Changed	Reduced minimum number of ordinals to 4.
#PDREU	New	New record to expand MPIF path definition to support 32-way loosely coupled processors.
#RC8RFS	Changed	Increased the minimum number of ordinals from 65 to 257.
#RLOG9 – #RLOG32	New	New commit and rollback logging records for processors 9 – 32.
#SONRPE	No Longer Supported	Replaced by #SONRPE0 – 7 to support 32-way loosely coupled processors.
#SONRPE0 – 7	New	New recoup pseudo directories for processors 0 – 7.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 1201 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1201. Changes to Data Macros for 32-Way Loosely Coupled Processor Support

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
BRPEQ	Changed	Yes	Programs included in Table 1208 on page 1193.
CB8HD	Changed	Yes	Programs included in Table 1208 on page 1193.
CB9PD	Changed	Yes	Programs included in Table 1208 on page 1193.
CK8KE	Changed	Yes	CCNUCL, CCCCP1, CCCTIN, CGT0, CGT1, CIJG, CVAD, CVAU, CVFF, CVFO, CVFP, CVFQ, CVHA, CVHB, CVHC, CVHF, CVHL, CVHY, CVIQ, CVKM, CVKN, CVLA, CVPX, CVP1, CVRN, CWA0, CWBL, CWGM, CWGO, CWGX, CYYE, XLAA, XLDD, XLEF, XLJK.
CN1ST	Changed	Yes	Programs included in Table 1199 on page 1186 and user-defined.

Table 1201. Changes to Data Macros for 32-Way Loosely Coupled Processor Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
CONKC	Changed	Yes	CONK
CR0AT	Changed	Yes	CCCCP1, CCCCCP4, CCCTIN, CCNUCL, CGT0, CGT1, CGT2, CGT4, CGT5, CGT8, CGT9, CIJG, CMID, COUF, CSOR, CTKT, CVPX, CVAD, CVAU, CVFF, CVFO, CVFP, CVFQ, CVHA, CVHB, CVHC, CVHF, CVHL, CVHY, CVIQ, CVKM, CVKN, CVLA, CVP1, CVRN, CWA0, CWBL, CWGM, CWGO, CWGX, CYYE, IPLB, XLAA, XLDD, XLEF, XLJK.
CX0CK	Changed	Yes	Programs included in Table 1208 on page 1193.
DCTIGT	Changed	No	Not Applicable
DCTMGT	Changed	Yes	Programs included in Table 1208 on page 1193.
GENFD	Changed	Yes	Programs included in Table 1208 on page 1193.
GO1GO	Changed	Yes	BAM1, GLBL, GOG1, GOG3, GOG5, GOGO.
I80I8	Changed	Yes	Programs included in Table 1208 on page 1193.
I82I8	Changed	Yes	Programs included in Table 1208 on page 1193.
IB0CT	Changed	Yes	Programs included in Table 1199 on page 1186 and in Table 1208 on page 1193.
IC0CK	Changed	Yes	Programs included in Table 1199 on page 1186 and user-defined.
ICFLV	Not Changed	Yes	User-defined programs that reference data macro ICFLV.

Table 1201. Changes to Data Macros for 32-Way Loosely Coupled Processor Support (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
ICRCT	Changed	Yes	CCTLOG, CDCR, CL26, CL99, CLH0, CLH2, CTMCCR, CTMPRP, CXACMT, CXAEND, CXAPRP, CXARLB, CXASTR, CXPCMT, CXPRCV, CXPRLB, CXQCMT, CXQPRP, CXQRCV, CXQRLB, IPLB, JCD4, JCS0.
IDSDLR	Changed	Yes	Programs included in Table 1208 on page 1193.
IDSKPT	Changed	No	Not Applicable.
IDSSST	Changed	No	Not Applicable.
IKPTR	New	No	Not Applicable.
LDCRL	Changed	Yes	ACPL and ALDR
NC0CB	Changed	Yes	Programs included in Table 1208 on page 1193.
PI1DT	Changed	Yes	Programs included in Table 1199 on page 1186 and user-defined.
RC1IT	Changed	Yes	CONN
RECOUP	Changed	Yes	Programs included in Table 1199 on page 1186 and user-defined.
SI3CT	Changed	Yes	Programs included in Table 1199 on page 1186 and user-defined.
SI4CT	Changed	No	Not Applicable.
ST0TB	Changed	Yes	OSTGIP, OSTGOT, OSTGP2, OSTGRT, OSTGUP.
VF0AC	Not Changed	Yes	User-defined programs that reference data macro VF0AC.

General Macros: Table 1202 summarizes the general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 1202. Changes to General Macros for 32-Way Loosely Coupled Processor Support

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
GENLC	Changed	No	Not Applicable.

Selected Equate Macros: Table 1203 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1203. Changes to Selected Equate Macros for 32-Way Loosely Coupled Processor Support

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
CFMDC	Changed	Yes	ICDF, STPP.
CPSEQ	Changed	No	Not Applicable.
CZ1SE	Changed	No	Not Applicable.
CZ3CP	Changed	No	Not Applicable.
SYSEQ	Changed	No	Not Applicable.
TPFGLB	Changed	Yes	User-defined programs that use TPFGLB or data macros ICFLV or VF0AC, programs included in Table 1208 on page 1193, and B0SH, BOFH, BRSH, BXAT, CCCTIN, CCDBAF, CCFADC, CCNUCL, CCRCS, CCSONS, CCTLOG, CCVAGE, CCVFAC, CDCR, CLMK, CLML, CLMN, CORB, CPAA, CTKR, CTKT, CVF2, CVF4, CVF7, CVF8, CVF9, CVFS, CVFX, CZXM, IPLB, JCF0, JCS0. Link-edit DLM CDCP.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1204 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1204. Changes to SIP Skeleton and Internal Macros for 32-Way Loosely Coupled Processor Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
GENC	Changed
GEND	Changed
GENR	Changed
SKANTD	Changed
SKCTKC	Changed
SKCTKI	Changed
SKCTKX	Changed
SKGLB	Changed
SKRCIT	Changed

Table 1204. Changes to SIP Skeleton and Internal Macros for 32-Way Loosely Coupled Processor Support (continued)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SKSET	Changed
SPERR	Changed
SPERRG	Changed

System Initialization Program (SIP) Stage I Macros and Statements:

Table 1205 summarizes system initialization program (SIP) Stage I macro and statement changes. This information is presented in alphabetic order by the name of the SIP Stage I macro. See *TPF System Generation* for a complete description of the SIP Stage I macros. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck

See “System Initialization Program (SIP) and System Generation Changes” on page 696 for a description of other system generation changes you must make.

Table 1205. Changes to SIP Stage I Macros and Statements for 32-Way Loosely Coupled Processor Support

SIP Stage I Macro	New, Changed, or No Longer Supported?
CONFIG	Changed
CRASTB	Changed
GENSIP	Changed
RAM	Changed
SPCPU	Changed
SPGLB	Changed
SPPGML	Changed
SPREPT	Changed

System Initialization Program (SIP) Stage II Macros: Table 1206 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1206. Changes to SIP Stage II Macros for 32-Way Loosely Coupled Processor Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: Table 1207 on page 1193 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 1207. Changes to System Macros for 32-Way Loosely Coupled Processor Support

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
SIPCC	Changed	Yes	User-defined programs only.

System Macros (IBM Use Only): There are no changes.

Segments

Table 1208 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
ACPL	Offline Assembler	Not Applicable	Changed	Make keypoint control items keypoint ordinal indexed; and convert keypoint control records to 32-way loosely coupled format when read, and back to the previous format when filed. Split #KEYPT support between #KEYPT and #KFBXn fixed file records.
B0BK	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
B0P0	Real-Time Assembler	Not Applicable	Changed	Added restriction on Recoup and updated for changes to SIPCC macro interface.
B0P3	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
B0P5	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
B0PE	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
B1A0	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the @@BUSED field in the RECOUP DSECT and changes to SIPCC macro interface.
B1A4	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the @@BUSED field in the RECOUP DSECT.
B1BK	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
BAM0	Real-Time Assembler	Not Applicable	Changed	Updated maximum processor value.
BAM1	Real-Time Assembler	Not Applicable	Changed	Updated for 32-way loosely coupled globals format.
BCPE	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the @@BUSED field in the RECOUP DSECT.
BCPU	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the 1052 FC33 record.
BCPY	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed file records.
BCPZ	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed file records.
BDBA	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
BKA0	Real-Time Assembler	Not Applicable	Changed	Updated maximum processor value.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BKP0	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
BKP3	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
BKP4	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
BKP5	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
BKPA	Real-Time Assembler	Not Applicable	Changed	Updated recoup duplicate message sender for 32-way loosely coupled processor support.
BLOG	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the following: <ul style="list-style-type: none"> • @@BUSED field in the RECOUP DSECT • 1052 FC33 record.
BLOH	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the @@BUSED field in the RECOUP DSECT.
BOF0	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the CPU ID in the I82I8 data macro.
BOF3	Real-Time Assembler	Not Applicable	Changed	Updated for changes to #SONRPEX fixed file records.
BOF4	Real-Time Assembler	Not Applicable	Changed	Updated for changes to #SONRPEX fixed file records.
BOF7	Real-Time Assembler	Not Applicable	Changed	Updated for 1052 I8 record.
BOF8	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the CPU ID in the I82I8 data macro.
BOFA	Real-Time Assembler	Not Applicable	Changed	Updated for the following changes: <ul style="list-style-type: none"> • Interprocessor communications (IPC) base support and user level • @@BUSED field in the RECOUP DSECT • 1052 FC33 record • I82I8 data macro CPU ID.
BOFF	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed records.
BPDH	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed records.
BRCP	Real-Time Assembler	Not Applicable	Changed	Updated for the SIPCC macro list interface.
BRCQ	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the 1052 FC33 record.
BRID	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
BRPE	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the @@BUSED field in the RECOUP DSECT.
BRV0	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed records.
BRV1	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed records.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
BRV2	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed records.
BRV3	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed records.
BRV5	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the #SONRPEX fixed records.
BRVT	Real-Time Assembler	Not Applicable	New	Added recoup function to the ZMIGR command.
BRYO	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the @@BUSED field in the RECOUP DSECT.
BRYU	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
BWRT	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
BXA1	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage, changes to the SIPCC macro interface, and changes to #KEYPT and #KFBX <i>n</i> fixed file records.
BXA2	Real-Time Assembler	Not Applicable	Changed	Updated to use CYYF to retrieve #CN1ST fixed record type.
BXAB	Real-Time Assembler	Not Applicable	Changed	Updated to use 32-way loosely coupled processor support.
BXBL	Real-Time Assembler	Not Applicable	Changed	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records.
BXDP	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
BXPC	Real-Time Assembler	Not Applicable	Changed	Updated for 32-way loosely coupled processor support.
BXPR	Real-Time Assembler	Not Applicable	Changed	Updated for 32-way loosely coupled processor support.
C277	Real-Time Assembler	Not Applicable	Changed	Target TPF-C no longer supported for SIPCC.
CBE2	Real-Time Assembler	Not Applicable	Changed	Updated MPIF help message.
CBG2	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBO0	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBO1	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBP0	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBP1	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBP3	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBR0	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBR1	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CBR2	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CBY0	Real-Time Assembler	Not Applicable	Changed	New MPIF record types or expanded data structures.
CDL0	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CDL1	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors and changes to the SIPCC macro interface.
CDL2	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors and changes to the SIPCC macro interface.
CDL3	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors and changes to the SIPCC macro interface.
CDL5	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks and modified communications to support 32-way loosely coupled processors.
CDL6	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks and modified communications to support 32-way loosely coupled processors.
CDL8	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CFL8	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CFL9	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CHEA	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CHKB	Real-Time Assembler	Not Applicable	Changed	Comments were updated for 32-way loosely coupled processors.
CHKR	Real-Time Assembler	Not Applicable	Changed	Comments were updated for 32-way loosely coupled processors.
CHZS	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CJ05	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CL11	Real-Time Assembler	Not Applicable	Changed	Changed to use new commit and rollback pointer for 32-way loosely coupled processor support expanded table and expanded table of system log record FACE-type equates.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CL21	Real-Time Assembler	Not Applicable	Changed	Changed to use new commit and rollback pointer for 32-way loosely coupled processor support expanded table and expanded table of system log record FACE-type equates.
CL22	Real-Time Assembler	Not Applicable	Changed	Expanded table of system log record FACE-type equates for 32-way loosely coupled processors.
CL23	Real-Time Assembler	Not Applicable	Changed	Changed to use new commit and rollback pointer for 32-way loosely coupled processor support expanded table and expanded table of system log record FACE-type equates.
CL24	Real-Time Assembler	Not Applicable	Changed	Changed to use new commit and rollback pointer for 32-way loosely coupled processor support expanded table and expanded table of system log record FACE-type equates.
CL31	Real-Time Assembler	Not Applicable	Changed	Changed to use new commit and rollback pointer for 32-way loosely coupled processor support expanded table.
CLM0	Real-Time Assembler	Not Applicable	Changed	Changed to use new commit and rollback pointer for 32-way loosely coupled processor support expanded table.
CLM1	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CLME	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CLMF	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CLMG	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CLMH	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CLMI	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CLMM	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support and deleted unused save areas.
CLMO	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CLMP	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CLMR	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CLMU	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CMT9	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CMTQ	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CMVS	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CNAC	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level to decrement the active processor count and reset the 32-way loosely coupled processor support flag in PIDT when a processor is deactivated.
CNAE	Real-Time Assembler	Not Applicable	Changed	Added calls to CYYF to access the #CN1ST fixed file record type and updated IPC base support and user level for 32-way loosely coupled processor support.
CNAF	Real-Time Assembler	Not Applicable	Changed	Added calls to CYYF to access the #CN1ST fixed record type.
CNAH	Real-Time Assembler	Not Applicable	Changed	Added calls to CYYF to access the #CN1ST fixed record type and updated for changes to the SIPCC macro interface.
CNAI	Real-Time Assembler	Not Applicable	Changed	Updated to save and restore the registers of the calling routine.
CNAJ	Real-Time Assembler	Not Applicable	Changed	Added calls to CYYF to access the #CN1ST fixed record type and updated for changes to the SIPCC macro interface.
CNAK	Real-Time Assembler	Not Applicable	Changed	Updated comments and changes to the SIPCC macro interface.
CNBA	Real-Time Assembler	Not Applicable	Changed	Updated to support CTKI coexistence for 32-way loosely coupled processor support.
CNON	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CNOP	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CNOQ	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CNOR	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CNPH	Real-Time Assembler	Not Applicable	Changed	Added restriction on PROT.
CNPU	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CNPY	Real-Time Assembler	Not Applicable	Changed	Updated CTKI and PIDT initialization and added calls to CYYF to access the #CN1ST fixed record type.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
COAD	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
COAH	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CONN	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
COTB	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CPAB	Real-Time Assembler	Not Applicable	Changed	Removed 8-way processor constraint in RCS support.
CPAI	Real-Time Assembler	Not Applicable	Changed	Removed 8-way processor constraint in RCS support.
CQAE	Real-Time Assembler	Not Applicable	Changed	Updated clock support for 32-way loosely coupled processors.
CQAL	Real-Time Assembler	Not Applicable	Changed	Updated clock support for 32-way loosely coupled processors.
CQAP	Real-Time Assembler	Not Applicable	Changed	Updated clock support for 32-way loosely coupled processors.
CQAQ	Real-Time Assembler	Not Applicable	Changed	Updated clock support for 32-way loosely coupled processors.
CSA0	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CSA1	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CSA2	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks and modified communications to support 32-way loosely coupled processors.
CSA8	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CSAG	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors and for changes to the SIPCC macro interface.
CSAI	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CSBS	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CSCD	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CSCZ	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CSG0	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CSG9	Real-Time Assembler	Not Applicable	Changed	Expanded 1-byte processor masks to support 32-way loosely coupled processors.
CSS1	Real-Time Assembler	Not Applicable	Changed	Removed 8-way processor constraint in RCS support.
CSS8	Real-Time Assembler	Not Applicable	Changed	Updated to add support for the RCS and IPC.
CTKS	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage, and split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records.
CVAB	Real-Time Assembler	Not Applicable	Changed	Added support for the ZMIGR and ZKPTR commands.
CVAQ	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CVGA	Real-Time Assembler	Not Applicable	Changed	Changed for general data set (GDS) restart control record structure in fixed record type #DSCRU.
CVGH	Real-Time Assembler	Not Applicable	Changed	Changed for GDS restart control record structure in fixed record type #DSCRU.
CVGP	Real-Time Assembler	Not Applicable	Changed	Changed for general file (GF) control record structure in fixed record type #IBMMP4.
CVGR	Real-Time Assembler	Not Applicable	Changed	Changed for GDS restart control record structure in fixed record type #DSCRU.
CVHF	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CVPQ	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CVPR	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CVPX	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CVRM	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CVRN	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CVRQ	Real-Time Assembler	Not Applicable	Changed	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records, and added multiple fallback extent support.
CVUB	Real-Time Assembler	Not Applicable	Changed	Added GF control record migration status messages.
CVZ1	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage, and new fallback extent record type support.
CVZ2	Real-Time Assembler	Not Applicable	Changed	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records, and added multiple fallback extent support.
CVZ4	Real-Time Assembler	Not Applicable	New	Provided support to split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records and map keypoint ordinal to FACE ordinal.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVZB	Real-Time Assembler	Not Applicable	Changed	Added multiple fallback extent support.
CWGO	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CYEP	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CYF1	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CYF3	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CYF8	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CYGN	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CYH0	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CYH3	Real-Time Assembler	Not Applicable	Changed	Updated to use the SAMXPRO equate value for the maximum number of processors.
CYH4	Real-Time Assembler	Not Applicable	Changed	Updated for changes to PIDT mask usage.
CYPR	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CYPS	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
CYTT	Real-Time Assembler	Not Applicable	Changed	Changed for GF control record structure in fixed record type #IBMMP4.
CYYA	Real-Time Assembler	Not Applicable	Changed	Updated to call segment CYYK to file CTKC data.
CYYB	Real-Time Assembler	Not Applicable	Changed	Removed reference to processor equates in CX0CK, and split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records.
CYYD	Real-Time Assembler	Not Applicable	Changed	Split #KEYPT support between #KEYPT and #KFBX <i>n</i> fixed file records.
CYYE	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
CYYF	Real-Time Assembler	Not Applicable	New	Adds find and file services for the #CN1ST fixed record type.
CYYG	Real-Time Assembler	Not Applicable	New	Provides the parser function for the ZMIGR command parameters.
CYYH	Real-Time Assembler	Not Applicable	New	Provides the CTKI function for the ZMIGR command.
CYYJ	Real-Time Assembler	Not Applicable	New	Provides the CTKC function for the ZMIGR command and updated for changes to the SIPCC macro interface.
CYYK	Real-Time Assembler	Not Applicable	New	Reformats CTKC to 8-way loosely coupled format, if necessary, before filing.

Table 1208. Changes to Segments for 32-Way Loosely Coupled Processor Support (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CYYL	Real-Time Assembler	Not Applicable	New	Reformats CTKC to 32-way loosely coupled format, if necessary, before completing the find process.
CYYM	Real-Time Assembler	Not Applicable	Changed	Updated to call segment CYYL to find CTKC data.
CZXD	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
DCR2	Offline Assembler	DCRS	Changed	Removed CPMXCPU equate.
DRD2	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.
DRD4	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the SIPCC macro interface.
DYDE	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the @@BUSED field in RECOUP DSECT.
DYDI	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the 1052 FC33 record.
FTER00	Offline C	FCTBG	Changed	Added support for new fallback extent record types (#KFBXn).
FTGN00	Offline C	FCTBG	Changed	Updated maximum number of processors.
FTVA02	Offline C	FCTBG	Changed	Added support for new fallback extent record types (#KFBXn), and updated RECNO requirements for #KBA and #KSA1 – 8.
FTVA03	Offline C	FCTBG	Changed	Added new INETD and MPIF record types, and added checks for #KFBX0–254 and #RLOG9 – 32.
GOGO	Real-Time Assembler	Not Applicable	Changed	Updated for super GOA support.
IPLA	Offline Assembler	Not Applicable	Changed	Split #KEYPT support between #KEYPT and #KFBXn fixed file records.
JCD6	Real-Time Assembler	Not Applicable	Changed	Updated to use CYYF to retrieve the #CN1ST fixed record type.
OSTGRT	Offline Assembler	OSTG	Changed	Updated for 32-way loosely coupled processor support.
STPP	Offline Assembler	PPCP	Not Changed	Reassembled to include changes to data macro CFMDC.
TLDR	Offline Assembler	TPFLDR	Changed	Expanded the CPU ID table for 32-way loosely coupled processor support.
XHA3	Real-Time Assembler	Not Applicable	Changed	Updated to allow 32 processors to share the message switching queues.
XLPP	Real-Time Assembler	Not Applicable	Changed	Updated IPC base support and user level for 32-way loosely coupled processor support.

System Equates

The following section summarizes system equate changes.

SYSEQ Tags: Table 1209 on page 1203 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 1209. Changes to SYSEQ Tags for 32-Way Loosely Coupled Processor Support

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?
#CRCRP8 – 31	171 – 194	New
#ICHUTLZ	93	New
#INETDCF_OLD	158	New
#MPIF_MIG1	169	New
#MPIF_MIG2	170	New
#RCPGLB	X'1B' – X'39'	Changed
#TCPICDT	59	New
#TCPIPCT	58	Changed
#TCPIPCT_OLD	150	New

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1210 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1210. Changes to Commands for 32-Way Loosely Coupled Processor Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZCLAW	Changed	Documentation-only change to identify restrictions on using the command in a loosely coupled complex, which includes processors with and without 32-way loosely coupled processor support.
ZINET ADD	Changed	Documentation-only change to identify restrictions on using the command in a loosely coupled complex, which includes processors with and without 32-way loosely coupled processor support.
ZINET ALTER	Changed	Documentation-only change to identify restrictions on using the command in a loosely coupled complex, which includes processors with and without 32-way loosely coupled processor support.
ZINET DELETE	Changed	Documentation-only change to identify restrictions on using the command in a loosely coupled complex, which includes processors with and without 32-way loosely coupled processor support.
ZKPTR	New	Provides support for updating keypoint pointer records during system restart and for displaying keypoint pointer records.
ZMIGR	New	Provides support for migration to 32-way loosely coupled processor support.

Table 1210. Changes to Commands for 32-Way Loosely Coupled Processor Support (continued)

Command	New, Changed, or No Longer Supported?	Description of Change
ZMPIF	Changed	Added the ALL subparameter to the PDF INIT parameter option and documentation change to identify restrictions on using the command in a loosely coupled complex, which includes processors with and without 32-way loosely coupled processor support.

Messages and System Errors

Table 1211 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1211. Changes to Messages and System Errors for 32-Way Loosely Coupled Processor Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
000074	System Error	Changed
0000EE	System Error	Changed
000296	System Error	New
000297	System Error	New
000298	System Error	New
005100	System Error	New
005101	System Error	New
005102	System Error	New
005103	System Error	New
005104	System Error	New
005105	System Error	New
005106	System Error	New
005107	System Error	New
005108	System Error	New
005109	System Error	New
00510A	System Error	New
00510B	System Error	New
00510C	System Error	New
006543	System Error	New
007701	System Error	Changed
00C13D	System Error	New
ACPL0104E	Online	New
ACPL0105W	Online	New

Table 1211. Changes to Messages and System Errors for 32-Way Loosely Coupled Processor Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
ACPL0106E	Online	New
ACPL0107W	Online	New
B0P00006E	Online	New
BOF80003I	Online	No Longer Supported
BOF80008I	Online	New
BRV30005E	Online	No Longer Supported
BRV30006E	Online	No Longer Supported
BRV30008E	Online	No Longer Supported
BRV30009E	Online	No Longer Supported
BRV30014E	Online	New
BRV30015E	Online	New
BRV30016E	Online	New
BRV30017E	Online	New
BRV50005E	Online	No Longer Supported
BRV50006E	Online	No Longer Supported
BRV50008E	Online	No Longer Supported
BRV50009E	Online	No Longer Supported
BRV50016E	Online	New
BRV50017E	Online	New
BRV50018E	Online	New
BRV50019E	Online	New
CBG20051I	Online	New
CBG20052I	Online	New
CBG20053I	Online	New
CBG20054I	Online	New
CBR10001E	Online	Changed
CBR10002E	Online	Changed
CBR10003I	Online	New
CBR10004I	Online	New
CBY00040E	Online	Changed
CBY00050E	Online	Changed
CBY00060E	Online	Changed
CLAW0001I	Online	Changed
CLAW0054I	Online	New
CLAW0055I	Online	New
CLTR0001I	Online	Changed
CLTR0006I	Online	New
CVRQ0001I	Online	No Longer Supported
CVRQ0003I	Online	New
CVZ10002I	Online	New
CVZ10003E	Online	New
CVZ10004E	Online	New
CVZ60001A	Online	New

Table 1211. Changes to Messages and System Errors for 32-Way Loosely Coupled Processor Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
CVZ60002A	Online	New
CVZ60003E	Online	New
CVZ60004I	Online	New
CVZ60005W	Online	New
CVZ60006T	Online	New
DSMG0070E	Online	Changed
DSMG0072E	Online	Changed
DSMG0080E	Online	Changed
DSMG0081E	Online	Changed
DSMG0090E	Online	Changed
DSMG0095E	Online	New
DSMG0096I	Online	New
DSMG0099E	Online	New
DSMG0172E	Online	Changed
FCTB0106I	Offline	Changed
FCTB0122E	Offline	New
FCTB0123W	Offline	New
FMN0015I	Online	New
FMN0017E	Online	New
FMNT0018E	Online	New
IMAG0011I	Online	No Longer Supported
IMAG0021I	Online	No Longer Supported
IMAG0211I	Online	New
IMAG0221I	Online	New
INET0020I	Online	New
IPLA0050E	Online	Changed
IPLA0055W	Online	New
IPLA0056T	Online	New
IPLB0003T	Online	New
IPLB0008T	Online	New
IPLB0009T	Online	New
IPLB0013E	Online	New
IPLB0018W	Online	New
KPTR0001I	Online	New
KPTR0002T	Online	New
KPTR0003I	Online	New
KPTR0004E	Online	New
KPTR0005I	Online	New
KPTR0006E	Online	New
KPTR0007E	Online	New
KPTR0010I	Online	New
KPTR0020I	Online	New
KPTR0030I	Online	New

Table 1211. Changes to Messages and System Errors for 32-Way Loosely Coupled Processor Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MIGR0001I	Online	New
MIGR0002I	Online	New
MIGR0003I	Online	New
MIGR0004I	Online	New
MIGR0005T	Online	New
MIGR0006T	Online	New
MIGR0007W	Online	New
MIGR0008T	Online	New
MIGR0009I	Online	New
MIGR0010I	Online	New
MIGR0011I	Online	New
MIGR0012T	Online	New
MIGR0013I	Online	New
MIGR0014I	Online	New
MIGR0015T	Online	New
MIGR0016I	Online	New
MIGR0017T	Online	New
MIGR0018T	Online	New
MIGR0019I	Online	New
MIGR0020T	Online	New
MIGR0021I	Online	New
MIGR0022W	Online	New
MIGR0023E	Online	New
MIGR0025T	Online	New
MIGR0030I	Online	New
MIGR0031I	Online	New
MIGR0032I	Online	New
MIGR0033I	Online	New
MIGR0034E	Online	New
MIGR0035E	Online	New
MIGR0036I	Online	New
MIGR0037E	Online	New
MIGR0038E	Online	New
MIGR0039E	Online	New
MIGR0040I	Online	New
MIGR0041I	Online	New
MIGR0042I	Online	New
MIGR0043I	Online	New
MIGR0044E	Online	New
MIGR0045E	Online	New
MPIF0038E	Online	Changed
MPIF0054A	Online	Changed
MPIF0064E	Online	Changed

Table 1211. Changes to Messages and System Errors for 32-Way Loosely Coupled Processor Support (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MPIF0079A	Online	Changed
PMIG0015E	Online	New
PROT0058E	Online	New
TPLD0125E	Online	New
TPLD0126E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1212 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1212. Changes to TPF Publications for 32-Way Loosely Coupled Processor Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0F	Updated with changes to the sipcc and tpf_genlc functions for 32-way loosely coupled processor support.
<i>TPF Concepts and Structures</i>	GTPCON0C	Updated for 32-way loosely coupled processor support.
<i>TPF Database Reference</i>	GTPDDBR0D	Updated keypoint equates for 32-way loosely coupled processor support.
<i>TPF General Macros</i>	GTPGEN0E	Updated the GENLC macro for 32-way loosely coupled processor support.
<i>TPF Main Supervisor Reference</i>	GTPMSR08	Updated with CTKI changes for 32-way loosely coupled processor support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for 32-way loosely coupled processor support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG205	Updated with migration considerations for 32-way loosely coupled processor support.
<i>TPF Operations</i>	GTPOPR0F	Updated with information about the commands that were added and changed for 32-way loosely coupled processor support.
<i>TPF System Generation</i>	GTPSYG0F	Updated macro record types for 32-way loosely coupled processor support.

Table 1212. Changes to TPF Publications for 32-Way Loosely Coupled Processor Support (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF System Installation Support Reference</i>	GTPINR0F	Updated macro record types for 32-way loosely coupled processor support.
<i>TPF System Macros</i>	GTPSYS0F	Updated the SIPCC macro for 32-way loosely coupled processor support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0B	Updated the Internet daemon (INETD) and CLAW device table (CDT) for 32-way loosely coupled processor support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

The following macros and functions have been enhanced:

- GENLC: added an option to this general macro to include inactive processors in event lists.
- tpf_genlc: added an option to this C/C++ function to include inactive processors in event lists.
- SIPCC: added support to this system macro for specifying a list of processors as interprocessor communications (IPC) destinations.
- sipcc: added support to this C/C++ function for specifying a list of processors as IPC destinations.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Before you begin your migration to 32-way loosely coupled processor support, read “Functional Overview” on page 1168 and “Architecture” on page 1174, paying particular attention to “Coexistence” on page 1170 and “Migration and Fallback” on page 1171.

To Migrate Your Complex to 32-Way Loosely Coupled Processor Support

Before You Begin

- If you need to fall back to the previous level of support during the installation and migration to 32-way loosely coupled processor support, follow the procedure in “Falling Back from 32-Way Loosely Coupled Processor Support” on page 1214.
- You need to examine the code, make the necessary modification, reassemble or recompile, and link-edit any application that uses the following functions:
 - Interprocessor communication (IPC)
 - IC0CK (c\$ic0ck.h)
 - CN1ST
 - PI1DT (c\$pi1dt.h).

See “Coexistence” on page 1170 and “Migration and Fallback” on page 1171 for more information about modifications to your applications required by 32-way loosely coupled processor support.

Note: 32-way loosely coupled processor support must be installed on the processor that is used to assemble, compile, or link-edit applications modified to run in a loosely coupled complex with more than eight processors.

1. Install PUT 15, which contains APAR PJ27785 for 32-way loosely coupled processor support, on your TPF 4.1 system.
2. Update the data record information library (DRIL) with the global storage allocation record fields:
 - GO2DSP
 - GO2CEC
 - GO2CID
 - GO2IID
 - GO2IS.

See the GO1GO data macro for more information about the global fields and see *TPF Program Development Support Reference* for more information about DRIL.

3. Update the SIP RAMFIL macro input statements to the FACE table generator (FCTBG):
 - Add RAMFIL statements, specifying the following new record types in the RECID parameter:
 - #CN1ST
 - #DSCRU
 - #HDREC
 - #IDCF1
 - #KFBXnnn
 - #PDREU
 - #SONRPEx.
 - Modify the RAMFIL statements for the following fixed file record types:
 - #BRIDCOR

- #IBMMP4
- #IBMMS
- #KBA
- #KSA1 – 8
- #RC8RFS.

Make sure that the required number of ordinals is specified. See *TPF System Generation* and Table 1069 on page 1015 for more information about fixed file record types; see *TPF System Generation* for more information about the RAMFIL macro.

4. Update SIP stage 1 deck as follows:
 - Add the CTKI32LC parameter to CONFIG macro (set to NO)
 - Add the CTKC32LC parameter to CRAFTB macro (set to NO).

See *TPF System Generation* for more information about the CONFIG and CRAFTB macros.

5. Run the FCTBG to create a new FACE table.
6. Assemble the SIP stage I deck to create a SIP stage II deck.
7. Run the system allocator program (SALO) using the IBMPAL and SPPGML additions for the newly created segments to create an updated program allocation table (IPAT) and a system allocator table (SAL).
8. Run SIP stage II.
9. Deactivate each processor and IPL it from an image containing 32-way loosely coupled processor support.

Note: During the first IPL of the first processor from image containing 32-way loosely coupled processor support, the TPF system will display messages IPLA0050E and IPLA0055W for the BSS and messages IPLB0018W and IPLB0086E for all other subsystems. These messages are displayed because the new keypoint pointer records have not been initialized on the subsystems. Because this is an expected occurrence and temporary pointer records will be used, continue with the IPL.

During restart, message CVZ60001A is displayed for each subsystem being IPLed. This message will request the operator to enter the ZKPTR command. Enter the ZKPTR REPLACE command for each subsystem to initialize the keypoint pointer records. This must be done only once on the first processor to be IPLed with 32-way loosely coupled processor support.

10. If you operate the loosely coupled complex in a coexistence mode with some processors IPLed from images with 32-way loosely coupled processor support and other processors IPLed with images without 32-way loosely coupled processor support, you must observe the following restrictions:
 - Before running recoup, you must enter the ZMIGR command with the RECOUP and INIT parameters specified to initialize the new FC33 records. All processors participating in a recoup run must be at the same PUT level.
 - While the loosely coupled complex is operating in coexistence mode, restrict your use of the following commands:
 - ZMPIF DEFINE DEVICE
 - ZMPIF DEFINE PATH
 - ZINET DISPLAY

- ZINET ADD
- ZINET ALTER.

See “Coexistence” on page 1170, “Migration and Fallback” on page 1171, and *TPF Operations* for more information about any restrictions and the use of these commands.

11. Once all active processors in the loosely coupled complex are IPLed from images containing 32-way loosely coupled processor support, do the following:
 - a. Confirm that any necessary modifications have been made to your applications and that the applications have been reassembled, recompiled, and link-edited.
 - b. Enter the ZMIGR command with the PROCESSOR and STATUS parameters specified to confirm that all processors are at the same PUT level.
 - c. Migrate to 32-way loosely coupled processor support for recoup by doing the following:
 - 1) If you have not done so previously, enter the ZMIGR command with the RECOUP and INIT parameters specified to initialize the new FC33 records.
 - 2) Enter the ZMIGR command with the RECOUP and CONVERT parameters specified to complete the recoup data conversion and movement.

These commands must be entered on each multiple database function (MDBF) subsystem, but need to be entered on only one processor in the complex.

- d. Migrate to 32-way loosely coupled processor support for CTKI by entering the ZMIGR command with the CTKI and CONVERT parameters specified to convert CTKI data to 32-way loosely coupled format. This command must be entered on the basic subsystem (BSS) and needs to be entered on only one processor in the complex.
- e. Migrate to 32-way loosely coupled processor support for CTKC by entering the ZMIGR command with the CTKC and CONVERT parameters specified to convert CTKC data to 32-way loosely coupled format. This command must be entered on the BSS and needs to be entered on only one processor in the complex.
- f. Migrate to 32-way loosely coupled processor support for keypoint access by entering the ZMIGR command with the KEYPOINT and CONVERT parameters specified to convert keypoint data to 32-way loosely coupled format and location. This command must be entered on each MDBF subsystem, but needs to be entered on only one processor in the complex.
- g. Migrate to 32-way loosely coupled processor support for MPIF by entering the ZMIGR command with the MPIF and CONVERT parameters specified to convert MPIF data to 32-way loosely coupled format. This command must be entered on the BSS and needs to be entered on only one processor in the complex.

Note: Enter the ZMIGR command with the MPIF parameter specified only if you have the MPIF feature installed on your TPF 4.1 system.

- h. Migration of the general file control record (GFCR) is performed automatically by the TPF 4.1 system. To change the definition of the GFCR, you may load a new keypoint B, which indicates that the GFCR should be initialized using the premount information in segment CVZD. See

“General File” on page 1177 for more information about automatic migration of the GFCR and see *TPF Database Reference* for more information about general files and the GFCR.

- i. Migration of the general data set (GDS) restart control records (RCRs) is performed automatically by the TPF 4.1 system. You may request that the premount information in segments CVZE and CVZF be used to initialize the RCRs by using the ZDSMG INIT command. See “General Data Set (GDS)” on page 1177 for more information about automatic migration of the RCRs and see *TPF Operations* for more information about the ZDSMG INIT command.

Notes:

1. Once you have completed migration to recoup, CTKI, CTKC, keypoint, and MPIF support for 32-way loosely coupled processors by converting records and data, any processors added to the loosely coupled complex must be running 32-way loosely coupled processor support. If there is a requirement for a processor that is not running 32-way loosely coupled processor support to join the loosely coupled complex, you must perform the fallback procedure defined in “Falling Back from 32-Way Loosely Coupled Processor Support” on page 1214.
2. Once the records and data have been converted, make sure that the CTKI32LC parameter of the CONFIG macro and the CTKC32LC parameter of the CRAFT macro in your system generation input are set to YES so that CTKI and CTKC are generated correctly for any new TPF 4.1 systems.
3. If you have not completed the conversion to 32-way loosely coupled pool support, that is, the ZPMIG CONVERT command has not been entered and all pool structures are still in PXP format, you must complete the conversion to 32-way loosely coupled pool support before you can define more than 8 loosely coupled processors in your TPF complex. See “32-Way Loosely Coupled Pool Support (APAR PJ27686)” on page 1006 for more information about 32-way loosely coupled pool support.
4. See “Migration and Fallback” on page 1171 and *TPF Operations* for more information about the data being converted and the use of the commands.

Once migration to 32-way loosely coupled processor support is completed and there is no requirement to fall back to coexistence mode, do the following:

- Delete the RAMFIL statements for the following fixed file record types:
 - #CB8HD
 - #DSCRI
 - #SONRPE.
- Reduce the number of ordinals for #PDREC to 4.
- Set the NFBACK parameter on the RAM macro to 0 and load a new CTKX. This causes time-initiated keypointing to copy keypoints to the fall back extents in #KFBXnnn. The TPF 4.1 system will no longer use the keypoint fall back extents defined in #KEYPT.

You can now add processors 9 – 32 to the TPF 4.1 loosely coupled processor complex.

Falling Back from 32-Way Loosely Coupled Processor Support

Before You Begin

Once you have generated the ninth processor for the loosely couple complex, it is no longer possible to fall back to a TPF 4.1 system without 32-way loosely coupled processor support.

If you must IPL a processor without 32-way loosely coupled processor support in the loosely coupled complex, do the following:

1. Enter the ZMIGR command with the RECOUP and FALLBACK parameters specified to restore the recoup data and record format and locations.
2. Enter the ZMIGR command with the CTKI and FALLBACK parameters specified to restore the CTKI records and data format.
3. Enter the ZMIGR command with the CTKC and FALLBACK parameters specified to restore the CTKC data format.
4. Enter the ZMIGR command with the KEYPOINT and FALLBACK parameters specified to restore keypoint data format and location.
5. Enter the ZMIGR command with the MPIF and FALLBACK parameters specified to restore the MPIF records and data format.

Note: Enter the ZMIGR command with the MPIF parameter specified only if you have the MPIF feature installed on your TPF 4.1 system.

6. On each processor that is to be IPLed with a back-level TPF 4.1 system, you must enter the ZPSMS command with the PR and DEAC parameters specified to reset the flag that indicates that the processor is migrated. Otherwise, IPC on the migrated processors will continue to attempt to communicate with that processor using the 32-way loosely coupled format.
7. If you have defined and loaded super GOA records for 32-way loosely coupled processor support, you must restore the previous super GOA records by entering the ZSLDR command to load the previous PILOTA tape.

Notes:

1. Fallback must be performed for all functions.
2. For those functions that required you to enter the ZMIGR command with the CONVERT parameter specified for each MDBF subsystem, you must also enter ZMIGR command with the FALLBACK parameter specified for each MDBF subsystem.
3. If you generate any new TPF 4.1 systems when ZMIGR FALLBACK processing is completed, make sure that the CTKI32LC parameter of the CONFIG macro and the CTKC32LC parameter of the CRAFTB macro in your system generation input are set to NO so that CTKI and CTKC correctly reflect that the data structures and content are back-level. When you migrate back to 32-way loosely coupled processor support again, set the CTKI32LC and CTKC32LC parameters to YES.
4. There is no fallback action required for general file or general data set support. Any TPF 4.1 system image that does not contain 32-way loosely coupled processor support will automatically use the general file control record (GFCR) in the #IBMM4 record type and the general data set restart control records (RCRs) in the #DSCRI record type. The previous GFCR and RCRs will not contain any changes to the GFCR and RCRs in the #IBMMP4 and #DSCRU record types made by general file and general data set support running on TPF 4.1 system images with 32-way loosely coupled processor support.

Program Update Tape 16 (PUT 16)

Table 1213 shows where to go to get migration consideration information for the small programming enhancements (SPEs) and maintenance updates that shipped on program update tape (PUT) 16 (PUT 16).

Table 1213. PUT 16 SPE and Maintenance Summary

SPE	Where to Go For More Information
TCP/IP Enhancements for PUT 16	"TCP/IP Enhancements for PUT 16 (APARs PJ28168, PJ28195, PJ28213, and PJ28344)" on page 1216
TPF MQSeries Clear Queue Support and Display Enhancements	"TPF MQSeries Clear Queue Support and Display Enhancements (APAR PJ28339)" on page 1230
TPF MQSeries Server Support	"TPF MQSeries Server Support (APAR PJ28435)" on page 1235
XML4C Parser 3.5.1	"XML4C Parser 3.5.1 (APAR PJ28176)" on page 1244
Maintenance APARs	"PUT 16 Interface Changes by Authorized Program Analysis Report (APAR)" on page 1249

Compiler Support

Table 1214. PUT 16 Compiler Support

PUT Level	Compiler	System Support Compiler
PUT 16	IBM OS/390 C/C++ Version 2 Release 10	IBM OS/390 C/C++ Version 2 Release 10
		IBM z/OS Version 1 Release 1
		IBM z/OS Version 1 Release 2

See the *OS/390 C/C++ User's Guide* for more information about C and C++ compilers and "C and C++ Compiler Requirements" on page 46 for more information about C and C++ compiler requirements for the TPF 4.1 system.

TCP/IP Enhancements for PUT 16 (APARs PJ28168, PJ28195, PJ28213, and PJ28344)

The following section discusses the migration considerations for TCP/IP enhancements for PUT 16.

Prerequisite APARs

See the APEDIT for APARs PJ28168, PJ28195, PJ28213, and PJ28344 for information about prerequisite APARs.

Functional Overview

TCP/IP enhancements for PUT 16 continue to build on the functions provided with TCP/IP native stack support and Simple Network Management Protocol (SNMP) agent support. See “TCP/IP Native Stack Support (APAR PJ26683)” on page 626 and “Simple Network Management Protocol Agent Support (APAR PJ27932)” on page 1083 for more information.

SNMP MIB Display Support

SNMP MIB display support (APAR PJ28168) allows you to use the ZSNMP command to display Management Information Base (MIB) variables from the TPF 4.1 system. You can also save the display information to a file on the TPF file system.

TCP/IP Network Services Database Support

TCP/IP network services database support (APAR PJ28195) allows you to:

- Define TCP/IP server applications so that you can use the getservbyname socket API to retrieve the port number for an application and the getservbyport socket API to retrieve the name of an application.
- Define a quality of service (QoS) differentiated services codepoint value for each application. With PUT 15, IP packet network prioritization (APAR PJ28034) provided a type of service (TOS) value that allowed you to define the network priority of all outbound TPF IP packets. With TCP/IP network services database support, that support is enhanced by allowing you to define a TOS value, now referred to as a differentiated services codepoint value, for each application.
- Identify the applications for which you want to collect data. Data collection and reduction has been enhanced to provide you with count information for messages, bytes, and packets on a per application basis. When you define an application in the TCP/IP network services database, you can define a weighting factor to allow messages from each application to be weighted differently when using data collection.

TCP/IP Packet Filtering Firewall Support

TCP/IP packet filtering firewall support (APAR PJ28213) provides added security for your Internet server applications. Packet filtering is a function of firewall support that examines each packet for an approved source and destination (or application) to determine whether the packet should be allowed (that is, processed), rejected, or discarded. TCP/IP packet filtering firewall support allows you to define rules to filter inbound packets destined for TPF applications. In addition, you can use the IP trace facility to identify packets that violate the packet filtering rules or cause other exception conditions.

Fast TCP Retransmit Support

Fast TCP retransmit support (APAR PJ28344) improves TCP/IP performance by detecting lost messages in the network faster.

Architecture

The following describes how the TCP/IP enhancements for PUT 16 are implemented in the TPF 4.1 system.

TCP/IP Network Services Database Support

The quality of service (QoS) differentiated services architecture is defined by the following Request for Comments (RFC) documents:

- RFC 2474 *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*
- RFC 2475 *An Architecture for Differentiated Services*.

Go to <http://www.ietf.org> for more information about these RFCs and any related extensions.

The TCP/IP network services database is created from information that you define in a file called `/etc/services`, which contains an entry for each application that you want to define in the database. The TCP/IP network services database file is read into core storage during system restart. You can also refresh the file by entering `ZIPDB REFRESH`. See *TPF Operations* for more information about the `ZIPDB` command.

TCP/IP Packet Filtering Firewall Support

TCP/IP packet filtering firewall support is controlled by a set of rules that you define in a file called `/etc/iprules.txt`. The rules define whether to allow, discard, or reject input packets based on the source IP address, destination port, and protocol of the packet. The packet filtering rules file is read into core storage during system restart. You can also refresh the file by entering `ZFILT REFRESH`. See *TPF Operations* for more information about the `ZFILT` command.

Fast TCP Retransmit Support

The architecture for fast TCP retransmit support is based on RFC 2001 *TCP Slow Start, Congestion Avoidance, Fast Retransmit, and Fast Recovery Algorithms*. Go to <http://www.ietf.org> for more information about this RFC and any related extensions.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1215 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1215. Changes to Build Scripts for TCP/IP Enhancements for PUT 16

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28168			
CNMPBS	DLL	Changed	Updated for SNMP MIB display support.

Table 1215. Changes to Build Scripts for TCP/IP Enhancements for PUT 16 (continued)

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28195			
CNSDBS	DLM	New	Created for TCP/IP network services database support.
COMXBS	DLM	Changed	Updated for TCP/IP network services database support.
APAR PJ28213			
CTLABS	DLM	New	Created for TCP/IP packet filtering firewall support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: Table 1216 summarizes the general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

General use means these header files are available for your use.

Table 1216. Changes to General Use C/C++ Language Header Files for TCP/IP Enhancements for PUT 16

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
APAR PJ28195			
c\$ck2sn.h	Changed	No	Not Applicable
c\$eb0eb.h	Changed	No	Not Applicable
netdb.h	Changed	No	Not Applicable
socket.h	Changed	No	Not Applicable
APAR PJ28213			
c\$ck2sn.h	Changed	No	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1217 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1217. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TCP/IP Enhancements for PUT 16

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
APAR PJ28195			
i\$nsdb.h	New	No	Not Applicable
APAR PJ28213			
i\$filt.h	New	No	Not Applicable
i\$iphd.h	Changed	No	Not Applicable

Library Interface Scripts: Table 1218 on page 1219 summarizes changes to the library interface scripts used by the library interface tool and the build tool. This information is presented in alphabetic order by the name of the library interface script.

Table 1218. Changes to Library Interface Scripts for TCP/IP Enhancements for PUT 16

Library Interface Script	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28195		
COMXXV	Changed	Updated for TCP/IP network services database support.

Link-Edited Modules: Table 1219 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1219. Changes to Link-Edited Modules for TCP/IP Enhancements for PUT 16

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28168		
CNMP	Changed	Updated for SNMP MIB display support.
CNM1	Changed	Updated for SNMP MIB display support.
APAR PJ28195		
CDNS	Changed	Updated for TCP/IP network services database support.
CFTP	Changed	Updated for TCP/IP network services database support.
CMAT	Changed	Updated for TCP/IP network services database support.
CMNA	Changed	Updated for TCP/IP network services database support.
CMNC	Changed	Updated for TCP/IP network services database support.
CMN0	Changed	Updated for TCP/IP network services database support.
CMN3	Changed	Updated for TCP/IP network services database support.
CMOA	Changed	Updated for TCP/IP network services database support.
CMOB	Changed	Updated for TCP/IP network services database support.
CMQS	Changed	Updated for TCP/IP network services database support.
CNMP	Changed	Updated for TCP/IP network services database support.
CNMT	Changed	Updated for TCP/IP network services database support.
CNSD	New	Created for TCP/IP network services database support.
COMX	Changed	Updated for TCP/IP network services database support.
CRDA	Changed	Updated for TCP/IP network services database support.
CREA	Changed	Updated for TCP/IP network services database support.
CRIA	Changed	Updated for TCP/IP network services database support.
CRII	Changed	Updated for TCP/IP network services database support.
CRIO	Changed	Updated for TCP/IP network services database support.
CRPC	Changed	Updated for TCP/IP network services database support.
CTFT	Changed	Updated for TCP/IP network services database support.
APAR PJ28213		
COMX	Changed	Updated for TCP/IP packet filtering firewall support.
CSF4	Changed	Updated for TCP/IP packet filtering firewall support.
CSL2	Changed	Updated for TCP/IP packet filtering firewall support.
CTIE	Changed	Updated for TCP/IP packet filtering firewall support.
CTLA	New	Created for TCP/IP packet filtering firewall support.

Members: Table 1220 on page 1220 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1220. Changes to Members for TCP/IP Enhancements for PUT 16

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
APAR PJ28168					
CNME	CNMP	DLL	Changed	C++ Language	Updated for SNMP MIB display support.
CNMF	CNMP	DLL	Changed	C++ Language	Updated for SNMP MIB display support.
CNMG	CNMP	DLL	New	C++ Language	Created for SNMP MIB display support.
CNM1	CNM1	DLM	Changed	C++ Language	Updated for SNMP MIB display support.
APAR PJ28195					
CDNS	CDNS	DLM	Changed	C++ Language	Updated for TCP/IP network services database support.
CFTP1	CFTP	DLM	Changed	C Language	Updated for TCP/IP network services database support.
CMADAT	CMAT	DLL	Changed	C++ Language	Updated for TCP/IP network services database support.
CMOA	CMOA	DLM	Changed	C++ Language	Updated for TCP/IP network services database support.
CMOB	CMOB	DLM	Changed	C++ Language	Updated for TCP/IP network services database support.
CNMS	CNMP	DLL	Changed	C++ Language	Updated for TCP/IP network services database support.
CNMT	CNMT	DLM	Changed	C++ Language	Updated for TCP/IP network services database support.
CNSD	CNSD	DLM	New	C++ Language	Created for TCP/IP network services database support.
CNSF	COMX	LLM	New	C Language	Created for TCP/IP network services database support.
CNSR	CNSD	DLM	New	C++ Language	Created for TCP/IP network services database support.
CREF	CRDA, CREA	DLM	Changed	C Language	Updated for TCP/IP network services database support.
CRIA	CRIA	DLM	Changed	C Language	Updated for TCP/IP network services database support.
CRII	CRII	DLM	Changed	C++ Language	Updated for TCP/IP network services database support.
CRIO	CRIO	DLM	Changed	C++ Language	Updated for TCP/IP network services database support.
CRMTRA	CMQS	DLL	Changed	Object Code Only	Updated for TCP/IP network services database support.
CTFTP1	CTFT	DLM	Changed	Object Code Only	Updated for TCP/IP network services database support.
APAR PJ28213					
CSF4	CSF4	DLM	Changed	C Language	Updated for TCP/IP packet filtering firewall support.
CSSLMT	CSL2	DLM	Changed	C Language	Updated for TCP/IP packet filtering firewall support.

Table 1220. Changes to Members for TCP/IP Enhancements for PUT 16 (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CTIE	CTIE	DLM	Changed	C Language	Updated for TCP/IP packet filtering firewall support.
CTLA	CTLA	DLM	New	C++ Language	Created for TCP/IP packet filtering firewall support.
C511	COMX	LLM	Changed	C Language	Updated for TCP/IP packet filtering firewall support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1221 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1221. Changes to Copy Members for TCP/IP Enhancements for PUT 16

Copy Member	Type	New, Changed, or No Longer Supported?	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
APAR PJ28195						
CHSZ	Control Program	Changed	CCNUCL	CPS0	Control Program	Updated for TCP/IP network services database support.
CTI2	Control Program	Changed	CCTCP2	CPS0	Control Program	Updated for TCP/IP network services database support.
CTI3	Control Program	Changed	CCTCP2	CPS0	Control Program	Updated for TCP/IP network services database support.
CTTO	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated for TCP/IP network services database support.
CT15	Control Program	Changed	CCCTIN	CPS0	Control Program	Updated for TCP/IP network services database support.
APAR PJ28213						
CTSS	Control Program	Changed	CCTCP3	CPS0	Control Program	Updated for TCP/IP packet filtering firewall support.
CTTO	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated for TCP/IP packet filtering firewall support.
CTT6	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated for TCP/IP packet filtering firewall support.
APAR PJ28344						
CTI2	Control Program	Changed	CCTCP2	CPS0	Control Program	Updated for fast TCP retransmit support.
CTSS	Control Program	Changed	CCTCP3	CPS0	Control Program	Updated for fast TCP retransmit support.
CTTO	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated for fast TCP retransmit support.
CTT6	Control Program	Changed	CCTCP1	CPS0	Control Program	Updated for fast TCP retransmit support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: Table 1222 summarizes the data macro changes. This information is presented in alphabetic order by the name of the data macro.

Table 1222. Changes to Data Macros for TCP/IP Enhancements for PUT 16

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs Using This Data Macro?	Programs to Reassemble
APAR PJ28195			
CK2SN	Changed	No	Not Applicable
DC0DC	Changed	No	Not Applicable
INSDB	Changed	No	Not Applicable
APAR PJ28213			
CK2SN	Changed	No	Not Applicable
IFILT	New	No	Not Applicable
IPMTE	Changed	No	Not Applicable
ISTAK	Changed	No	Not Applicable
APAR PJ28344			
ISOCK	Changed	No	Not Applicable

General Macros: There are no changes.

Selected Equate Macros: Table 1223 summarizes the selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1223. Changes to Selected Equate Macros for TCP/IP Enhancements for PUT 16

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	Programs to Reassemble
APAR PJ28195			
IEQCE2	Changed	No	Not Applicable

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1224 on page 1223 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1224. Changes to SIP Skeleton and Internal Macros for TCP/IP Enhancements for PUT 16

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
APAR PJ28168	
SPPGML	Changed
APAR PJ28195	
SPPGML	Changed
APAR PJ28213	
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1225 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1225. Changes to SIP Stage II Macros for TCP/IP Enhancements for PUT 16

SIP Stage II Macro	New, Changed, or No Longer Supported?
APAR PJ28195	
IBMPAL	Changed
APAR PJ28213	
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 1226 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1226. Changes to Segments for TCP/IP Enhancements for PUT 16

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28195				
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
CTSN	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
CTS1	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
CTS7	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
CTS8	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.

Table 1226. Changes to Segments for TCP/IP Enhancements for PUT 16 (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
CVOR	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
JCD4	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
JCM0	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
JCS0	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP network services database support.
JRA1	Offline PL/I	DATAREAD	Changed	Updated for TCP/IP network services database support.
JRA2	Offline PL/I	DATAREAD	Changed	Updated for TCP/IP network services database support.
JRA3	Offline PL/I	DATAREAD	Changed	Updated for TCP/IP network services database support.
JRF4	Offline PL/I	DATAREAD	Changed	Updated for TCP/IP network services database support.
JRM5	Offline PL/I	DATAREAD	Changed	Updated for TCP/IP network services database support.
JRP3	Offline PL/I	DATAREAD	Changed	Updated for TCP/IP network services database support.
JRS3	Offline PL/I	DATAREAD	Changed	Updated for TCP/IP network services database support.
APAR PJ28213				
CTFB	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
CTF4	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
CTSG	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
CTSK	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
CTSW	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
CTS6	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for TCP/IP packet filtering firewall support.
IPTPRT	Offline C Language	IPTPRT	Changed	Updated for TCP/IP packet filtering firewall support.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1227 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1227. Changes to Commands for TCP/IP Enhancements for PUT 16

Command	New, Changed, or No Longer Supported?	Description of Change
APAR PJ28168		
ZSNMP	Changed	Added the DISPLAY parameter for SNMP MIB display support.
APAR PJ28195		
ZDTCP	Changed	Updated the examples for TCP/IP network services database support.
ZIPDB	New	Added for TCP/IP network services database support.
ZSTAT	Changed	Updated the examples for TCP/IP network services database support.
APAR PJ28213		
ZFILT	New	Added for TCP/IP packet filtering firewall support.
ZINIP	Changed	Updated the examples for TCP/IP packet filtering firewall support.
ZIPTR	Changed	Updated the examples for TCP/IP packet filtering firewall support.

Messages and System Errors

Table 1228 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *TPF Messages* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1228. Changes to Messages and System Errors for TCP/IP Enhancements for PUT 16

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
APAR PJ28168		
SNMP0018I	Online	New
SNMP0019I	Online	New
SNMP0020E	Online	New

Table 1228. Changes to Messages and System Errors for TCP/IP Enhancements for PUT 16 (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
SNMP0021E	Online	New
SNMP0022E	Online	New
APAR PJ28195		
IPDB0001I	Online	New
IPDB0010E	Online	New
IPDB0011E	Online	New
IPDB0012E	Online	New
IPDB0013E	Online	New
IPDB0014E	Online	New
IPDB0015E	Online	New
IPDB0016E	Online	New
IPDB0017E	Online	New
APAR PJ28213		
FILT0001I	Online	New
FILT0002I	Online	New
FILT0003E	Online	New
FILT0004E	Online	New
FILT0006E	Online	New
FILT0007E	Online	New
FILT0008E	Online	New
FILT0009E	Online	New
FILT0010E	Online	New

Performance or Tuning Changes

TCP/IP network services database support provides enhancements to data collection for TCP/IP applications. Previously, the only TCP/IP information in data collection was the number of TCP/IP input messages, which was included in the overall high-speed message counts. This presented a number of problems:

- There was no easy way to determine how much activity is TCP/IP activity.
- TCP/IP applications do not always process a single outbound message for each inbound message. Therefore, counting only input messages can be misleading for TCP/IP network planning.
- TCP architecture has no definition of a message. Before this support, the TPF 4.1 system counted each socket read that received data as a TCP/IP input message. However, many TCP applications do two reads per message: one for the header to get the message length and a second read to get the message. For larger messages, more than two reads may be required to get an entire message.
- There was no breakdown of traffic by TCP/IP application like there is with Systems Network Architecture (SNA).

To address these problems, TCP/IP messages are no longer included with the high-speed message counts. TCP/IP messages are now counted separately. These counts can be displayed by entering the ZSTAT command or by running data collection and looking at the system summary report.

In addition to the updated system summary report, the following reports were added:

- The TCP/IP weighted message by application report provides information about the number of TCP/IP weighted input messages for each application for which there is activity.
- The TCP/IP message summary report provides information about the number of messages, packets, and bytes that are sent and received by each application.

See *TPF Transmission Control Protocol/Internet Protocol* for more information about collecting data for applications in the TCP/IP network services database. See *TPF System Performance and Measurement Reference* for more information about data collection and reduction in general and for an example of the reports.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1229 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1229. Changes to TPF Publications for TCP/IP Enhancements for PUT 16

Publication Title	Softcopy File Name	Description of Change
APAR PJ28168		
<i>Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for SNMP MIB display support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG206	Updated with migration considerations for SNMP MIB display support.
<i>TPF Operations</i>	GTPOPR0G	Updated with information about the commands that were added and changed for SNMP MIB display support.
<i>TPF System Installation Support Reference</i>	GTPINR0E	Updated the information about the SNMP enterprise-specific MIB retrieval user exit (UMIB) for SNMP MIB display support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0C	Updated with information about SNMP MIB display support.
APAR PJ28195		
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0G	Updated with information about C functions that were added for TCP/IP network services database support.
<i>Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TCP/IP network services database support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG206	Updated with migration considerations for TCP/IP network services database support.

Table 1229. Changes to TPF Publications for TCP/IP Enhancements for PUT 16 (continued)

Publication Title	Softcopy File Name	Description of Change
<i>TPF Operations</i>	GTPOPR0G	Updated with information about the commands that were added and changed for TCP/IP network services database support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR0F	Updated the sample data collection and reduction reports for TCP/IP network services database support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0C	Updated with information about TCP/IP network services database support.
APAR PJ28213		
<i>Messages (Online)</i>	Not Applicable	Updated with information about messages that were added, changed, and no longer supported for TCP/IP packet filtering firewall support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG206	Updated with migration considerations for TCP/IP packet filtering firewall support.
<i>TPF Operations</i>	GTPOPR0G	Updated with information about the commands that were added and changed for TCP/IP packet filtering firewall support.
<i>TPF Transmission Control Protocol/Internet Protocol</i>	GTPCLW0C	Updated with information about Internet security, including TCP/IP packet filtering firewall support.
APAR PJ28344		
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG206	Updated with migration considerations for fast TCP retransmit support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

TCP/IP network services database support provides the following new APIs:

- getservbyname
- getservbyport
- tpf_tcpip_message_cnt

See *TPF Transmission Control Protocol/Internet Protocol* for more information about the getservbyname and getservbyport socket APIs. See the *TPF C/C++ Language Support User's Guide* for more information about the tpf_tcpip_message_cnt function.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TCP/IP enhancements for PUT 16 on your TPF 4.1 system:

1. Unpack program update tape (PUT) 16. See *TPF Memo to Licensees* for more information about unpacking the tape.

2. Install the following:
 - C/C++ language header files listed in Table 1216 on page 1218 and Table 1217 on page 1218
 - Copy members listed in Table 1221 on page 1221
 - Macros found in “Macros” on page 1222.
3. Run the LIBI offline program for all changed library interface scripts listed in Table 1218 on page 1219.
4. Run the system allocator (SALO) using SPPGML additions for newly created segments to create an updated program allocation table (PAT) and system allocator (SAL) table.
5. Assemble the SIP stage I deck to create a SIP stage II deck.
6. Run SIP stage II.
7. Run the CBLD program for the build scripts listed in Table 1215 on page 1217.
8. Reassemble or recompile the following:
 - Members listed in Table 1220 on page 1220
 - CSECTs listed in Table 1221 on page 1221
 - Segments listed in Table 1226 on page 1223.
9. Load the link-edited modules listed in Table 1219 on page 1219.
10. IPL your TPF 4.1 system.

To use TCP/IP packet filtering firewall support (APAR PJ28213), do the following:

1. Create the `/etc/iprules.txt` packet filtering rules file. See *TPF Transmission Control Protocol/Internet Protocol* for more information about how to create this file.
2. From the basic subsystem (BSS), enter **ZFILT REFRESH** to copy the file into core storage. See *TPF Operations* for more information about the ZFILT command.

To use TCP/IP network services database support (APAR PJ28195), do the following:

1. Create the `/etc/services` TCP/IP network services database file. See *TPF Transmission Control Protocol/Internet Protocol* for more information about how to create this file.
2. From the basic subsystem (BSS), enter **ZIPDB REFRESH** to copy the file into core storage. See *TPF Operations* for more information about the ZIPDB command.

TPF MQSeries Clear Queue Support and Display Enhancements (APAR PJ28339)

The following section discusses the migration considerations for TPF MQSeries clear queue support and display enhancements.

Prerequisite APARs

See the APEDIT for APAR PJ28339 for information about prerequisite APARs.

Functional Overview

TPF MQSeries clear queue support and display enhancements includes the following:

- The ZMQSC CLEAR QL command was created to allow you to remove all messages from a local normal queue.
- The ZMQSC DISPLAY command was updated to allow you to display an individual attribute for all channels or all queues.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: There are no changes.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1230 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1230. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF MQSeries Clear Queue Support and Display Enhancements

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
amqscrw.h	Changed	No	Not Applicable
c\$mqmg.h	Changed	No	Not Applicable
c\$mq.s.h	Changed	No	Not Applicable

Library Interface Scripts: There are no changes.

Link-Edited Modules: There are no changes.

Members: Table 1231 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1231. Changes to Members for TPF MQSeries Clear Queue Support and Display Enhancements

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CMQMGC	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries clear queue support and display enhancements.
CMQQUE	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries clear queue support and display enhancements.
CMQRCV	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries clear queue support and display enhancements.
CMQSWP	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries clear queue support and display enhancements.
CUSCCA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries clear queue support and display enhancements.
CUSCCD	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries clear queue support and display enhancements.
CUSCQL	CUSC	DLL	Changed	C++ Language	Updated for TPF MQSeries clear queue support and display enhancements.
CUSCRW	CUSC	DLM	Changed	C++ Language	Updated for TPF MQSeries clear queue support and display enhancements.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1232 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1232. Changes to Commands for TPF MQSeries Clear Queue Support and Display Enhancements

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQSC CLEAR QL	New	Created for TPF MQSeries clear queue support and display enhancements.
ZMQSC DISPLAY	Changed	Updated for TPF MQSeries clear queue support and display enhancements.

Messages and System Errors

Table 1233 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *TPF Messages* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1233. Changes to Messages and System Errors for TPF MQSeries Clear Queue Support and Display Enhancements

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0140I	Online	No Longer Supported
MQSC0150I	Online	No Longer Supported
MQSC0151I	Online	No Longer Supported
MQSC0152I	Online	No Longer Supported
MQSC0156W	Online	New
MQSC0219I	Online	New
MQSC0225I	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1234 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1234. Changes to TPF Publications for TPF MQSeries Clear Queue Support and Display Enhancements

Publication Title	Softcopy File Name	Description of Change
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF MQSeries clear queue support and display enhancements.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG206	Updated with migration considerations for TPF MQSeries clear queue support and display enhancements.
<i>TPF Operations</i>	GTPOPR0G	Updated with information about the commands that were added and changed for TPF MQSeries clear queue support and display enhancements.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

There are no changes.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TPF MQSeries clear queue support and display enhancements (APAR PJ28339) on your TPF 4.1 system.

1. Install program update tape (PUT) 16.

2. Compile the segments listed for this APAR in Table 1231 on page 1231.
3. Link-edit the CMQS DLL and CUSC DLM. CMQS must be linked before CUSC because CUSC needs a function that is in the definition side-deck from CMQS.
4. Stop the TPF MQSeries local queue manager on the processor to which you want to activate the new code.
5. Load the CMQS DLL and CUSC DLM to your TPF 4.1 system.
6. Activate the loadset that contains the new code.
7. Start the TPF MQSeries local queue manager that you previously stopped.

TPF MQSeries Server Support (APAR PJ28435)

The following section discusses the migration considerations for TPF MQSeries server support.

Prerequisite APARs

See the APEDIT for APAR PJ28435 for information about prerequisite APARs.

Functional Overview

TPF MQSeries server support provides the following:

- TPF MQSeries local queue manager server support
- TPF MQSeries database rebuild support.

TPF MQSeries local queue manager server support allows an MQSeries client to connect to a TPF 4.1 system by using a server connection channel. MQSeries clients can now pass MQSeries application programming interfaces (APIs) to the TPF 4.1 system, which can act as the server, run the API, and return code to the client. TPF MQSeries user exits and APIs have been added and existing APIs have been enhanced as part of this support.

TPF MQSeries database rebuild support provides the ZMQSC DBREBUILD command, which allows you to rebuild TPF MQSeries definitions in the current file address reference format (FARF) on the TPF system without losing those definitions and without losing any messages that are currently on queue.

Architecture

There are no changes.

Operating Environment Requirements and Planning Information

There are no changes.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: Table 1235 summarizes changes to the build scripts used by the build tool. This information is presented in alphabetic order by the name of the build script.

Table 1235. Changes to Build Scripts for TPF MQSeries Server Support

Build Script	Type	New, Changed, or No Longer Supported?	Description of Change
CMQSBS	DLM	Changed	Updated for TPF MQSeries server support.
CPGCBS	DLL	New	Created for TPF MQSeries server support.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: There are no changes.

Implementation-Specific C/C++ Language Header Files (IBM Use Only):

Table 1236 summarizes the general use C/C++ language header file changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language header file.

Table 1236. Changes to Implementation-Specific C/C++ Language Header Files (IBM Use Only) for TPF MQSeries Server Support

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Segments?	Segments to Recompile
amquscw.h	Changed	No	Not Applicable
cmqc.h	Changed	No	Not Applicable
c\$mqdc.h	Changed	No	Not Applicable
c\$mq.s.h	Changed	No	Not Applicable
c\$mqtr.h	Changed	No	Not Applicable

Library Interface Scripts: There are no changes.

Link-Edited Modules: There are no changes.

Members: Table 1237 summarizes changes to members. This information is presented in alphabetic order by the name of the member.

Notes:

1. You must recompile or reassemble a member if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

Table 1237. Changes to Members for TPF MQSeries Server Support

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CCCCXA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CCCITA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CMQAPI	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CMQCOL	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CMQERR	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CMQFTR	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CMQHSH	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CMQMCA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CMQMGC	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CMQMGR	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CMQMTR	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.

Table 1237. Changes to Members for TPF MQSeries Server Support (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CMQQUE	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CMQSVR	CMQS	DLL	New	Object Code Only	Created for TPF MQSeries server support.
CMQUTL	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CPGS	CPGS	DLM	Changed	C Language	Changed for TPF MQSeries server support.
CRCMSA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRCSIA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CREXTA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRFPTA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRMCLA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRMCVA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRMRSA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRMSAA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRMSSA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRMTRA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CRSRVA	CMQS	DLL	New	Object Code Only	Created for TPF MQSeries server support.
CUIF	CUIF	DLM	Changed	Object Code Only	Updated for TPF MQSeries server support.
CUIT	CMQU	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CUSCCA	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CUSCCD	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.
CUSCPF	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CUSCPR	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CUSCQL	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CUSCQM	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CUSCQR	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.
CUSCRW	CUSC	DLM	Changed	C++ Language	Updated for TPF MQSeries server support.
CUSCUL	CMQS	DLL	Changed	C++ Language	Updated for TPF MQSeries server support.

Table 1237. Changes to Members for TPF MQSeries Server Support (continued)

Member	DLM/DLL/LLM Name	Type	New, Changed, or No Longer Supported?	Member Type	Description of Change
CXCSSW	CMQS	DLL	Changed	Object Code Only	Updated for TPF MQSeries server support.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1238 summarizes the copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1238. Changes to Copy Members for TPF MQSeries Server Support

Copy Member	Type	New, Changed, or No Longer Supported?	Segment Where Copy Member is Included	Name of Link-Edited Module	DLM, DLL, LLM, or Control Program	Description of Change
CL10	CP	Changed	CCTLOG	CPS0	Control Program	Updated for TPF MQSeries server support.

Fixed File Records

There are no changes.

Macros

The following section summarizes the macro changes. This information is presented in alphabetic order by the type of macro.

Advanced Program-to-Program Communications (APPC) Macros: There are no changes.

Communication Macros and Statements: There are no changes.

Data Macros: There are no changes.

General Macros: There are no changes.

Selected Equate Macros: There are no changes.

Structured Programming Macros (SPMs): There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros): Table 1239 on page 1239 summarizes the system initialization program (SIP) skeleton and internal macro changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1239. Changes to SIP Skeleton and Internal Macros for TPF MQSeries Server Support

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?
SPPGML	Changed

System Initialization Program (SIP) Stage I Macros and Statements: There are no changes.

System Initialization Program (SIP) Stage II Macros: Table 1240 summarizes system initialization program (SIP) Stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1240. Changes to SIP Stage II Macros for TPF MQSeries Server Support

SIP Stage II Macro	New, Changed, or No Longer Supported?
IBMPAL	Changed

System Communication Keypoint (SCK) Generation Macros: There are no changes.

System Macros: There are no changes.

System Macros (IBM Use Only): There are no changes.

Segments

Table 1241 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1241. Changes to Segments for TPF MQSeries Server Support

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change
CMQMPP	Offline	CMQMPP	Changed	Updated for TPF MQSeries server support.
JCD4	Real-Time Assembler	Not Applicable	Changed	Updated for TPF MQSeries server support.
JRA1	Offline PL/I	DATAREAD	Changed	Updated for TPF MQSeries server support.
JRA2	Offline PL/I	DATAREAD	Changed	Updated for TPF MQSeries server support.
JRA3	Offline PL/I	DATAREAD	Changed	Updated for TPF MQSeries server support.
JRM1	Offline PL/I	DATAREAD	Changed	Updated for TPF MQSeries server support.
JRM5	Offline PL/I	DATAREAD	Changed	Updated for TPF MQSeries server support.
JRS3	Offline PL/I	DATAREAD	Changed	Updated for TPF MQSeries server support.

System Equates

There are no changes.

User Exits

“Control Program (CP) User Exits” and “ECB User Exits” summarize the control program (CP) and ECB user exit changes. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits: There are no changes.

ECB User Exits: This information is presented in alphabetic order by the name of the function.

Table 1242. Changes to ECB User Exits for TPF MQSeries Server Support

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change
TPF MQSeries Channel Message Exit	CMQU	CUIT	New	Created for TPF MQSeries server support.
TPF MQSeries Channel Message Retry Exit	CMQU	CUIT	New	Created for TPF MQSeries server support.
TPF MQSeries Channel Security Exit	CMQU	CUIT	Changed	Updated for TPF MQSeries server support.

Functional and Operational Changes

The following section summarizes functional and operational changes. This information is presented in alphabetic order by the functional or operational change.

See Appendix for a summary of functional and operational changes by APAR.

Commands

Table 1243 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1243. Changes to Commands for TPF MQSeries Server Support

Command	New, Changed, or No Longer Supported?	Description of Change
ZMQSC ALT CHL	Changed	Updated for TPF MQSeries server support.
ZMQSC DBREBUILD	New	Created for TPF MQSeries server support.
ZMQSC DEF CHL	Changed	Updated for TPF MQSeries server support.
ZMQSC DISPLAY	Changed	Updated for TPF MQSeries server support.

Messages and System Errors

Table 1244 on page 1241 summarizes message (offline and online messages) and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information,

the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1244. Changes to Messages and System Errors for TPF MQSeries Server Support

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?
MQSC0101E	Online	New
MQSC0167E	Online	Changed
MQSC0226E	Online	New
MQSC0227E	Online	New
MQSC0232E	Online	New
MQSC0233E	Online	New
MQSC0234E	Online	New
MQSC0235I	Online	New
MQSC0236E	Online	New
MQSC0237E	Online	New
MQSC0350E	Online	New
MQSC0351I	Online	New
MQSC0352E	Online	New
MQSC0353I	Online	New
MQSC0354E	Online	New
MQSC0355E	Online	New
MQSC0900I	Online	New
MQSC0901E	Online	New
MQSC0950E	Online	New
MQSC0951E	Online	New

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1245 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1245. Changes to TPF Publications for TPF MQSeries Server Support

Publication Title	Softcopy File Name	Description of Change
<i>TPF Concepts and Structures</i>	GTPCON0D	Updated for TPF MQSeries server support.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0G	Updated for TPF MQSeries server support.
<i>Messages (System Error and Offline) and Messages (Online)</i>	Not Applicable	Updated with information about messages and system errors that were added, changed, and no longer supported for TPF MQSeries server support.
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG206	Updated with migration considerations for TPF MQSeries server support.
<i>TPF Operations</i>	GTPOPR0G	Updated with information about the commands that were added and changed for TPF MQSeries server support.
<i>TPF System Installation Support Reference</i>	GTPINR0G	Created and updated user exits for TPF MQSeries server support.
<i>TPF System Performance and Measurement Reference</i>	GTPSPR0F	Updated with information for TPF MQSeries server support.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

Table 1246 summarizes API changes. This information is presented in alphabetic order by the name of the command. See *TPF C/C++ Language Support User's Guide* for a complete description of all APIs.

Table 1246. Changes to APIs for TPF MQSeries Server Support

Command	New, Changed, or No Longer Supported?	Description of Change
MQBACK	New	Created for TPF MQSeries server support.
MQCMIT	New	Created for TPF MQSeries server support.
MQGET	Changed	Updated by TPF MQSeries server support.
MQPUT	Changed	Updated by TPF MQSeries server support.
MQPUT1	Changed	Updated by TPF MQSeries server support.
MQSET	Changed	Updated by TPF MQSeries server support.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install TPF MQSeries server support (APAR PJ28435) on your TPF 4.1 system.

1. Install program update tape (PUT) 16.
2. Assemble segment CCTLOG.
3. Compile the segments listed for this APAR in Table 1241 on page 1239.
4. Compile the members listed for this APAR in Table 1237 on page 1236.
5. Run the CBLD program to create the link-edit decks for the CMQS DLL and CPGC DLM.
6. Link-edit the control program (CPS0).
7. Link-edit the CMQS DLL, CMQU DLL, CPGC DLM, CUIF DLM, and CUSC DLM. CMQS must be linked before CUSC because CUSC needs a function that is in the definition side-deck from CMQS.
8. Link-edit the CMQMPP offline trace program by using the system initialization program (SIP) generated job control language (JCL). The CMQMPP program does not require prelinking because the program is compiled with the NORENT and NOLONGNAME options.
9. Stop all TPF MQSeries queue managers.
10. Load the new control program (CP), CMQS DLL, CMQU DLL, CPGC DLM, CUIF DLM, and CUSC DLM to a new image using the auxiliary loader (TLDR).
11. IPL the new image and cycle the TPF 4.1 system to NORM state.

XML4C Parser 3.5.1 (APAR PJ28176)

The following section discusses the migration considerations for XML4C parser 3.5.1.

Prerequisite APARs

XML4C Parser 3.5.1 (APAR PJ28176) obsoletes the version of the parser that was ported for XML parser (APAR PJ27634) on PUT 14. As a result, only the pieces of APAR PJ27634 that are TPF-specific are considered prerequisites for APAR PJ28176:

- The updates to the CICON library member (object file) and to the CISO link-edited module support changes to the `iconv` function.
- The SPPGML and IBMPAL macro updates support the addition of the CXML link-edited module. (The parser code contained in the CXML link-edited module, however, is not required because it is replaced by XML4C Parser 3.5.1.)

Functional Overview

XML4C parser 3.5.1 allows your applications to read (parse) and write Extensible Markup Language (XML) data on the TPF 4.1 system. XML is a markup language that combines the power of Standard Generalized Markup Language (SGML) and the simplicity of Hypertext Markup Language (HTML). XML allows you to mark up data based on what information the data contains rather than on how it is to be rendered. Data marked up in XML is easy to share across various platforms and across various companies. For more information about the XML specification, go to <http://www.w3.org/>.

XML4C parser 3.5.1 is the XML Parser for C++ (XML4C) Version 3.5.1 ported to the TPF 4.1 system. The parser is XML Version 1.0 compliant and allows TPF 4.1 applications written in C++ language to do the following:

- Parse XML documents using the Document Object Model (DOM) Level 1.0 or 2.0 specification. You can also parse XML documents using the experimental IDOM API, but this is not formally supported by the XML4C parser and, therefore, not formally supported on the TPF 4.1 system.
- Parse XML documents using the Simple API for XML (SAX) Version 1.0 or 2.0 specification.
- Parse XML documents with or without validation against a specified Document Type Definition (DTD).
- Parse XML documents with or without validation against a document written in the XML Schema language.

Note: XML Schema support is experimental and only includes a subset of the W3C Schema language.

In addition, the parser fully implements the ability to use namespaces in support of unique tagging structures.

Applications on the TPF 4.1 system interact with XML documents that are in the file system, coming in through standard input (`stdin`) or residing in memory. This interaction is made possible through application programming interfaces (APIs) specified by either the DOM or SAX specifications and can be either nonvalidating or validating against a schema (DTD or XML Schema). The API definitions are contained in a set of header files that application programmers will need to have in

their `#include` (or search) path. See General Use C/C++ Language Header Files for more information about these header files.

TPF information for XML4C parser 3.5.1 is exclusively online. The browser-readable HTML files are available on *IBM TPF Product Information Center*, which is the CD-ROM included with TPF 4.1 PUT 16, or on the TPF Web site (<http://www.ibm.com/tpf/pubs/tpfpubs.htm>). See Publication Changes on page 1247 for more information about XML4C parser 3.5.1 written information.

Architecture

IBM contributed the XML4C parser to the Apache XML Project (<http://xml.apache.org>) as open source in November 1999. XML Parser for C++ (XML4C) Version 3.5.1 is based on Xerces-C Version 1.5.0 and is fully compliant with the Unicode 3.0 specification. While the Apache Xerces-C parser can be updated by the open source community, the XML4C parser is maintained only by IBM and may differ slightly from the Xerces-C parser.

- For more information about the Unicode specification, go to the Unicode Consortium's Web page (<http://www.unicode.org>).
- For more information about XML and the DOM specification, go to <http://www.w3.org/>.
- For more information about the SAX specification, go to <http://www.saxproject.org>.

Operating Environment Requirements and Planning Information

There are none.

Interface Changes

The following section summarizes interface changes.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts: There are no changes.

Dynamic Load Module (DLM) Stubs: There are no changes.

General Use C/C++ Language Header Files: *General use* means these header files are available for your use.

The ported XML4C parser code provides a set of header files (or `#include` files) that are needed for applications that use the XML4C parser to access XML data. The header files are included with XML4C parser 3.5.1 and must be copied into a directory accessible by application programmers. (Application programmers are instructed to concatenate the directory that contains these header files in their `#include` path.)

When copying the XML4C header files to your TPF 4.1 system, ensure that you first remove any header files you copied with the XML parser (APAR PJ27634) on PUT 14 and that you retain the directory structure in which the XML4C parser 3.5.1

(APAR PJ28176) header files reside. The following shows the directory structure for the XML4C parser 3.5.1 files (note that there are many header files in each directory):

```
include
  - dom
  - framework
  - internal
  - parsers
  - sax
  - sax2
  - util
    - regx
    - Compilers
    - MsgLoaders
      - InMemory
    - Platforms
      - TPF
    - Transcoders
      - IconvTPF
  - validators
    - common
    - datatype
    - schema
    - DTD
```

See Publication Changes on page 1247 for more information about XML4C parser 3.5.1 information. (For specific information about the XML4C header files, open *XML on TPF: An Online User's Guide* and click **XML4C Version 3.5.1 Documentation**.)

Note: The XML4C header files cannot reside in a partitioned data set (PDS) because the first eight characters of all header files that reside in a PDS must be unique, and the XML4C header file names do not follow this rule. To ensure that your application programs work, put the header files into a hierarchical file system (HFS); these header files cannot be renamed and each must reside in its native directory in the HFS.

Implementation-Specific C/C++ Language Header Files (IBM Use Only): There are no changes.

Library Interface Scripts: There are no changes.

Link-Edited Modules: Table 1247 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1247. Changes to Link-Edited Modules for XML4C Parser 3.5.1

Link-Edited Module	New, Changed, or No Longer Supported?	Description of Change
CXML	Changed	Updated for XML4C Parser 3.5.1.

Members: There are no changes.

Object Code Only (OCO) Stubs: There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

There are no changes.

Fixed File Records

There are no changes.

Macros

There are no changes.

Segments

There are no changes.

System Equates

There are no changes.

User Exits

There are no changes.

Functional and Operational Changes

There are no changes.

Performance or Tuning Changes

There are no changes.

Storage Considerations and Changes

There are no changes.

System Initialization Program (SIP) and System Generation Changes

There are no changes.

Loading Process Changes

There are no changes.

Online System Load Changes

There are no changes.

Publication Changes

Table 1248 summarizes changes to the publications in the TPF library. This information is presented in alphabetic order by the publication title. See the *TPF Library Guide* for more information about the TPF library.

Table 1248. Changes to TPF Publications for XML4C Parser 3.5.1

Publication Title	Softcopy File Name	Description of Change
<i>TPF Migration Guide: Program Update Tapes</i>	GTPMG206	Updated with migration considerations for XML4C parser 3.5.1.
<i>TPF C/C++ Language Support User's Guide</i>	GTPCLU0G	Updated the list of classes that are supported by XML Parser for C++ (XML4C) Version 3.5.1 but not documented in the <i>TPF C/C++ Language Support User's Guide</i> .

Table 1248. Changes to TPF Publications for XML4C Parser 3.5.1 (continued)

Publication Title	Softcopy File Name	Description of Change
XML User's Guide	Not Applicable	<p>Updated for the delivery of TPF information on XML4C parser 3.5.1.</p> <p>This guide was delivered previously as browser-readable HTML files only, called <i>XML on TPF: An Online User's Guide</i>. The contents of this guide have been changed slightly so that you can view XML information in PDF as well as in HTML format. From the IBM TPF Product Information Center, do one of the following:</p> <ul style="list-style-type: none"> Click Tasks → XML4C Parser 3.5.1 to view task-oriented information such as a short tutorial that walks you through a real example of XML on TPF, step-by-step instructions for using sample programs included with the ported source code, and migration information. Click Concepts → XML4C Parser 3.5.1 to view conceptual information about XML on TPF, including a list of resources and the documentation included with the ported source code. Click Full Library and select XML User's Guide to view the information in either HTML or PDF.

Host System Changes

There are no changes.

Application Programming Interface (API) Changes

XML4C parser 3.5.1 supports the DOM and SAX specifications, which are each comprised of several APIs. These APIs are supported on the TPF 4.1 system but are not documented in the library. Some of the APIs included with this version of the parser may be different than those included with the original port of the XML parser (APAR PJ27634) on PUT 14. The information for the APIs was included with the ported code for XML4C parser 3.5.1 and is available in *XML on TPF: An Online User's Guide*. See Publication Changes on page 1247 for more information.

Database Changes

There are no changes.

Feature Changes

There are no changes.

Installation Validation

There are no changes.

Migration Scenarios

Use the following procedure to install XML4C parser 3.5.1 on your TPF 4.1 system:

1. Unpack program update tape (PUT) 16, which contains APAR PJ28176 for XML4C parser 3.5.1. See *TPF Memo to Licensees* for more information about unpacking the tape.
2. Copy the XML4C C/C++ language header files into an HFS so that they are available to application programmers. The directory structure must be maintained and any header files copied for XML parser (APAR PJ27634) on PUT 14 must be removed. See General Use C/C++ Language Header Files on page 1245 for more information about the XML4C header files.

3. Load the CXML link-edited module listed in Table 1247 on page 1246.
4. IPL your TPF 4.1 system.

Additional Information

- Listing files are available on a CD-ROM. See your IBM service representative for more information about these CD-ROMs.
- Source code information:
 1. The xml4c3_5_1.tpf.ascii.tar.Z tar file is provided and contains the XML Parser for C++ (XML4C) Version 3.5.1 source code. The files created after extracting this tar file contain source code, listings, samples, written information, and makefiles. (IBM does not, however, warrant that these makefiles will run in your development environment because these files may use tools that are not required for your TPF 4.1 system.) The tar file is provided **for your information only** and this source code is not supported on the TPF 4.1 system.
 2. Extracting the contents of the tar file will create a samples directory. The samples in this directory may be useful to programmers who are writing applications that interact with XML data. Directions for using these samples (included in *XML on TPF: An Online User's Guide*) assume that the programmers have access to the extracted samples directory.

PUT 16 Interface Changes by Authorized Program Analysis Report (APAR)

This information summarizes maintenance APAR interface changes for program update tape (PUT) 16.

Use the information documented here along with the following:

- The information provided for each PUT
- The APEDIT provided with each APAR.

Link to PUT 16 APEDITs

To view the APEDIT for an APAR listed in this section, go to <http://www.ibm.com/software/ts/tpf/maint/put16/put16.htm> for a list of all PUT 16 APEDITs. You will be prompted to enter your user name and password. If you are a current license holder and do not have a user name or cannot remember your user name or password, see your TPF representative for a user ID and password.

Each table in this section is ordered alphabetically by the name of the interface item. If there have been no changes for a particular interface item, the table will contain no information.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts

Table 1249 on page 1250 summarizes build script changes. This information is presented in alphabetic order by the name of the build script.

Table 1249. Build Script Changes by APAR

Build Script	New, Changed, or No Longer Supported?	APAR Number
BJ05BS	New	PJ28140
CJ10BS	Changed	PJ28386
CLSUBS	No Longer Supported	PJ28266
CTALBS	Changed	PJ28020

Dynamic Load Module (DLM) Stubs

There are no changes.

General Use C/C++ Language Header Files

Table 1250 summarizes general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the C/C++ language header file.

Table 1250. General Use C/C++ Language Header File Changes by APAR

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$dictist.h	Changed	No	PJ27890	Not Applicable
c\$eb0eb.h	Changed	No	PJ28218	Not Applicable
c\$idsinq.h	Changed	No	PJ28411	Not Applicable
c\$irdicb	Changed	No	PJ27887	Not Applicable
c\$pn1.h	Changed	No	PJ28399	Not Applicable
c\$to2.h	Changed	No	PJ28140	Not Applicable
c\$vfac.h	Changed	No	PJ28411	Not Applicable
icmp.h	Changed	No	PJ28229	Not Applicable
i\$matp.h	Changed	No	PJ27829	Not Applicable
opensslconf.h	Changed	No	PJ28369	Not Applicable
math.h	Changed	No	PJ28295	Not Applicable
modes.h	Changed	No	PJ28295	Not Applicable
string.h	Changed	No	PJ28295	Not Applicable
strings.h	Changed	No	PJ28295	Not Applicable
sysapi.h	Changed	No	PJ28020, PJ28178	Not Applicable
tpf_mail.h	Changed	No	PJ28396	Not Applicable
tpftape.h	Changed	No	PJ28411	Not Applicable
udp.h	Changed	No	PJ28229	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only)

Table 1251 summarizes the general use C/C++ language header file (IBM use only) changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language (IBM use only) header file.

Table 1251. Implementation-Specific C/C++ Language Header Files (IBM Use Only) Changes by APAR

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$mqqs.h	Changed	No	PJ28169, PJ27858, PJ27979	Not Applicable

Table 1251. Implementation-Specific C/C++ Language Header Files (IBM Use Only) Changes by APAR (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$to2b.h	Changed	No	PJ28386	Not Applicable
c\$to2m.h	Changed	No	PJ28140	Not Applicable
tpfmail.h	Changed	No	PJ28396	Not Applicable
tpfmaild.h	Changed	No	PJ28224, PJ28396	Not Applicable

Library Interface Scripts

Table 1252 summarizes library interface script changes. This information is presented in alphabetic order by the name of the library interface script.

Table 1252. Library Interface Script Changes by APAR

Library Interface Script	New, Changed, or No Longer Supported?	APAR Number
CJ00XV	Changed	PJ28140
CTALXV	Changed	PJ28020

Library Members (Object Files)

Table 1253 summarizes library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 1253. Library Member (Object File) Changes by APAR

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CDBINT	CISO	Changed	Object Code Only	PJ28235
CDDNPI	COMX	Changed	C Language	PJ28171, PJ28367
CFS181	COMX	Changed	C Language	PJ28367
CGTHBA	COMX	Changed	C Language	PJ28218
CICONT	CISO	Changed	C Language	PJ28372
CLDT	CLDT	Changed	C Language	PJ28411
CLDU	CELA	Changed	C Language	PJ28411
CLDV	CELA	Changed	C Language	PJ28411
CLD9	CLDT	Changed	C Language	PJ28411
CLES	CLES	Changed	C Language	PJ28411
CLMINT	CISO	Changed	Assembler	PJ28235
COLE	CELA	Changed	C Language	PJ28411
COLF	COLF	Changed	C Language	PJ28411
COLG	CELA	Changed	C Language	PJ28411
COLJ	CELA	Changed	C Language	PJ28411
COLX	COLX	Changed	C Language	PJ28411
COLY	COLY	Changed	C Language	PJ28411
CRLA	CLDT	Changed	C Language	PJ28411
CRLC	CRLC	Changed	C Language	PJ28411
CRLE	CELA	Changed	C Language	PJ28411
CSIGPA	COMX	Changed	C Language	PJ28400
CSIGSL	COMX	Changed	C Language	PJ28400

Table 1253. Library Member (Object File) Changes by APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CSIGWP	COMX	Changed	C Language	PJ28400
CXXFUN	CISO	Changed	Object Code Only	PJ28241
CYIELD	CTAL	New	Real-Time Assembler	PJ28020
C536	COMX	Changed	C Language	PJ28396
UELN	UELN	Changed	C Language	PJ28411

Link-Edited Modules

Table 1254 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1254. Link-Edited Module Changes by APAR

Link-Edited Module	New, Changed, or No Longer Supported?	APAR Number
CDBG	Changed	PJ27973
CEL5	No Changes – Must be relinked and loaded.	PJ28020
CEXP	Changed	PJ28234
CLER	No Changes – Must be relinked and loaded.	PJ28020
CMNA	Changed	PJ28396
CMNC	Changed	PJ28396
CMNG	Changed	PJ28396
CMNI	Changed	PJ28396
CMNJ	Changed	PJ28396
CMNM	Changed	PJ28396
CMNP	Changed	PJ28396
CMNS	Changed	PJ28396
CMNZ	Changed	PJ28396
CMN0	Changed	PJ28396
CMN1	Changed	PJ28396
CMN2	Changed	PJ28396
CMN3	Changed	PJ28396
CMN4	New	PJ28396
CMN5	New	PJ28396
CMN8	Changed	PJ28396
COMX	No Changes – Must relinked and loaded.	PJ28171, PJ28367, PJ28396, PJ28400
CPA0	Changed	PJ28255
CPLX	Changed	PJ27973
CPS0	No Changes – Must be relinked and loaded.	PJ28235, PJ28241, PJ28262, PJ28395, PJ28363

Table 1254. Link-Edited Module Changes by APAR (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	APAR Number
CRYP	Changed	PJ28369
CRY1	Changed	PJ28369
CRY2	Changed	PJ28369
CSSL	Changed	PJ28369
CSYL	Changed	PJ28203
CTAL	Changed	PJ28020
CTXO	No Changes – Must be relinked and loaded (PJ28171).	PJ28171, PJ28396
CUPH	No Changes – Must be relinked and loaded.	PJ28294

Members (Object Files)

Table 1255 summarizes member (object file) changes.

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

This information is presented in alphabetic order by the name of the member (object file).

Table 1255. Member (Object File) Changes by APAR

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
BJ02	BJ02	Changed	C++ Language	PJ28040
BJ04	BJ04	Changed	C++ Language	PJ28371
BJ05	BJ05	New	C++ Language	PJ28140
CDBS	CDBS	Changed	C Language	PJ28193
CEL5	CEL5	Changed	C Language	PJ28020
CFNDEC	CTAD	Changed	Real-Time Assembler	PJ28263
CINET4	CLTX	Changed	C Language	PJ28193
CJ111	CJ10	Changed	C Language	PJ28386
CJ115	CJ10	New	C Language	PJ28386
CLER	CLER	Changed	C Language	PJ28020
CLSU	CLSU	No Longer Supported	C Language	PJ28266
CLTQ	CLTN	Changed	C Language	PJ28229
CLTN	CLTN	Changed	C Language	PJ28229
CMACMD	CMAT	Changed	C Language	PJ27829
CMAP	CMAP	Changed	C Language	PJ27829
CMARTN	CMAT	Changed	C Language	PJ28209
CMATAB	CMAT	Changed	C Language	PJ27829
CMQBAT	CMQS	Changed	Object Code Only	PJ28017

Table 1255. Member (Object File) Changes by APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CMQCKP	CUIU	Changed	C++ Language	PJ28256
CMQERR	CMQS	Changed	Object Code Only	PJ27979
CMQFRM	CMQF	Changed	C++ Language	PJ28169
CMQFTR	CMQS	Changed	Object Code Only	PJ28335
CMQHSH	CMQS	Changed	C++ Language	PJ28466
CMQMCA	CMQS	Changed	Object Code Only	PJ27858
CMQMGR	CMQS	Changed	C++ Language	PJ27858
CMQMTR	CMQS	Changed	Object Code Only	PJ28335
CMQQUE	CMQS	Changed	C++ Language	PJ27979, PJ28017
CMQSWP	CMQS	Changed	C++ Language	PJ28221
CMQXLR	CMQX	Changed	C++ Language	PJ28228
CRDB	CRDA, CREA	Changed	C Language	PJ27887
CRDC	CRDA, CREA	Changed	C Language	PJ27887
CRDU	CRDU	Changed	C Language	PJ27953, PJ28353
CRDV	CRDU	Changed	C Language	PJ27953
CREB	CRDA, CREA	Changed	C Language	PJ27887
CREJ	CRDA, CREA	Changed	C Language	PJ27887
CREK	CRDA, CREA	Changed	C Language	PJ27887
CREO	CRDA, CREA	Changed	C Language	PJ27887
CRESIN	CTXO	Changed	C Language	PJ28396
CRFPTA	CMQS	Changed	Object Code Only	PJ28335
CRMSAA	CMQS	Changed	Object Code Only	PJ28289
CRMTRA	CMQS	Changed	Object Code Only	PJ27979
CSYLGD	CSYL	Changed	C Language	PJ28203
CSYLOG	CTXO	Changed	C Language	PJ28171
CTXOVE	CTXO	New	C Language	PJ28396
CUD0	CUD0	Changed	C Language	PJ27973
CUPH	CUPH	Changed	C Language	PJ28294
CUSCUL	CMQS	Changed	C++ Language	PJ28335, PJ28389

Object Code Only (OCO) Stubs

There are no changes.

Configuration Constant (CONKC) Tags

There are no changes.

Control Program Interface (CINFC) Tags

There are no changes.

Copy Members

Table 1256 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1256. Copy Member Changes by APAR

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CBU2M0	Control Program	Changed	CC3088	Not Applicable	PJ28090, PJ28230, PJ28268
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ28235
CCED	Control Program	Changed	CCENBK	Not Applicable	PJ28235, PJ28395
CCE7	Control Program	Changed	CCIISC	Not Applicable	PJ27890
CEDT	Control Program	Changed	CCCPSE	Not Applicable	PJ28177
CEFA	Control Program	Changed	CCTAPE	Not Applicable	PJ28262
CEFB	Control Program	Changed	CCTAPE	Not Applicable	PJ28125
CEFE	Control Program	Changed	CCTAPE	Not Applicable	PJ28219
CEFR	Control Program	Changed	CCTAPE	Not Applicable	PJ28057
CEFT	Control Program	Changed	CCTAPE	Not Applicable	PJ28167
CHSZ	Control Program	Changed	CCNUCL	Not Applicable	PJ28218
CICS	Control Program	Changed	CCNUCL	Not Applicable	PJ28306—Reassemble the CCNUCL CSECT and relink the CPS0 link-edited module.
CIEF	Control Program	Changed	CCCIEF	Not Applicable	PJ28131—Reassemble the CCCIEF CSECT and relink the CPS0 link-edited module.
CJ001	Real-Time Assembler	Changed	CJ003	CJ00	PJ28140, PJ28456 (Reassemble CJ003 CSECT and relink CJ00.)
CJ002	Real-Time Assembler	Changed	CJ000, CJ003, CJ004, CJ005, CJ006, CJ007	CJ00	PJ28140—Reassemble CSECTs CJ000, CJ003, CJ004, CJ005, CJ006, and CJ007, and relink CJ00.
CJ101	Real-Time Assembler	Changed	CJ100	CJ10	PJ28386
CJ103	Real-Time Assembler	Changed	CJ100	CJ10	PJ28155, PJ28386
CJ327	Real-Time Assembler	Changed	CJ005	CJ00	PJ28140
CJ328	Real-Time Assembler	Changed	CJ005	CJ00	PJ28226
CJ521	Real-Time Assembler	Changed	CJ004	CJ00	PJ28226
CJ721	Real-Time Assembler	Changed	CJ007	CJ00	PJ28226
CJ928	Real-Time Assembler	Changed	CJ007	CJ00	PJ28226
CJIM	Control Program	Changed	CCSONS	Not Applicable	PJ28159 – Relink the CPS0 link-edited module.
CJIR	Control Program	Changed	CCSONS	Not Applicable	PJ28358—Reassemble the CCSONS CSECT and relink the CPS0 link-edited module.
CJIU	Control Program	Changed	CCSONS	Not Applicable	PJ28205— Relink the CPS0 link-edited module.
CJIV	Control Program	Changed	CCRCSC	Not Applicable	PJ28205— Relink the CPS0 link-edited module.

Table 1256. Copy Member Changes by APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CLHP	Control Program	Changed	CCSTOR	Not Applicable	PJ28363—Reassemble the CCSTOR CSECT and relink the CPS0 link-edited module.
CLHV	Control Program	Changed	CCSTOR	Not Applicable	PJ28363—Reassemble the CCSTOR CSECT and relink the CPS0 link-edited module.
CLWP	Control Program	Changed	CCLAW3	Not Applicable	PJ28266
CLW8	Control Program	Changed	CCLAW3	Not Applicable	PJ28266
CPSM	Control Program	Changed	CCCPSE	Not Applicable	PJ28088—Reassemble the CCCPSE CSECT and relink the CPS0 link-edited module.
CS0J	Control Program	Changed	CCSNA1	Not Applicable	PJ28050—Updated to clear CCW index of inactivated CDRMs.
CS06	Control Program	Changed	CCSNA1	Not Applicable	PJ28312 – Relink the CPS0 link-edited module.
CS96	Control Program	Changed	CCSNA3	Not Applicable	PJ28070
CTIN	Control Program	Changed	CCCTIN	Not Applicable	PJ28363—Reassemble the CCCTIN CSECT and relink the CPS0 link-edited module.
CT09	Control Program	Changed	CCCTIN	Not Applicable	PJ28352
CT12	Control Program	Changed – Updated to correct an AOR timing problem. Re-link CPS0.	CCTCP2	Not Applicable	PJ28360
CT13	Control Program	Changed – Updated to correct an AOR timing problem. Re-link CPS0.	CCTCP2	Not Applicable	PJ28360
CT14	Control Program	Changed – Updated to correct an AOR timing problem. Re-link CPS0.	CCTCP2	Not Applicable	PJ28360
CTSM	Control Program	Changed	CCTCP3	Not Applicable	PJ28303—Reassemble the CCTCP3 CSECT and relink the CPS0 link-edited module.
CTTO	Control Program	Changed	CCTCP1	Not Applicable	PJ28237—Reassemble the CCTCP1 CSECT and relink the CPS0 link-edited module. PJ28303—Reassemble the CCTCP1 CSECT and relink the CPS0 link-edited module. PJ28348—Reassemble the CCTCP1 CSECT and relink the CPS0 link-edited module.
CTT6	Control Program	CCTCP1	Not Applicable	Changed	PJ28254—Reassemble the CCTCP1 CSECT and relink the CPS0 link-edited module.

Table 1256. Copy Member Changes by APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CT38	Control Program	Changed	CCCTIN	Not Applicable	PJ28162–Reassemble the CCCTIN CSECT and relink the CPS0 link-edited module. PJ28363–Reassemble the CCCTIN CSECT and relink the CPS0 link-edited module.
CUDU	Control Program	Changed	CCVAGE	Not Applicable	PJ28235
CVF3	Control Program	Changed	CCVFAC	Not Applicable	PJ28257 – Reassemble CCVFAC and link-edit the CPS0 link-edited module.
IB01	Offline Assembler	Changed	IPLB	Not Applicable	PJ28363–You must perform an IPL with the CLEAR option to ensure these changes are included.
IB02	Offline Assembler	Changed	IPLB	Not Applicable	PJ28363–You must perform an IPL with the CLEAR option to ensure these changes are included.
RTCU	Control Program	Changed	CCDBAF	Not Applicable	PJ28040

Fixed File Records

There are no changes.

Commands

Table 1257 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1257. Command Changes by APAR

Command	New, Changed, or No Longer Supported?	APAR Number
ZBROW ALTER	Changed	PJ28386
ZBROW DISPLAY	Changed	PJ28386
ZBROW DISPLAY	Changed	PJ28155
ZBROW QUALIFY	Changed	PJ28386
ZDTCP	Changed	PJ28195
ZFILT	New	PJ28213
ZINIP	Changed	PJ28213
ZIPDB	New	PJ28195
ZIPTR	Changed	PJ28213
ZSNMP	Changed	PJ28168
ZSQLD	Changed	PJ27953
ZSTAT	Changed	PJ28195

Macros

The following section summarizes the macro changes.

Advanced Program-to-Program Communications (APPC) Macros

There are no changes.

Communication Macros and Statements

There are no changes.

Data Macros

Table 1258 summarizes data macro changes.

Table 1258. Data Macro Changes by APAR

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?	APAR Number	Programs to Reassemble
DCTCWA	Changed	Yes	PJ28230, PJ28268	Reassemble CC3088 and link-edit CPS0.
DCTIST	Changed	Yes	PJ27890	Reassemble CCLHR, CCCPSE, CCCPSF, CCCTIN, CCLANG, CCMCKH, CCNUCL, CDCR, CLDL, CMVP, CNAH, CNBA, CQAD, CQAK, CQAL, CQAU, CVAN, CVAX, CVFE, CVOO, CZXR, GOGO, IPLB, and JCS0, and link-edit CPS0.
DLTEC	Changed	Yes	PJ28363	CCCPSE and CCCTIN
IBOCT	Changed	Yes	PJ28363	CCCPSE, CCCTIN, CCMCKH, CCSONS, IPLA, and IPLB.
IDSSST	Changed	No	PJ28094	Not Applicable
IDSSVH	Changed	Yes	PJ28363	CCSTOR and CCCTIN
IDSXTR	Changed	Yes	PJ28040	CCDBAF; link-edit BJ02 and CPS0.
IEQCE2	Changed	No	PJ28218	Not Applicable
IRDICB	Changed	No	PJ27887	Not Applicable
ISCFDT	Changed	No	PJ28266	Not Applicable
ISHCT	New	Yes	PJ28363	CCSTOR and CCCTIN
ISOCK	Changed	No	PJ28360	Not Applicable
ISTAK	Changed	Yes	PJ28364	CRIC
ITO2	Changed	No	PJ28140	Not Applicable

General Macros

Table 1259 summarizes general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 1259. General Macro Changes by APAR

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
CRESC	Changed	No	PJ28147	Not Applicable
EVNTC	Changed	No	PJ28147	Not Applicable

Selected Equate Macros

Table 1260 summarizes selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1260. Selected Equate Macro Changes by APAR

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
CZ1SE	Changed	No	PJ28340	Not Applicable
SYSEQ	Changed	No	PJ28286	Not Applicable
TAPEQ	Changed	Yes	PJ28057	Reassemble CCTAPE and COSK, and link-edit CPS0.

Structured Programming Macros (SPMs)

There are no changes.

Structured Programming Macros (SPMs) (IBM Use Only)

There are no changes.

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros)

Table 1261 summarizes system initialization program (SIP) skeleton and internal macro (inner macro) changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1261. SIP Skeleton and Internal Macro (Inner Macro) Changes by APAR

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?	APAR Number
SKCTKA	Changed	PJ28363
SKCTKB	Changed	PJ28363
SKFMTR	Changed	PJ28106
SPGLB	Changed	PJ28363
SPPBLD	Changed	PJ28016, PJ28296
SPPGML	Changed	PJ28020, PJ28140, PJ28266, PJ28286, PJ28396, PJ28386

System Initialization Program (SIP) Stage I Macros and Statements

Table 1262 on page 1260 summarizes system initialization program (SIP) Stage I macro and statement changes. See *TPF System Generation* for a complete description of the SIP Stage I macros. This information is presented in alphabetic order by the name of the SIP Stage I macro. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1262. SIP Stage I Macro and Statement Changes by APAR

SIP Stage I Macro	New, Changed, or No Longer Supported?	APAR Number
CORREQ	Changed	PJ28363—If you specify the SSPS parameter that is introduced by this APAR, assemble the SIP stage I deck and then assemble the generated keypoint A (CTKA) and keypoint B (CTKB) and load them to the system.
GENSIP	Changed	PJ28106

System Initialization Program (SIP) Stage II Macros

Table 1263 summarizes system initialization program (SIP) stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1263. SIP Stage II Macro Changes by APAR

SIP Stage II Macro	New, Changed, or No Longer Supported?	APAR Number
IBMPAL	Changed	PJ28140, PJ28169, PJ28266, PJ28369, PJ28396

System Communication Keypoint (SCK) Generation Macros

There are no changes.

System Macros

Table 1264 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 1264. System Macro Changes by APAR

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
BBEWP	Changed	Yes — TPF customers must assemble BCC0, BCC2, BWRA, BWRT, BRFM, BOFL, and BJ11. TPF Database Facility customers must assemble BRC2 and BRC9.	PJ28303	Not Applicable
IPSDC	Changed	No	PJ28303	Not Applicable

System Macros (IBM Use Only)

There are no changes.

Messages and System Errors

Table 1265 on page 1261 summarizes message and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information,

the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1265. Message and System Error Changes by APAR

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
009304	System Error	No Longer Supported	PJ27979
C62055	System Error	New	PJ28340
ACPF0011E	Online	New	PJ28011
BKP60007E	Online	New	PJ28140
BROW0460E	Online	No Longer Supported	PJ28155
BROW0480E	Online	New	PJ28155
BROW0601I	Online	No Longer Supported. This message has been replaced by BROW0607I.	PJ28386
BROW0606I	Online	New	PJ28386
BROW0607I	Online	New. This message replaces BROW0601I.	PJ28386
BROW0649W	Online	New	PJ28386
BROW0650W	Online	Changed. This is an information change only; there is no code change.	PJ28386
BROW0652E	Online	No Longer Supported	PJ28386
BROW0654E	Online	New	PJ28386
BROW0655E	Online	New	PJ28386
BROW0656E	Online	New	PJ28386
BROW0658E	Online	New	PJ28386
BROW1110I	Online	New	PJ28386
BROW1120I	Online	New	PJ28386
BROW1151E	Online	New	PJ28386
BROW1152E	Online	New	PJ28386
BROW1153E	Online	New	PJ28386
BROW1154E	Online	New	PJ28386
BROW1155E	Online	New	PJ28386
BROW1156E	Online	New	PJ28386
BROW1157E	Online	New	PJ28386
BROW1158E	Online	New	PJ28386
BROW1159E	Online	New	PJ28386
FILT0001I	Online	New	PJ28213
FILT0002I	Online	New	PJ28213
FILT0003E	Online	New	PJ28213
FILT0004E	Online	New	PJ28213
FILT0006E	Online	New	PJ28213
FILT0007E	Online	New	PJ28213
FILT0008E	Online	New	PJ28213

Table 1265. Message and System Error Changes by APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
FILT0009E	Online	New	PJ28213
FILT0010E	Online	New	PJ28213
IMAG0221I	Online	Changed	PJ28183 – Corrected system action and user response information.
IPDB0001I	Online	New	PJ28195
IPDB0010E	Online	New	PJ28195
IPDB0011E	Online	New	PJ28195
IPDB0012E	Online	New	PJ28195
IPDB0013E	Online	New	PJ28195
IPDB0014E	Online	New	PJ28195
IPDB0015E	Online	New	PJ28195
IPDB0016E	Online	New	PJ28195
IPDB0017E	Online	New	PJ28195
MATP0035I	Online	New	PJ27829
MQSC0349E	Online	New	PJ27979
MQSC0708E	Online	New	PJ28169
MQSC9996E	Online	New	PJ27672
MQSC9997E	Online	New	PJ27672
RECP0000A	Online	Changed	PJ28140
RECP0668E	Online	New	PJ28140
RFPC0009T	Online	Changed	PJ28139
RFPC0010T	Online	Changed	PJ28139
RFPC0012T	Online	Changed	PJ28139
RFPC0014T	Online	Changed	PJ28139
RFPC0015T	Online	Changed	PJ28139
RFPC0019T	Online	Changed	PJ28139
RFPC0128T	Online	Changed	PJ28139
RFPC0009T	Online	Changed	PJ28139
SMTP0005E	Online	New	PJ28396
SNMP0018I	Online	New	PJ28168
SNMP0019I	Online	New	PJ28168
SNMP0020E	Online	New	PJ28168
SNMP0021E	Online	New	PJ28168
SNMP0022E	Online	New	PJ28168
SQLD0117I	Online	Changed	PJ27953

Segments

Table 1266 on page 1263 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1266. Segment Changes by APAR

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
ACPF	Real-Time Assembler	Not Applicable	Changed	Updated to add a message ACPF0011E to report file address compute (FACE) program errors when ordinal numbers greater than 64 KB are in use.	PJ28011
ALDR	Offline Assembler	TPFLDR	Changed	Updated to display messages ALDR0901E, ALDR0902E, ALDR0903E, ALDR0904E, and ALDR0905E correctly.	PJ28202
BAM0	Real-Time Assembler	Not Applicable	Changed	Updated after label BAM0FL to branch to label BAM02I2 instead of BAM02I2F at the completion of the loop. Updated to save and restore R15 using EBW022 across the FREEC macro call. Updated to reload R15 with the slot number before the branch to BAM0VAC.	PJ28371
BAM1	Real-Time Assembler	Not Applicable	Changed	Updated to restore the registers correctly.	PJ28319
BCC2	Real-Time Assembler	Not Applicable	Changed	Updated to avoid losing addresses.	PJ28287
BCP1	Real-Time Assembler	Not Applicable	Changed	Updated to check register 15 for the proper return code value.	PJ28251
BKA0	Real-Time Assembler	Not Applicable	Changed	Updated to use new indicators returned by the RTCUC macro with the EXTRACT option to determine the unique attributes of a record type and save the information in the Recoup keypoint slot (PJ28040). Updated to move the location for activating the BRID segment. An additional activation point was also added (PJ28314).	PJ28040, PJ28314
BKP3	Real-Time Assembler	Not Applicable	Changed	Updated to ensure that all IPC requests to BJ05 were transmitted successfully.	PJ28140
BKP5	Real-Time Assembler	Not Applicable	Changed	Updated transfer vector BKP6 of program BKP5 to call DLM BJ05 after switching RTA tapes across the TPF complex during recoup processing.	PJ28140
BPDH	Real-Time Assembler	Not Applicable	Changed	Updated to change the hard-coded displacement into the current INDEX statement to a variable.	PJ28417
BRID	Real-Time Assembler	Not Applicable	Changed	Updated to zero the ID counts in #BRIDO8 before starting the recoup phase 2 ID merge. If restart is done, previous counts will be set to zero before starting the ID merge.	PJ28297
BRPT	Real-Time Assembler	Not Applicable	Changed	Updated to remove the OC operation; also, the test for zero is performed through an ICM operation.	PJ28320

Table 1266. Segment Changes by APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
BRUB	Real-Time Assembler	Not Applicable	Changed	Updated to allow a ZRBKD command entry if the line (first byte of the LNIATA) equals X'01', or the entire LNIATA equals that of either RTCDPRC or RTCDRO.	PJ28311
BRV3	Real-Time Assembler	Not Applicable	Changed	Updated to check register 15 for the proper return code value.	PJ28251
BSSC	Real-Time Assembler	Not Applicable	Changed	Updated to remove the activation of the BRID segment at the end of the prime group chase.	PJ28314
BSSD	Real-Time Assembler	Not Applicable	Changed	Updated to use new indicators returned by the RTCUC macro with the EXTRACT option to determine the unique attributes of a record type and save the information in the Recoup keypoint slot (PJ28040). Updated to move the location for activating segment BRID (PJ28314).	PJ28040, PJ28314
CAPC	Real-Time Assembler	Not Applicable	Changed	Updated to correct a problem with the ZECBL command. References to EBW004 have been changed to EBW080.	PJ28308
CAPD	Real-Time Assembler	Not Applicable	Changed	Updated to correct a problem with the ZECBL command. References to EBW004 have been changed to EBW080.	PJ28308
CBY0	Real-Time Assembler	Not Applicable	Changed	Updated to add support to MPIF for FICON channels.	PJ28268
CBY1	Real-Time Assembler	Not Applicable	Changed	Updated because MPIF paths may not connect when using 3088 MCCU devices after APAR PJ27391 is applied (PJ28268). Updated to add support to MPIF for FICON channels (PJ28268).	PJ28268, PJ28268
CCENBK	CSECT	Not Applicable	No Change	Reassemble this CSECT because of changes made to the CCEB and CCED copy members, and relink the CPS0 link-edited module.	PJ28235
CCTAPE	Assembler	Not Applicable	Not Applicable	Reassemble the CCTAPE tape control program to pick up changes to copy member CEFA.	PJ28262
CCVAGE	CSECT	Not Applicable	No Change	Reassemble this CSECT because of changes made to the CUDU copy member.	PJ28235
CFS152	C Language	Not Applicable	Changed	Updated to return a TPFCS BLOB when the corresponding file is deleted.	PJ28180
CFS154	C Language	Not Applicable	Changed	Updated for performance reasons.	PJ28180
CHDL	Real-Time Assembler	Not Applicable	Changed	Updated to issue system error C62055 when the AM0CCT field exceeds the logical block size.	PJ28340

Table 1266. Segment Changes by APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CLM2	Real-Time Assembler	Not Applicable	Changed	Updated to ensure that only the new connect device is set to be the connect device for the specified DASD subsystem.	PJ28388
CL21	Real-Time Assembler	Not Applicable	Changed	Updated to allow RLOG initialization (APAR PJ28261). Updated to replace DLAYC macros with YIELDC macros to avoid input list shutdown problems (APAR PJ28390).	PJ28261, PJ28390
CL24	Real-Time Assembler	Not Applicable	Changed	Updated to correct the setup of copy CCWs and replace DLAYC macros with YIELDC macros to avoid input list shutdown problems.	PJ28390
CL80	Real-Time Assembler	Not Applicable	Changed	Updated to use new TPFDF restricted macro DFIFB.	PJ28206
CL99	Real-Time Assembler	Not Applicable	Changed	Updated comments to allow customers to request initialization for find errors.	PJ28261
CMTB	Real-Time Assembler	Not Applicable	Changed	Updated to rearrange condition checks to prevent an OPR-4F1 dump.	PJ28265
CNAH	Real-Time Assembler	Not Applicable	Changed	Updated the SSST header to indicate that a processor is deactivated, before entering a SIPCC to all active processors in the complex.	PJ28153
CORE	Real-Time Assembler	Not Applicable	Changed	Updated to exit gracefully when tape library drives have been removed from the system during tape library device fill processing.	PJ28167
COSK	Real-Time Assembler	Not Applicable	Changed	Updated to reissue the failing command after a 1-second delay if the long busy condition still exists.	PJ28057
CPAA	Real-Time Assembler	Not Applicable	Changed	Updated after the call to CPAD to reset the lock suspension bit (MF1NOHLD) (APAR PJ28285). Updated to move the store halfword instruction above label CPAAEAAA1 in segment CPAA so that field MF2RCR cannot be corrupted (APAR PJ28315).	PJ28285, PJ28315
CRIC	Real-Time Assembler	Not Applicable	Changed	Updated to only send out RIP messages in CRAS state or above.	PJ28324
CSBV	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a C6204C dump from occurring when single LU 6.2 sessions are started.	PJ27978
CSCP	Real-Time Assembler	Not Applicable	Changed	Updated to indicate the proper device type when building a DISCONTACT command in response to a forced DACTVR command received.	PJ28327

Table 1266. Segment Changes by APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CSCQ	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a 0006DF dump from occurring if network control block (NCB) records are in virtual file access (VFA).	PJ28149
CSS1	Real-Time Assembler	Not Applicable	Changed	Updated to check that the SSTSMTX bit is reset in the RCS subsystem status table (SSST) memory entry when a control unit dismount is abandoned.	PJ28094
CSSA	Real-Time Assembler	Not Applicable	Changed	Updated to check that when an RCS subsystem status table (SSST) entry is filed to DASD, only file-relevant status indicators are filed. Memory-only status indicators will be reset.	PJ28094
CTFB	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a CTL-00C from occurring if you try to inactivate a socket and there are too many open sockets waiting to activate on request or activate on receipt.	PJ28197
CTF4	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a CTL-00C from occurring if you try to inactivate a socket and there are too many open sockets waiting to activate on request or activate on receipt.	PJ28197
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated to reset the DBI and SSU before the SYSTC SBDLOCK routine runs.	PJ28150
CTSA	Real-Time Assembler	Not Applicable	Changed	Updated to correct an AOR timing problem.	PJ28360
CTSG	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a CTL-3 error.	PJ28161
CTSW	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a possible CTL-4 or tight loop error.	PJ28237
CTS6	Real-Time Assembler	Not Applicable	Changed	Updated to post all pending ECBs when a close() function is issued.	PJ28303
CTS7	Real-Time Assembler	Not Applicable	Changed	Updated to correct an AOR timing problem.	PJ28360
CVAA	Real-Time Assembler	Not Applicable	Changed	Updated to process the ZNKEY command when TCP/IP native stack or OSA-Express support is enabled in the system without SNA and CLAW support enabled.	PJ28321
CVAN	Real-Time Assembler	Not Applicable	Changed	Updated to ensure that the ZDCOR command displays all of the bytes in an instruction.	PJ28245
DRDC	Real-Time Assembler	Not Applicable	Changed	Updated to retrieve the processor ID for all systems, including base-only systems.	PJ28139
DRDY	Real-Time Assembler	Not Applicable	Changed	Updated to change the valid configuration table for short-term pools (CY\$RST2) to have a length of two bytes.	PJ28139

Table 1266. Segment Changes by APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
DRD6	Real-Time Assembler	Not Applicable	Changed	Updated so that DRD6 no longer forces you to specify VFAF=NO on the ZRTDM MODIFY command if you want to change any other characteristic for record IDs X'00FF' and X'00E0'.	PJ28144
DRVA	Assembler	DRIVERA	Changed	Updated to use the NOSEARCH and NOLSEARCH parameters to override any SEARCH and LSEARCH installation defaults.	PJ27959
DRVA	Assembler	DRIVERA	Changed	Updated so that SIP-compiled C++ programs are compiled with the NOMARGINS parameter.	PJ28431—Link-edit the DRIVERA and MASM segments.
DYDN	Real-Time Assembler	Not Applicable	Changed	Updated to check register 15 for the proper return code value.	PJ28251
FTRG05	C Language	FCTBG	Changed	Updated to display I-streams greater than 9 for the USER and OWNER fields.	PJ28192
FTVA03	Offline C Language	FCTB	Changed	Updated to remove checking for obsolete record types #PSTCUR, #PSTNEW, and #SONSP. The number of ordinals required for record types #SRM41A8 and #SRM51A8 are now checked only by GENR.	PJ28192
TLDRMN	Offline C Language	TPFLDR	Changed	Updated to display messages ALDR0901E, ALDR0902E, ALDR0903E, ALDR0904E, and ALDR0905E correctly.	PJ28202
UIS2	Real-Time Assembler	Not Applicable	Changed	Updated to ensure that the last line of a scrolling message is displayed.	PJ27948

System Equates

There are no changes.

User Exits

There are no changes.

Appendix. PUT 2–15 Interface Changes by Authorized Program Analysis Report (APAR)

This appendix summarizes PUT 2–15 interface changes (by PUT and APAR) for:

- Small programming enhancements (SPEs) documented in each chapter of this book for each program update tape (PUT) (only changes for commands, and messages and system errors are documented in this appendix; the remaining interface changes, such as segments, are documented in the chapter reserved for that SPE. For example, if you are looking for segment changes for dynamic LU support, see “Dynamic LU Support (APAR PJ21044)” on page 180 for more information.)
- TARGET(TPF) to ISO-C migration APARs.
- Maintenance APARs.

Use the information documented in this appendix along with:

- The information provided in each chapter for each PUT
- The APEDIT provided with each APAR.

Each table in this appendix is ordered sequentially by the latest PUT and then alphabetically by the name of the interface item. For example, Table 1292 on page 1369 is ordered by the message ID or system error number.

C/C++ Language

The following section summarizes C/C++ language changes. This information is presented in alphabetic order by the type of C/C++ language information. See the *TPF C/C++ Language Support User's Guide* and *TPF Application Programming* for more information about the C/C++ language.

Build Scripts

Table 1267 summarizes build script changes. This information is presented in alphabetic order by the name of the build script.

Table 1267. Build Script Changes by PUT and APAR

Build Script	New, Changed, or No Longer Supported?	APAR Number
PUT 15		
CISOBS	Changed	PJ27954, PJ27786
CLNMBS	New	PJ27786
CMLMBS	New	PJ27786
COMXBS	Changed	PJ27786
CSNMBS	New	PJ27786
USUDBS	New	PJ27786
PUT 14		
CFIABS	Changed	PJ27094
CISOBS	Changed	PJ27367
CJ01BS	Changed	PJ27380
CLDKBS	No Longer Supported	PJ27746
COMXBS	Changed	PJ26712
PUT 13		

Table 1267. Build Script Changes by PUT and APAR (continued)

Build Script	New, Changed, or No Longer Supported?	APAR Number
CFIDBS	Changed	PJ27078
CFLNBS	Changed	PJ27299
CLM8BS	Changed	PJ27302
CLTNBS	Changed	PJ27227
CISOBS	Changed	PJ27317
PUT 12		
CDCABS	New	PJ27095
CDCBBS	New	PJ27095
CDCOBS	New	PJ27095
CDCPBS	New	PJ27095
CFTPBS	New	PJ27028
CISOBS	Changed	PJ21337
CISOBS	Changed	PJ27028
CISOBS	Changed	PJ27159
CLTVBS	Changed	PJ26434
CL51BS	New	PJ21337
CL52BS	New	PJ21337
CL53BS	New	PJ21337
CL54BS	New	PJ21337
CL55BS	New	PJ21337
CL56BS	New	PJ21337
CL57BS	New	PJ21337
CL58BS	New	PJ21337
CL59BS	New	PJ21337
CL60BS	New	PJ21337
CL61BS	New	PJ21337
CL62BS	New	PJ21337
CL63BS	New	PJ21337
CL64BS	New	PJ21337
CL65BS	New	PJ21337
CL66BS	New	PJ21337
CL67BS	New	PJ21337
CL68BS	New	PJ21337
CL69BS	New	PJ21337
CL70BS	New	PJ21337
CL71BS	New	PJ21337
CL72BS	New	PJ21337
COMXBS	Changed	PJ26895
CPP1BS	No Longer Supported	PJ26967
CRPCBS	No Longer Supported	PJ21337
CUDABS	Changed	PJ26765, PJ26864
CUD2BS	Changed	PJ26864
PUT 11		
CBOTBS	Changed	PJ26713

Table 1267. Build Script Changes by PUT and APAR (continued)

Build Script	New, Changed, or No Longer Supported?	APAR Number
CFINBS	Changed	PJ26713
CFZFBS	Changed	PJ26713
CFZIBS	Changed	PJ26713
CJ10BS	Changed	PJ26522
CLTVBS	Changed	PJ25761, PJ26515
CLTWBS	Changed	PJ25761
CLTXBS	Changed	PJ26515
CLTYBS	Changed	PJ26515
CLTZBS	New	PJ25761, PJ26515
CMATBS	Changed	PJ26671
CMQSBS	Changed	PJ26498
COMXBS	Changed	PJ26713
CRP1BS	No Longer Supported – Remove the build script from your libraries.	PJ26809
CRP2BS	No Longer Supported – Remove the build script from your libraries.	PJ26809
CRPCBS	No Longer Supported – Remove the build script from your libraries.	PJ26809
CTHDBS	No Longer Supported – Remove the build script from your libraries.	PJ26809
CVXSBS	New	PJ26534
JCI1BS	Changed	PJ26713
UFHCBS	No Longer Supported	PJ26384
UFHPBS	No Longer Supported	PJ26384
UFHQBS	No Longer Supported	PJ26384
PUT 10		
CDBPBS	Changed	PJ25981
CDBSBS	Changed	PJ25981
CFIFBS	New	PJ26174
CFIGBS	New	PJ26174
CFIHBS	New	PJ26174
CFIJBS	New	PJ26174
CFIKBS	New	PJ26174
CFILBS	New	PJ26174
CFIMBS	Changed	PJ26174
CFIOBS	New	PJ26174
CFIPBS	New	PJ26174
CFIQBS	New	PJ26174
CFIRBS	New	PJ26174
CFISBS	New	PJ26174
CFIVBS	New	PJ26174
CFI1BS	New	PJ26174
CFI2BS	New	PJ26174

Table 1267. Build Script Changes by PUT and APAR (continued)

Build Script	New, Changed, or No Longer Supported?	APAR Number
CFI7BS	New	PJ26174
CISOBS	Changed	PJ26008
CLDFBS	Changed	PJ25981
COLHBS	Changed	PJ25981
CPA0BS	New	PJ25983
CPGABS	New	PJ25983
CRL1BS	Changed	PJ25981
CTALBS	Changed	PJ25981
CUDABS	New	PJ25981
CUD0BS	New	PJ25981
CUD1BS	New	PJ25981
CUD2BS	New	PJ25981
CUPHBS	New	PJ25880
CUPTBS	New	PJ25880
UFHABS	New	PJ26125
UFHBBS	New	PJ26125
UFHCBS	New	PJ26125
UFHDBS	New	PJ26125
UFHEBS	New	PJ26125
UFHFBS	New	PJ26125
UFHGBS	New	PJ26125
UFHOBS	New	PJ26125
UFHPBS	New	PJ26125
UFHQBS	New	PJ26125
PUT 8		
CBOTBS	Changed	PJ25266
CDPLBS	New	PJ25075
CFZFBS	Changed	PJ25266
CFZIBS	Changed	PJ25266
CISOBS	Changed	PJ25240
COMXBS	Changed	PJ25266
CTBXBS	Changed	PJ25174
PUT 6		
CENVBS	New	PJ23923
CISOBS	Changed	PJ23923
CDFTBS	New	PJ23297
CSRABS	New	PJ21693
CVRIBS	Changed	PJ23526
CTALBS	Changed	PJ23923
CZXGBS	New	PJ21708
CZXKBS	New	PJ21708
UENVBS	New	PJ23923
PUT 5		
CISOBS	Changed	PJ21907

Table 1267. Build Script Changes by PUT and APAR (continued)

Build Script	New, Changed, or No Longer Supported?	APAR Number
CNAMBS	New	PJ21705
CORDBS	New	PJ21709
CSFXBS	New	PJ21706
CTUUBS	New	PJ21701
PUT 4		
CELABS	New	PJ20388
CELCBS	New	PJ20388
CELDDBS	New	PJ20388
CELEBS	New	PJ20388
CELFBS	New	PJ20388
CELMBS	New	PJ20388
CELNBS	New	PJ20388
CELOBBS	New	PJ20388
CELPBS	New	PJ20388
CELRBS	New	PJ20388
CELTBS	New	PJ20388
CELUBS	New	PJ20388
CELVBS	New	PJ20388
CELWBS	New	PJ20388
CELXBS	New	PJ20388
CELYBS	New	PJ20388
CELZBS	New	PJ20388
CEL0BS	New	PJ20388
CEL2BS	New	PJ20388
CEL4BS	New	PJ20388
CEL5BS	New	PJ20388
CEL6BS	New	PJ20388
CEL7BS	New	PJ20388
CEL8BS	New	PJ20388
CLCSBS	New	PJ22389
CLCUBS	New	PJ22389
CLDABS	New	PJ20388
CLDBBS	New	PJ20388
CLDCBS	New	PJ20388
CLDIBS	New	PJ20388
CLDKBS	New	PJ20388
CLDOBS	New	PJ20388
CLDPBS	New	PJ20388
CLDQBS	New	PJ20388
CLDRBS	New	PJ20388
CLDSBS	New	PJ20388
CLDTBS	New	PJ20388
CLDXBS	New	PJ20388
CLD7BS	New	PJ20388

Table 1267. Build Script Changes by PUT and APAR (continued)

Build Script	New, Changed, or No Longer Supported?	APAR Number
CLD8BS	New	PJ20388
CLEABS	New	PJ20388
CLECBS	New	PJ20388
CLEDBS	New	PJ20388
CLEEBBS	New	PJ20388
CLEFBS	New	PJ20388
CLEGBS	New	PJ20388
CLEIBS	New	PJ20388
CLEJBS	New	PJ20388
CLELBS	New	PJ20388
CLEMBBS	New	PJ20388
CLEQBS	New	PJ20388
CLERBS	New	PJ20388
CLESBS	New	PJ20388
CLETBS	New	PJ20388
CLEVBS	New	PJ20388
CLEWBS	New	PJ20388
CLEYBS	New	PJ20388
CLEZBS	New	PJ20388
CLE4BS	New	PJ20388
CLE6BS	New	PJ20388
CLE7BS	New	PJ20388
CLE8BS	New	PJ20388
COLCBS	New	PJ20388
COLFBS	New	PJ20388
COLHBS	New	PJ20388
COLIBS	New	PJ20388
COLMBS	New	PJ20388
COLOBBS	New	PJ20388
COLQBS	New	PJ20388
COLSBS	New	PJ20388
COLVBS	New	PJ20388
COLWBS	New	PJ20388
COLXBS	New	PJ20388
COLYBS	New	PJ20388
COLZBS	New	PJ20388
COL0BS	New	PJ20388
COL1BS	New	PJ20388
COL3BS	New	PJ20388
COL4BS	New	PJ20388
COL5BS	New	PJ20388
COL6BS	New	PJ20388
COL7BS	New	PJ20388
COL8BS	New	PJ20388

Table 1267. Build Script Changes by PUT and APAR (continued)

Build Script	New, Changed, or No Longer Supported?	APAR Number
CRLBBS	New	PJ20388
CRLCBS	New	PJ20388
CRLGBS	New	PJ20388
CRLHBS	New	PJ20388
CRLIBS	New	PJ20388
CRLQBS	New	PJ20388
CVA7BS	New	PJ20388
CYB2BS	New	PJ20388
UELCBS	New	PJ20388
UELDBS	New	PJ20388
UELEBS	New	PJ20388
UELFBS	New	PJ20388
UELGBS	New	PJ20388
UELHBS	New	PJ20388
UELLBS	New	PJ20388
UELMBS	New	PJ20388
UELNBS	New	PJ20388
UELUBS	New	PJ20388
UELWBS	New	PJ20388
UELXBS	New	PJ20388
UEL1BS	New	PJ20388

Dynamic Load Module (DLM) Stubs

Table 1268 summarizes dynamic load module (DLM) stub changes. This information is presented in alphabetic order by the name of the DLM stub.

Table 1268. Dynamic Load Module (DLM) Stub Changes by PUT and APAR

DLM Stub	New or No Longer Supported?	APAR Number
PUT 15		
CL13	New	PJ27925
CMLM	New	PJ27786
USUD	New	PJ27786
PUT 12		
CDB0	New	PJ26793
PUT 10		
CUPH	New	PJ25880, PJ26330
CUPT	New	PJ25880
PUT 6		
CYYA	New	PJ21693
CZXI	New	PJ21708
CZXM	New	PJ21708
PUT 5		
CFDS	New	PJ21701
PUT 4		

Table 1268. Dynamic Load Module (DLM) Stub Changes by PUT and APAR (continued)

DLM Stub	New or No Longer Supported?	APAR Number
CELC	New	PJ20388
CELD	New	PJ20388
CELM	New	PJ20388
CELN	New	PJ20388
CELO	New	PJ20388
CELP	New	PJ20388
CELR	New	PJ20388
CELT	New	PJ20388
CELU	New	PJ20388
CELV	New	PJ20388
CELW	New	PJ20388
CELX	New	PJ20388
CELY	New	PJ20388
CELZ	New	PJ20388
CEL0	New	PJ20388
CEL2	New	PJ20388
CEL3	New	PJ20388
CEL4	New	PJ20388
CEL8	New	PJ20388
CIPX	New	PJ20388
CLDA	New	PJ20388
CLDC	New	PJ20388
CLDI	New	PJ20388
CLDO	New	PJ20388
CLDP	New	PJ20388
CLDQ	New	PJ20388
CLDR	New	PJ20388
CLDS	New	PJ20388
CLDT	New	PJ20388
CLDX	New	PJ20388
CLD1	New	PJ20388
CLD7	New	PJ20388
CLD8	New	PJ20388
CLEA	New	PJ20388
CLEC	New	PJ20388
CLED	New	PJ20388
CLEE	New	PJ20388
CLEF	New	PJ20388
CLEG	New	PJ20388
CLEJ	New	PJ20388
CLEK	New	PJ20388
CLEL	New	PJ20388
CLEQ	New	PJ20388
CLER	New	PJ20388
CLET	New	PJ20388

Table 1268. Dynamic Load Module (DLM) Stub Changes by PUT and APAR (continued)

DLM Stub	New or No Longer Supported?	APAR Number
CLEU	New	PJ20388
CLEV	New	PJ20388
CLEW	New	PJ20388
CLEY	New	PJ20388
CLEZ	New	PJ20388
CLE4	New	PJ20388
CLE6	New	PJ20388
CLE7	New	PJ20388
CLE8	New	PJ20388
COLC	New	PJ20388
COLF	New	PJ20388
COLH	New	PJ20388
COLI	New	PJ20388
COLM	New	PJ20388
COLO	New	PJ20388
COLQ	New	PJ20388
COLS	New	PJ20388
COLV	New	PJ20388
COLW	New	PJ20388
COLY	New	PJ20388
COL1	New	PJ20388
COL3	New	PJ20388
COL4	New	PJ20388
COL5	New	PJ20388
COL6	New	PJ20388
COL7	New	PJ20388
COL8	New	PJ20388
CRLB	New	PJ20388
CRLC	New	PJ20388
CRLG	New	PJ20388
CRLH	New	PJ20388
CRLI	New	PJ20388
CRLQ	New	PJ20388
CYAS	New	PJ20388
UELB	New	PJ20388
UELC	New	PJ20388
UELD	New	PJ20388
UELE	New	PJ20388
UELF	New	PJ20388
UELG	New	PJ20388
UELL	New	PJ20388
UELN	New	PJ20388
UELU	New	PJ20388
UELW	New	PJ20388
UELX	New	PJ20388

Table 1268. Dynamic Load Module (DLM) Stub Changes by PUT and APAR (continued)

DLM Stub	New or No Longer Supported?	APAR Number
UEL1	New	PJ20388
UF00	New	PJ20388

General Use C/C++ Language Header Files

Table 1269 summarizes general use C/C++ language header file changes. This information is presented in alphabetic order by the name of the C/C++ language header file.

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
PUT 15				
amqusrw.h	Changed	Yes	PJ27830	Not Applicable
c\$cmqxc.h	Changed	Yes	PJ27830	Not Applicable
c\$dadfq.h	Changed	No	PJ27727	Not Applicable
c\$fva0.h	Changed	No	PJ27951	Not Applicable
c\$isc1nt.h	Changed	No	PJ27379	Not Applicable
c\$mqcp.h	Changed	No	PJ27674	Not Applicable
c\$mqmg.h	Changed	Yes	PJ28104 corrects APAR PJ27023	Recompile CMQMGC, CMQMGR, CMQMRM, CMQMVM, and link-edit CMQS and CMQM.
c\$mqrm.h	Changed	No	PJ27925	Not Applicable
c\$mqs.h	Changed	No	PJ27854, PJ27830	Not Applicable
i\$dgrp.h	Changed	Yes	PJ27993	Recompile CPWGR0 and CPWGT1, and link-edit COMX.
i\$matp.h	Changed	No	PJ28065	Not Applicable
stdio.h	Changed	No	PJ27835	Not Applicable
sysgtime.h	Changed	No	PJ28152	Not Applicable
syslog.h	Changed	No	PJ27855	Not Applicable
tpfapi.h	Changed	No	PJ27835	Not Applicable
unistd.h	Changed	No	PJ27835	Not Applicable
PUT 14				
asclocal.h	New	No	PJ27627	Not Applicable
c\$cinfc.h	Changed	No	PJ27530	Not Applicable
c\$ck1ke.h	Changed	No	PJ27446	Not Applicable
c\$ck2sn.h	Changed	No	PJ26334	Not Applicable
c\$dctist.h	Changed	No	PJ27479	Not Applicable
c\$decb.h	Changed	No	PJ27479	Not Applicable
c\$dgrp.h	No Longer Supported	No	PJ27479	Not Applicable
c\$dpwd.h	No Longer Supported	No	PJ27479	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$eb0eb.h	Changed	No	PJ27530, PJ27445	Not Applicable
c\$idse1d.h	Changed	No	PJ27530, PJ27605	Not Applicable
c\$idse1v.h	Changed	No	PJ27530	Not Applicable
c\$idsemr.h	Changed	No	PJ27530	Not Applicable
c\$idslst.h	Changed	No	PJ27692	Not Applicable
c\$iedctl.h	Changed	No	PJ27479	Not Applicable
c\$iptbl.h	Changed	No	PJ27479	Not Applicable
c\$iscfdt.h	Changed	No	PJ27479	Not Applicable
c\$isc1nt.h	Changed	No	PJ27479	Not Applicable
c\$isiucv.h	Changed	No	PJ27479	Not Applicable
c\$miob.h	Changed	No	PJ27479	Not Applicable
c\$mqs.h	Changed	No	PJ27274, PJ27555	Not Applicable
c\$proc.h	Changed	No	PJ27479	Not Applicable
c\$pwgr.h	No Longer Supported	No	PJ27479	Not Applicable
c\$rhtb.h	Changed	No	PJ27479	Not Applicable
c\$to2.h	Changed	No	PJ27380, PJ27390	Not Applicable
c\$vfac.h	Changed	No	PJ27479	Not Applicable
claw.h	Changed	No	PJ27479	Not Applicable
features.h	Changed	No	PJ27367	Not Applicable
float.h	Changed	No	PJ27367	Not Applicable
fnmatch.h	Changed	No	PJ27479	Not Applicable
fstream.h	Changed	No	PJ27627, PJ27479	Not Applicable
fts.h	Changed	No	PJ27479	Not Applicable
generic.h	Changed	No	PJ27627, PJ27479	Not Applicable
i\$tmcr.h	Changed	No	PJ27460, PJ27446	Not Applicable
iapp.hpp	New	No	PJ27627	Not Applicable
ibase.hpp	New	No	PJ27627	Not Applicable
ibhandle.hpp	New	No	PJ27627	Not Applicable
ibhandle.inl	New	No	PJ27627	Not Applicable
ibuffer.hpp	New	No	PJ27627	Not Applicable
ibuffer.inl	New	No	PJ27627	Not Applicable
icconst.h	New	No	PJ27627	Not Applicable
icconsta.h	New	No	PJ27627	Not Applicable
idate.hpp	New	No	PJ27627	Not Applicable
idate.inl	New	No	PJ27627	Not Applicable
idbcsbuf.hpp	New	No	PJ27627	Not Applicable
idbcsbuf.inl	New	No	PJ27627	Not Applicable
idecfunc.hpp	New	No	PJ27627	Not Applicable
idecimal.hpp	New	No	PJ27627	Not Applicable
idecimal.inl	New	No	PJ27627	Not Applicable
idecima2.inl	New	No	PJ27627	Not Applicable
ievtdata.hpp	New	No	PJ27627	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
ievtdata.inl	New	No	PJ27627	Not Applicable
iexcbase.hpp	New	No	PJ27627	Not Applicable
iexcept.hpp	New	No	PJ27627	Not Applicable
imprintf.h	New	No	PJ27627	Not Applicable
imsgtext.hpp	New	No	PJ27627	Not Applicable
inotifev.hpp	New	No	PJ27627	Not Applicable
inotifev.inl	New	No	PJ27627	Not Applicable
inotify.hpp	New	No	PJ27627	Not Applicable
iobsvr.hpp	New	No	PJ27627	Not Applicable
iobslst.hpp	New	No	PJ27627	Not Applicable
iomanip.h	Changed	No	PJ27479	Not Applicable
iostream.h	Changed	No	PJ27627, PJ27479	Not Applicable
ip.h	Changed	No	PJ27479	Not Applicable
irefcnt.hpp	New	No	PJ27627	Not Applicable
ireslock.hpp	New	No	PJ27627	Not Applicable
ireslock.inl	New	No	PJ27627	Not Applicable
irtllock.h	Changed	No	PJ27627, PJ27479	Not Applicable
istdntfy.hpp	New	No	PJ27627	Not Applicable
istparse.hpp	New	No	PJ27627	Not Applicable
istrenum.hpp	New	No	PJ27627	Not Applicable
istring.hpp	New	No	PJ27627	Not Applicable
istring.inl	New	No	PJ27627	Not Applicable
istrtest.hpp	New	No	PJ27627	Not Applicable
istrtest.inl	New	No	PJ27627	Not Applicable
isynonym.hpp	New	No	PJ27627	Not Applicable
ithread.hpp	New	No	PJ27627	Not Applicable
ithread.inl	New	No	PJ27627	Not Applicable
itime.hpp	New	No	PJ27627	Not Applicable
itime.inl	New	No	PJ27627	Not Applicable
itmstamp.hpp	New	No	PJ27627	Not Applicable
itmstamp.inl	New	No	PJ27627	Not Applicable
itrace.hpp	New	No	PJ27627	Not Applicable
itrace.inl	New	No	PJ27627	Not Applicable
ivbase.hpp	New	No	PJ27627	Not Applicable
i0string.hpp	New	No	PJ27627	Not Applicable
i0string.inl	New	No	PJ27627	Not Applicable
langinfo.h	Changed	No	PJ27479	Not Applicable
lc_core.h	Changed	No	PJ27479	Not Applicable
limits.h	Changed	No	PJ27367	Not Applicable
list.h	No Longer Supported	No	PJ27772	Not Applicable
localdef.h	Changed	No	PJ27479	Not Applicable
mman.h	Changed	No	PJ27479	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
modes.h	Changed	No	PJ27479	Not Applicable
monetary.h	Changed	No	PJ27479	Not Applicable
namei.h	Changed	No	PJ27479	Not Applicable
nl_types.h	Changed	No	PJ27479	Not Applicable
poll.h	Changed	No	PJ27479	Not Applicable
portaf.h	Changed	No	PJ27479	Not Applicable
regex.h	Changed	No	PJ27479	Not Applicable
regex.h	Changed	No	PJ27479	Not Applicable
resolv.h	Changed	No	PJ27479	Not Applicable
socket.h	Changed	No	PJ27607	Not Applicable
stdefs.h	Changed	No	PJ27479	Not Applicable
stdiostream.h	Changed	No	PJ27479	Not Applicable
stdlib.h	Changed	No	PJ27627	Not Applicable
stdlib.h	Changed	No	PJ27367	Not Applicable
stream.h	Changed	No	PJ27627, PJ27479	Not Applicable
strstream.h	Changed	No	PJ27627, PJ27479	Not Applicable
uheap.h	Changed	No	PJ27479	Not Applicable
uio.h	Changed	No	PJ27479, PJ27607	Not Applicable
variant.h	Changed	No	PJ27479	Not Applicable
vnode.h	Changed	No	PJ27479	Not Applicable
wchar.h	Changed	No	PJ27367	Not Applicable
wctype.h	Changed	No	PJ27479	Not Applicable
PUT 13				
adata.h	Changed	Yes	PJ27339	Not Applicable
c\$cfreq.h	Changed	No	PJ27299	Not Applicable
c\$cfllp.h	Changed	No	PJ27302	Not Applicable
c\$cinfc.h	Changed	No	PJ26794	Not Applicable
c\$cklke.h	Changed	Yes	PJ27087	Not Applicable
c\$cklke.h	Changed	Yes	PJ27373	Not Applicable
c\$fapi.h	Changed	No	PJ27299	Not Applicable
c\$fva0.h	Changed	No	PJ27305	Not Applicable
c\$mq.s.h	Changed	No	PJ27355	Not Applicable
c\$mq.s.h	Changed	Yes	PJ27190	Not Applicable
c\$mq.s.h	Changed	Yes	PJ27199	Not Applicable
c\$rvlrt.h	Changed	No	PJ27086	Not Applicable
i\$matp.h	Changed	No	PJ26858	Not Applicable
i\$opfd.h	Changed	No	PJ27013	Not Applicable
plfapi.h	Changed	No	PJ27272	Not Applicable
tpfapi.h	Changed	No	PJ26767	Not Applicable
PUT 12				
c\$an0nt.h	Changed	Yes	PJ26943	Not Applicable
c\$cfcb.h	Changed	No	PJ26714	Not Applicable
c\$cfco.h	Changed	No	PJ26714	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$cfdi.h	Changed	No	PJ26714	Not Applicable
c\$cfreq.h	Changed	No	PJ26841, PJ26919	Not Applicable
c\$cfsb.h	Changed	No	PJ26714	Not Applicable
c\$cftt.h	Changed	No	PJ26714	Not Applicable
c\$cfvb.h	Changed	No	PJ26714	Not Applicable
c\$cinfc.h	Changed	No	PJ26721	Not Applicable
c\$eb0eb.h	Changed	No	PJ26775	Not Applicable
c\$eb0eb.h	Changed	No	PJ26746, PJ26914	Not Applicable
c\$eb0eb.h	Changed	No	PJ26721, PJ26793	Not Applicable
c\$idspat.h	Changed	No	PJ26211	Not Applicable
c\$iscddt.h	Changed	No	PJ26727	Not Applicable
c\$msct.h	Changed	No	PJ26714	Not Applicable
c\$pn1.h	Changed	No	PJ26714	Not Applicable
c\$psfb.h	Changed	No	PJ26714	Not Applicable
c\$pwgr.h	Changed	No	PJ26714	Not Applicable
c\$stdhd.h	Changed	No	PJ26781	Not Applicable
c\$syseq.h	Changed	No	PJ27095	Not Applicable
c\$thex.h	New	No	PJ26944	Not Applicable
c\$to2.h	Changed	No	PJ26714	Not Applicable
c\$to2r.h	Changed	No	PJ26714	Not Applicable
c\$trmeq.h	Changed	No	PJ26873	Not Applicable
c\$udeq.h	Changed	No	PJ26714	Not Applicable
c\$vfac.h	Changed	No	PJ26959	Not Applicable
collate.h	Changed	No	PJ21337	Not Applicable
cobolbas.h	New	No	PJ26944	Not Applicable
codesets.h	New	No	PJ26944	Not Applicable
codestbh.h	New	No	PJ26944	Not Applicable
cpconver.h	New	No	PJ26944	Not Applicable
csmgmt.h	New	No	PJ26944	Not Applicable
dce.h	New	No	PJ26944	Not Applicable
dceerror.h	New	No	PJ26944	Not Applicable
dcemsg.h	New	No	PJ26944	Not Applicable
dcemsgmsg.h	New	No	PJ26944	Not Applicable
dcemvs.h	New	No	PJ26944	Not Applicable
dcerpcmsg.h	New	No	PJ26944	Not Applicable
dcerpcsvc.h	New	No	PJ26944	Not Applicable
dcesvc.h	New	No	PJ26944	Not Applicable
dcesvcmacro.h	New	No	PJ26944	Not Applicable
dcesvcmsg.h	New	No	PJ26944	Not Applicable
dlltypes.h	New	No	PJ26944	Not Applicable
errno.h	Changed	No	PJ21337	Not Applicable
fcntl.h	Changed	No	PJ26714	Not Applicable
fnmatch.h	New	No	PJ21337	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
grp.h	Changed	No	PJ26714	Not Applicable
idlbase.h	New	No	PJ26944	Not Applicable
idlddefs.h	New	No	PJ26944	Not Applicable
idles.h	New	No	PJ26944	Not Applicable
ioctl.h	Changed	No	PJ26917	Not Applicable
iovector.h	New	No	PJ26944	Not Applicable
langinfo.h	Changed – This was changed from object code only (OCO) to C language source.	No	PJ21337	Not Applicable
lbase.h	New	No	PJ26944	Not Applicable
lc_core.h	Changed – This was changed from object code only to C language source.	No	PJ21337	Not Applicable
ldra11.h	New	No	PJ26944	Not Applicable
limits.h	Changed	No	PJ21337	Not Applicable
localdef.h	Changed – This was changed from object code only (OCO) to C language source.	No	PJ21337	Not Applicable
marshall.h	New	No	PJ26944	Not Applicable
monetary.h	Changed – This was changed from object code only (OCO) to C language source.	No	PJ21337	Not Applicable
nbase.h	New	No	PJ26944	Not Applicable
ncastat.h	New	No	PJ26944	Not Applicable
ndrold.h	New	No	PJ26944	Not Applicable
ndrrep.h	New	No	PJ26944	Not Applicable
ndrtypes.h	New	No	PJ26944	Not Applicable
nl_types.h	Changed – This was changed from object code only to C language source.	No	PJ21337	Not Applicable
poll.h	New	No	PJ21337	Not Applicable
pthdex.h	New	No	PJ26944	Not Applicable
regex.h	Changed – This was changed from object code only (OCO) to C language source.	No	PJ21337	Not Applicable
regexp.h	New	No	PJ21337	Not Applicable
rpcbase.h	New	No	PJ26944	Not Applicable
rpcexc.h	New	No	PJ26944	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
rpcpvt.h	New	No	PJ26944	Not Applicable
rpctypes.h	New	No	PJ26944	Not Applicable
rpcxd1.h	New	No	PJ26944	Not Applicable
rpcxstub.h	New	No	PJ26944	Not Applicable
service.h	New	No	PJ26944	Not Applicable
signal.h	Changed	No	PJ26714	Not Applicable
stat.h	Changed	No	PJ26714	Not Applicable
stddef.h	Changed	No	PJ21337	Not Applicable
stdefs.h	New	No	PJ21337	Not Applicable
stdio.h	Changed	No	PJ26714	Not Applicable
strings.h	Changed	No	PJ26714	Not Applicable
stubble.h	New	No	PJ26944	Not Applicable
sysgtime.h	Changed	No	PJ26714	Not Applicable
tpfapi.h	Changed	No	PJ26714	Not Applicable
tpfapi.h	Changed	No	PJ26820, PJ26873	Not Applicable
tpfio.h	Changed	No	PJ26714	Not Applicable
tpftape.h	Changed	No	PJ26714	Not Applicable
twr.h	New	No	PJ26944	Not Applicable
types.h	Changed	No	PJ21337	Not Applicable
uheap.h	New	No	PJ21337	Not Applicable
unistd.h	Changed	No	PJ26714	Not Applicable
utime.h	Changed	No	PJ26714	Not Applicable
uuid.h	New	No	PJ26944	Not Applicable
varargs.h	Changed	No	PJ26714	Not Applicable
variant.h	Changed – This was changed from object code only (OCO) to C language source.	No	PJ21337	Not Applicable
wait.h	Changed	No	PJ26714	Not Applicable
wchar.h	Changed	No	PJ21337	Not Applicable
wcstr.h	New	No	PJ21337	Not Applicable
wctype.h	Changed – This was changed from object code only (OCO) to C language source.	No	PJ21337	Not Applicable
PUT 11				
amqscrw.h	Changed	Yes	PJ26498	Not Applicable
c\$cach.h	New	No	PJ26713	Not Applicable
c\$cfco.h	Changed	No	PJ26403	Not Applicable
c\$cfdi.h	Changed	No	PJ26403	Not Applicable
c\$cinfc.h	Changed	No	PJ26384, PJ26713	Not Applicable
c\$cj6kp.h	Changed	No	PJ26686	Not Applicable
c\$eb0eb.h	Changed	No	PJ26441, PJ26468	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$fapi.h	Changed	No	PJ26403	Not Applicable
c\$fva0.h	Changed	No	PJ26384	Not Applicable
c\$mfst.h	Changed	No	PJ26511, PJ26686	Not Applicable
c\$mqs.h	Changed	Yes	PJ26498	Not Applicable
c\$psfb.h	Changed	No	PJ26403, PJ26441	Not Applicable
c\$rvlvt.h	Changed	No	PJ25482	Not Applicable
c\$syseq.h	Changed	No	PJ26713	Not Applicable
c\$tmcr.h	Changed	No	PJ26366	Not Applicable
c\$to2.h	Changed	No	PJ26139, PJ26522	Not Applicable
c\$tpxd.h	Changed	No	PJ26139	Not Applicable
c\$vfac.h	New	No	PJ26155	Not Applicable
c\$wtue.h	New	No	PJ26100	Not Applicable
i\$tmcr.h	Changed	No	PJ26687	Not Applicable
i\$tmcr.h	Changed	No	PJ26439	Not Applicable
nldtci.h	Changed	No	PJ26403	Not Applicable
stdio.h	Changed	No	PJ26499	Not Applicable
stdlib.h	Changed	No	PJ26384	Not Applicable
tpfapi.h	Changed	No	PJ26100	Not Applicable
tpftape.h	Changed	No	PJ26139	Not Applicable
PUT 10				
ansi.h	New	Not Applicable	PJ26174	Not Applicable
c\$cdbg.h	Changed	Yes	PJ25983	Not Applicable
c\$cincf.h	Changed	No	PJ25981	Not Applicable
c\$eb0eb.h	Changed	No	PJ25981, PJ25983	Not Applicable
c\$fbd0.h	Changed	Yes	PJ26160	Not Applicable
c\$fer0.h	Changed	Yes	PJ26160	Not Applicable
c\$fps0.h	Changed	Yes	PJ26160	Not Applicable
c\$fva0.h	Changed	No	PJ25880, PJ26125	Not Applicable
c\$idspat.h	Changed	No	PJ25981	Not Applicable
c\$idsuxt.h	Changed	No	PJ25880	Not Applicable
c\$mfst.h	Changed	No	PJ26160	Not Applicable
c\$prog.h	Changed	Yes	PJ25983	Not Applicable
c\$psfb.h	New	No	PJ25880	Not Applicable
c\$term.h	Changed	Yes	PJ25983	Not Applicable
c\$to2.h	Changed – Change all applications with T02_asSequenceCollection coded; you do not necessarily need to recompile these applications.	Yes	PJ26594	Not Applicable
c\$udeq.h	New	No	PJ25981	Not Applicable
cdefs.h	New	Not Applicable	PJ26174	Not Applicable
ctype.h	Changed	No	PJ26174	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
err.h	Changed	No	PJ26174	Not Applicable
errno.h	Changed	No	PJ26174	Not Applicable
fts.h	New	Not Applicable	PJ26174	Not Applicable
globb.h	New	Not Applicable	PJ26174	Not Applicable
limits.h	Changed	No	PJ26174	Not Applicable
mman.h	New	Not Applicable	PJ26174	Not Applicable
mount.h	New	Not Applicable	PJ26174	Not Applicable
namei.h	New	Not Applicable	PJ26174	Not Applicable
param.h	New	Not Applicable	PJ26174	Not Applicable
queue.h	New	Not Applicable	PJ26174	Not Applicable
stat.h	Changed	No	PJ26174	Not Applicable
stdarg.h	Changed	No	PJ26174, PJ26814	Not Applicable
stdio.h	Changed	No	PJ26174	Not Applicable
stdlib.h	Changed	No	PJ26174, PJ26125	Not Applicable
strings.h	Changed	Not Applicable	PJ26174	Not Applicable
sysapi.h	Changed	No	PJ25981	Not Applicable
sysgtime.h	Changed	No	PJ26174	Not Applicable
syslimit.h	New	Not Applicable	PJ26174	Not Applicable
ucred.h	New	Not Applicable	PJ26174	Not Applicable
uio.h	New	Not Applicable	PJ26174	Not Applicable
varargs.h	New	Not Applicable	PJ26174	Not Applicable
vnode.h	New	Not Applicable	PJ26174	Not Applicable
PUT 9				
c\$ck1ke.h	Changed	No	PJ24659	Not Applicable
c\$sonf.h	New	No	PJ25199	Not Applicable
c\$to2.h	Changed	No	PJ25524	Not Applicable
sysapi.h	Changed	No	PJ25199	Not Applicable
PUT 8				
c\$cinfc.h	Changed	No	PJ25266	Not Applicable
c\$fva0.h	Changed	No	PJ25266	Not Applicable
c\$help.h	New	No	PJ25174	Not Applicable
c\$msg.h	New	No	PJ25174	Not Applicable
c\$proc.h	Changed	No	PJ25240	Not Applicable
c\$to2.h	Changed	No	PJ25207	Not Applicable
c\$tpxd.h	Changed	No	PJ25207	Not Applicable
i\$back.h	Changed	No	PJ25266	Not Applicable
i\$glue.h	Changed	No	PJ25266	Not Applicable
i\$node.h	Changed	No	PJ25266	Not Applicable
i\$zero.h	Changed	No	PJ25266	Not Applicable
PUT 7				
amqcccha.h	Changed	No	PJ24541	Not Applicable
amqcccha.h	Changed	No	PJ24541	Not Applicable
amqccxha.h	Changed	No	PJ24541	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
amqrfpha.h	Changed	No	PJ24541	Not Applicable
amqrrcha.h	Changed	No	PJ24541	Not Applicable
amqrriha.h	Changed	No	PJ24541	Not Applicable
amqrrxha.h	Changed	No	PJ24541	Not Applicable
amqxdvha.h	Changed	No	PJ24541	Not Applicable
amqxecha.h	Changed	No	PJ24541	Not Applicable
amqxeeha.h	Changed	No	PJ24541	Not Applicable
assert.h	Changed	No	PJ24541	Not Applicable
c\$am0sg.h	Changed	No	PJ24541	Not Applicable
c\$cinfc.h	Changed	No	PJ24541	Not Applicable
c\$cj6kp.h	Changed	No	PJ24541	Not Applicable
c\$ck1ke.h	Changed	No	PJ24541	Not Applicable
c\$ck2sn	Changed	No	PJ24541	Not Applicable
c\$ck9k.h	Changed	No	PJ24541	Not Applicable
c\$cx0ck.h	Changed	No	PJ24541	Not Applicable
c\$cy1k.h	Changed	No	PJ24541	Not Applicable
c\$czx1.h	Changed	No	PJ24541	Not Applicable
c\$czx2.h	Changed	No	PJ24541	Not Applicable
c\$dadfq.h	Changed	No	PJ24541	Not Applicable
c\$dbrm.h	Changed	No	PJ24541	Not Applicable
c\$dbsbac.h	Changed	No	PJ24541	Not Applicable
c\$dbsdh.h	Changed	No	PJ24541	Not Applicable
c\$dtist.h	Changed	No	PJ24541	Not Applicable
c\$eb0eb.h	Changed	No	PJ24541	Not Applicable
c\$cfct.h	Changed	No	PJ24541	Not Applicable
c\$icadap.h	Changed	No	PJ24541	Not Applicable
c\$iccacb.h	Changed	No	PJ24541	Not Applicable
c\$iccb.h	Changed	No	PJ24541	Not Applicable
c\$ichutl.h	Changed	No	PJ24541	Not Applicable
c\$icmn.h	Changed	No	PJ24541	Not Applicable
c\$icnv	Changed	No	PJ24541	Not Applicable
c\$icpath.h	Changed	No	PJ24541	Not Applicable
c\$icracb	Changed	No	PJ24541	Not Applicable
c\$icusda.h	Changed	No	PJ24541	Not Applicable
c\$ic0ck.h	Changed	No	PJ24541	Not Applicable
c\$idcutl.h	Changed	No	PJ24541	Not Applicable
c\$iddm.h	Changed	No	PJ24541	Not Applicable
c\$iddmeq.h	Changed	No	PJ24541	Not Applicable
c\$idir.h	Changed	No	PJ24541	Not Applicable
c\$idirmc.h	Changed	No	PJ24541	Not Applicable
c\$idsalo.h	Changed	No	PJ24541	Not Applicable
c\$idscdr.h	Changed	No	PJ24541	Not Applicable
c\$idsgrp.h	Changed	No	PJ24541	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$idseat.h	Changed	No	PJ24541	Not Applicable
c\$idsecl.h	Changed	No	PJ24541	Not Applicable
c\$idsecl.d.h	Changed	No	PJ24541	Not Applicable
c\$idsecl.t.h	Changed	No	PJ24541	Not Applicable
c\$idsecl.v.h	Changed	No	PJ24541	Not Applicable
c\$idsemr.h	Changed	No	PJ24541	Not Applicable
c\$idsepd.h	Changed	No	PJ24541	Not Applicable
c\$idserd.h	Changed	No	PJ24541	Not Applicable
c\$idsfrp.h	Changed	No	PJ24541	Not Applicable
c\$idsicd.h	Changed	No	PJ24541	Not Applicable
c\$idsicr.h	Changed	No	PJ24541	Not Applicable
c\$idsihr.h	Changed	No	PJ24541	Not Applicable
c\$idsinq.h	Changed	No	PJ24541	Not Applicable
c\$idsipl.h	Changed	No	PJ24541	Not Applicable
c\$idskpt.h	Changed	No	PJ24541	Not Applicable
c\$idsldr.h	Changed	No	PJ24541	Not Applicable
c\$idslsd.h	Changed	No	PJ24541	Not Applicable
c\$idslst.h	Changed	No	PJ24541	Not Applicable
c\$idsmxxp.h	Changed	No	PJ24541	Not Applicable
c\$idsold.h	Changed	No	PJ24541	Not Applicable
c\$idspat.h	Changed	No	PJ24541	Not Applicable
c\$idsprg.h	Changed	No	PJ24541	Not Applicable
c\$idsprv.h	Changed	No	PJ24541	Not Applicable
c\$idsuxt.h	Changed	No	PJ24541	Not Applicable
c\$idsxtp.h	Changed	No	PJ24541	Not Applicable
c\$iedctl.h	Changed	No	PJ24541	Not Applicable
c\$ifc2.h	Changed	No	PJ24541	Not Applicable
c\$ifc3.h	Changed	No	PJ24541	Not Applicable
c\$ifc4.h	Changed	No	PJ24541	Not Applicable
c\$ifdo.h	Changed	No	PJ24541	Not Applicable
c\$ifdomc.h	Changed	No	PJ24541	Not Applicable
c\$iflddf.h	Changed	No	PJ24541	Not Applicable
c\$ihctcb.h	Changed	No	PJ24541	Not Applicable
c\$ilvl.h	Changed	No	PJ24541	Not Applicable
c\$imer.h	Changed	No	PJ24541	Not Applicable
c\$imermc.h	Changed	No	PJ24541	Not Applicable
c\$imqt.h	Changed	No	PJ24541	Not Applicable
c\$iptbl.h	Changed	No	PJ24541	Not Applicable
c\$irdicb.h	Changed	No	PJ24541	Not Applicable
c\$iscddt.h	Changed	No	PJ24541	Not Applicable
c\$iscfdt.h	Changed	No	PJ24541	Not Applicable
c\$iscipt.h	Changed	No	PJ24541	Not Applicable
c\$iscldt.h	Changed	No	PJ24541	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
c\$isddcb.h	Changed	No	PJ24541	Not Applicable
c\$isiucv.h	Changed	No	PJ24541	Not Applicable
c\$idseiv.h	Changed	No	PJ24881	Not Applicable
c\$ismtc.b.h	Changed	No	PJ24541	Not Applicable
c\$isql.h	Changed	No	PJ24541	Not Applicable
c\$isqlmc.h	Changed	No	PJ24541	Not Applicable
c\$isrtbk.h	Changed	No	PJ24541	Not Applicable
c\$istpcb.h	Changed	No	PJ24541	Not Applicable
c\$itpicb.h	Changed	No	PJ24541	Not Applicable
c\$itrtbl.h	Changed	No	PJ24541	Not Applicable
c\$ituutl.h	Changed	No	PJ24541	Not Applicable
c\$kptpat.h	Changed	No	PJ24541	Not Applicable
c\$lupd.h	Changed	No	PJ24541	Not Applicable
c\$mi0mi.h	Changed	No	PJ24541	Not Applicable
c\$mk0ck.h	Changed	No	PJ24541	Not Applicable
c\$mqcd.h	Changed	No	PJ24541	Not Applicable
c\$mqpr.h	Changed	No	PJ24541	Not Applicable
c\$ms0at.h	Changed	No	PJ24541	Not Applicable
c\$ms0ut.h	Changed	No	PJ24541	Not Applicable
c\$nrnt.h	Changed	No	PJ24541	Not Applicable
c\$pldt.h	Changed	No	PJ24541	Not Applicable
c\$proc.h	Changed	No	PJ24541	Not Applicable
c\$rc0pl.h	Changed	No	PJ24541	Not Applicable
c\$rmxeq.h	Changed	No	PJ24541	Not Applicable
c\$rvlvt.h	Changed	No	PJ24541	Not Applicable
c\$sqlca.h	Changed	No	PJ24541	Not Applicable
c\$sqlda.h	Changed	No	PJ24541	Not Applicable
c\$stdhd.h	Changed	No	PJ24541	Not Applicable
c\$sthr.h	Changed	No	PJ24541	Not Applicable
c\$syseq.h	Changed	No	PJ24541	Not Applicable
c\$sysct.h	Changed	No	PJ24541	Not Applicable
c\$sysug.h	Changed	No	PJ24541	Not Applicable
c\$tar0.h	Changed	No	PJ24541	Not Applicable
c\$tpldr.h	Changed	No	PJ24541	Not Applicable
c\$uatbc.h	Changed	No	PJ24541	Not Applicable
c\$ucnfeq.h	Changed	No	PJ24541	Not Applicable
c\$uprs.h	Changed	No	PJ24541	Not Applicable
c\$law.h	Changed	No	PJ24541	Not Applicable
cmqc.h	Changed	No	PJ24541	Not Applicable
cmqxc.h	Changed	No	PJ24541	Not Applicable
ctype.h	Changed	No	PJ24541	Not Applicable
decimal.h	Changed	No	PJ24541	Not Applicable
dll.h	Changed	No	PJ24541	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
errno.h	Changed	No	PJ24541	Not Applicable
fcntl.h	Changed	No	PJ24541	Not Applicable
features.h	Changed	No	PJ24541	Not Applicable
float.h	Changed	No	PJ24541	Not Applicable
i\$ecb3.h	Changed	No	PJ24541	Not Applicable
i\$fsqu.h	Changed	No	PJ24541	Not Applicable
i\$lerr.h	Changed	No	PJ24541	Not Applicable
ioctl.h	Changed	No	PJ24541	Not Applicable
ip.h	Changed	No	PJ24541	Not Applicable
limits.h	Changed	No	PJ24541	Not Applicable
locale.h	Changed	No	PJ24541	Not Applicable
math.h	Changed	No	PJ24541	Not Applicable
modes.h	Changed	No	PJ24541	Not Applicable
piutr.h	Changed	No	PJ24541	Not Applicable
plfapi.h	Changed	No	PJ24541	Not Applicable
reusable.h	Changed	No	PJ24541	Not Applicable
setjmp.h	Changed	No	PJ24541	Not Applicable
signal.h	Changed	No	PJ24541	Not Applicable
socket.h	Changed	No	PJ24541	Not Applicable
stdarg.h	Changed	No	PJ24541	Not Applicable
stddef.h	Changed	No	PJ24541	Not Applicable
stdio.h	Changed	No	PJ24541	Not Applicable
stdlib.h	Changed	No	PJ24541	Not Applicable
string.h	Changed	No	PJ24541	Not Applicable
sysapi.h	Changed	No	PJ24541	Not Applicable
sysdef.h	Changed	No	PJ24541	Not Applicable
time.h	Changed	No	PJ24541	Not Applicable
tpfapi.h	Changed	No	PJ24541	Not Applicable
tpfar.h	Changed	No	PJ24541	Not Applicable
tpfarapi.h	Changed	No	PJ24541	Not Applicable
tpfeq.h	Changed	No	PJ24541	Not Applicable
tpfglbl.h	Changed	No	PJ24541	Not Applicable
tpfio.h	Changed	No	PJ24541	Not Applicable
tpfmap.h	Changed	No	PJ24541	Not Applicable
tpfmcsll.h	Changed	No	PJ24541	Not Applicable
tpfparft.h	Changed	No	PJ24541	Not Applicable
tpfparse.h	Changed	No	PJ24541	Not Applicable
tpfregs.h	Changed	No	PJ24541	Not Applicable
tpftape.h	Changed	No	PJ24541	Not Applicable
tpftuu.h	Changed	No	PJ24541	Not Applicable
tppc.h	Changed	No	PJ24541	Not Applicable
types.h	Changed	No	PJ24541	Not Applicable
unistd.h	Changed	No	PJ24541	Not Applicable

Table 1269. General Use C/C++ Language Header File Changes by PUT and APAR (continued)

C/C++ Language Header File	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
wchar.h	Changed	No	PJ24541	Not Applicable
zimag.h	Changed	No	PJ24541	Not Applicable
zimageq.h	Changed	No	PJ24541	Not Applicable
zimagmc.h	Changed	No	PJ24541	Not Applicable
zimagmsg.h	Changed	No	PJ24541	Not Applicable
ztpld.h	Changed	No	PJ24541	Not Applicable
PUT 6				
c\$cinfc.h	Changed	No	PJ23923	Not Applicable
c\$cklke.h	Changed	No	PJ23493	Not Applicable
c\$lupd.h	New	Not Applicable	PJ23526	Not Applicable
c\$proc.h	New	No	PJ23923	Not Applicable
c\$eb0eb.h	Changed	No	PJ23923	Not Applicable
c\$rvlvt.h	Changed	Yes	PJ21693	Not Applicable
c\$syseq.h	Changed	No	PJ23526	Not Applicable
errno.h	Changed	No	PJ23923	Not Applicable
piutr.h	Changed	Yes	PJ21693	Not Applicable
stdlib.h	Changed	No	PJ23923	Not Applicable
sysapi.h	Changed	No	PJ23923	Not Applicable
tpfapi.h	Changed	No	PJ23923	Not Applicable
PUT 5				
c\$cy1k.h	New	No	PJ22827	Not Applicable
c\$nrnt.h	New	No	PJ21907	Not Applicable
string.h	Changed	No	PJ21907	Not Applicable
piutr.h	Changed	Yes	PJ21706	Not Applicable
tpflink.h	Changed	Yes	PJ21709	Not Applicable
tpfstrng.h	Changed	No	PJ21907	Not Applicable
tpftuu.h	Changed	Yes	PJ21701	Not Applicable
PUT 4				
c\$ck9k.h	New	Not Applicable	PJ21474	Not Applicable
c\$idse1d.h	Changed	Yes	PJ20388	Not Applicable
c\$idse1t.h	Changed	No	PJ20388	Not Applicable
c\$isrtbk.h	Changed	Yes	PJ20388	Not Applicable
tpfio.h	Changed	Yes	PJ20388	Not Applicable

Implementation-Specific C/C++ Language Header Files (IBM Use Only)

Table 1270 on page 1292 summarizes the general use C/C++ language header file (IBM use only) changes that are for IBM use only. This information is presented in alphabetic order by the name of the general use C/C++ language (IBM use only) header file.

Table 1270. Implementation-Specific C/C++ Language Header Files (IBM Use Only) Changes by PUT and APAR

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
PUT 15				
i\$breq.h	No Longer Supported	No	PJ27910	Not Applicable
i\$decb.h	Changed	No	PJ27774	Not Applicable
i\$glue.h	Changed	No	PJ27835	Not Applicable
i\$mqrt.h	Changed	No	PJ27925	Not Applicable
i\$tmcr.h	Changed	No	PJ27925	Not Applicable
i\$tres.h	Changed	No	PJ27835	Not Applicable
I\$ZF.h	Changed	No	PJ27835	Not Applicable
PUT 14				
c\$cbuf.h	Changed	No	PJ27479	Not Applicable
c\$ddsm.h	Changed	No	PJ27479	Not Applicable
c\$ddtb.h	Changed	No	PJ27479	Not Applicable
c\$spif.h	Changed	No	PJ27479	Not Applicable
c\$to2b.h	Changed	No	PJ27380, PJ27479	Not Applicable
c\$to2m.h	Changed	No	PJ27380	Not Applicable
evlibp.h	Changed	No (PJ27479) Yes (PJ27772)	PJ27479	Not Applicable (PJ27479) Recompile CEVTIM and link-edit CTXO (PJ27772).
extern.h	Changed	No	PJ27479	Not Applicable
_Ieee754.h	New	No	PJ27367	Not Applicable
i\$glue.h	Changed	No	PJ27479	Not Applicable
i\$grp.h	Changed	No	PJ27606	Not Applicable
i\$ls.h	New	Not Applicable	PJ27094	Not Applicable
i\$matp.h	Changed	Yes	PJ27726	Not Applicable
i\$netd.h	Changed	Yes	PJ27619	CINET8
i\$udcl.hpp	Changed	No	PJ27580	Not Applicable
isc/list.h	New	No	PJ27772	Not Applicable
telnet.h	Changed	No	PJ27479	Not Applicable
utmp.h	Changed	No	PJ27479	Not Applicable
PUT 13				
i\$netd.h	Changed	No	PJ27255, PJ27363	Not Applicable
i\$udbg.hpp	Changed	Yes	PJ27388	Not Applicable
i\$udcl.hpp	Changed	Yes	PJ27342	Not Applicable
PUT 12				
c\$icdccb.h	New	No	PJ27095	Not Applicable
c\$iscfdt.h	Changed	No	PJ26917	Not Applicable
extern.h	New	No	PJ27028	Not Applicable
ftp.h	New	No	PJ27028	Not Applicable
i\$dd2.h	Changed	No	PJ26714	Not Applicable
I\$Dir.hpp	Changed	Yes	PJ26714	Not Applicable
I\$Env.hpp	Changed	Yes	PJ26714	Not Applicable
I\$File.hpp	Changed	Yes	PJ26714	Not Applicable

Table 1270. Implementation-Specific C/C++ Language Header Files (IBM Use Only) Changes by PUT and APAR (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
i\$fsdd.h	Changed	No	PJ26714	Not Applicable
i\$lmap.h	Changed – You must recompile CDMPRC in CDM2BS and rebuild CDM20. You must also recompile NLDLT in TPFLDR and rebuild TPFLDR.	Yes	PJ21337	Not Applicable
i\$matp.h	Changed	Yes	PJ26873	Not Applicable
i\$matp.h	Changed	Yes	PJ26886	Not Applicable
I\$Msg.hpp	Changed	Yes	PJ26714	Not Applicable
i\$netd.h	New	No	PJ26434, PJ26714, PJ26848	Not Applicable
i\$pwbl.h	Changed	No	PJ26895, PJ26917	Not Applicable
i\$pwgr.h	Changed	No	PJ26714	Not Applicable
i\$shm.h	Changed	No	PJ26714	Not Applicable
i\$udbg.hpp	Changed	Yes	PJ26864, PJ27009, PJ26714	Not Applicable
i\$udcl.hpp	Changed	Yes	PJ27009, PJ26714	Not Applicable
I\$ZF.h	Changed	Yes	PJ26714	Not Applicable
irtllock.h	Changed	Yes	PJ26714, PJ26981, PJ27037	Not Applicable
pathnames.h	New	No	PJ27028	Not Applicable
pwd.h	Changed	No	PJ26714	Not Applicable
reusable.h	Changed	No	PJ27028	Not Applicable
string.h	Changed	No	PJ27028	Not Applicable
utmp.h	New	No	PJ27028	Not Applicable
telnet.h	New	No	PJ27028	Not Applicable
PUT 11				
c\$to2b.h	New	No	PJ26522	Not Applicable
i\$glue.h	Changed	Yes	PJ26713	Not Applicable
i\$netd.h	Changed	No	PJ25761, PJ26515	Not Applicable
i\$tftp.h	Changed	No	PJ26408	Not Applicable
i\$udbg.hpp	Changed	Yes	PJ26503	Not Applicable
i\$zero.h	Changed	Yes	PJ26713	Not Applicable
PUT 10				
EPDCBD	New	No	PJ25981	Not Applicable
EPDCCN	New	No	PJ25981	Not Applicable
EPDCPD	New	No	PJ25981	Not Applicable
EPDCSS	New	No	PJ25981	Not Applicable
I\$Dir.hpp	New	Not Applicable	PJ26174	Not Applicable
i\$ecb3.h	Changed	Not Applicable	PJ25981	Not Applicable
I\$Env.hpp	New	Not Applicable	PJ26174	Not Applicable
I\$File.hpp	New	Not Applicable	PJ26174	Not Applicable
I\$Msg.hpp	New	Not Applicable	PJ26174	Not Applicable

Table 1270. Implementation-Specific C/C++ Language Header Files (IBM Use Only) Changes by PUT and APAR (continued)

C/C++ Language Header File (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Recompile Any Segments?	APAR Number	Segments to Recompile
i\$udbg.hpp	New	Not Applicable	PJ25981, PJ26008	Not Applicable
i\$udcl.hpp	Changed	Not Applicable	PJ25981	Not Applicable
I\$ZF.h	New	Not Applicable	PJ26174	Not Applicable

Library Interface Scripts

Table 1271 summarizes library interface script changes. This information is presented in alphabetic order by the name of the library interface script.

Table 1271. Library Interface Script Changes by PUT and APAR

Library Interface Script	New, Changed, or No Longer Supported?	APAR Number
PUT 14		
CISOXV	Changed	PJ27367
CJ00XV	Changed	PJ27380
PUT 13		
CISOXV	Changed	PJ27317
PUT 12		
CISOXV	Changed	PJ21337, PJ26805, PJ27028, PJ27159
PUT 11		
COMXXV	Changed	PJ26713
CTALXV	Changed	PJ26366
PUT 10		
CISOXV	Changed	PJ26174
CTALXV	Changed	PJ25981
PUT 8		
CJ00XV	Changed	PJ25207
COMXXV	Changed	PJ25266
CTBXXV	Changed	PJ25174
PUT 6		
CISOXV	Changed	PJ23923
CTALXV	Changed	PJ23923

Library Members (Object Files)

Table 1272 summarizes library member (object file) changes. This information is presented in alphabetic order by the name of the library member (object file).

Table 1272. Library Member (Object File) Changes by PUT and APAR

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
PUT 15				
C301	COMX	Changed	C Language	PJ27379

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
C302	COMX	Changed	C Language	PJ27379
C511	COMX	Changed	C Language	PJ28000, PJ28002, PJ27379
C512	COMX	Changed	C Language	PJ28000, PJ27379
C513	COMX	Changed	C Language	PJ27379
C514	COMX	Changed	C Language	PJ27379
C515	COMX	Changed	C Language	PJ28000, PJ27379
C518	COMX	Changed	C Language	PJ27379
C519	COMX	Changed	C Language	PJ27379
C524	COMX	Changed	C Language	PJ28002, PJ27379
C525	COMX	Changed	C Language	PJ27379
C528	COMX	Changed	C Language	PJ27379
C529	COMX	Changed	C Language	PJ28000, PJ27379
C530	COMX	Changed	C Language	PJ28000, PJ27379
C531	COMX	Changed	C Language	PJ27379
C532	COMX	Changed	C Language	PJ27379
C533	COMX	Changed	C Language	PJ27379
C534	COMX	Changed	C Language	PJ27379
C536	COMX	Changed	C Language	PJ27379
C537	COMX	Changed	C Language	PJ27379
C539	COMX	Changed	C Language	PJ27379
C540	COMX	Changed	C Language	PJ28000, PJ27379
C550	COMX	New	C Language	PJ28019
CEVNQC	CTAL	Changed	Real-Time Assembler	PJ28105
CGTHBA	COMX	Changed	C Language	PJ27566
CGTHBN	COMX	Changed	C Language	PJ27566
CLMINT	CISO	Changed	Assembler	PJ27977
CMACCP	CTAL	Changed	C Language	PJ27633
CMALLC	CTAL	Changed	C Language	PJ27633
CMCFM	CTAL	Changed	C Language	PJ27633
CMCFMD	CTAL	Changed	C Language	PJ27633
CMDEAL	CTAL	Changed	C Language	PJ27633
CMECS	CTAL	Changed	C Language	PJ27633
CMEMN	CTAL	Changed	C Language	PJ27633
CMEPLN	CTAL	Changed	C Language	PJ27633
CMESL	CTAL	Changed	C Language	PJ27633
CMFLUS	CTAL	Changed	C Language	PJ27633
CMINIT	CTAL	Changed	C Language	PJ27633
CMPTR	CTAL	Changed	C Language	PJ27633
CMQMCA	CMQS	Changed	C++ Language	PJ27830
CMQUTL	CMQS	Changed	C++ Language	PJ27844
CMRCV	CTAL	Changed	C Language	PJ27633
CMRTS	CTAL	Changed	C Language	PJ27633
CMSDT	CTAL	Changed	C Language	PJ27633

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CMSD	CTAL	Changed	C Language	PJ27633
CMSDND	CTAL	Changed	C Language	PJ27633
CMSERR	CTAL	Changed	C Language	PJ27633
CMSMN	CTAL	Changed	C Language	PJ27633
CMSPLN	CTAL	Changed	C Language	PJ27633
CMSPTR	CTAL	Changed	C Language	PJ27633
CMSRC	CTAL	Changed	C Language	PJ27633
CMSSSL	CTAL	Changed	C Language	PJ27633
CMSST	CTAL	Changed	C Language	PJ27633
CMSTPN	CTAL	Changed	C Language	PJ27633
CMTRTS	CTAL	Changed	C Language	PJ27633
CSIGKL	COMX	Changed	C Language	PJ27899
CTALL	CTAL	Changed	Real-Time Assembler	PJ27633
CTALLC	CTAL	Changed	C Language	PJ27633
CTAOC	CTAL	Changed	Real-Time Assembler	PJ27633
CTAOR	CTAL	Changed	Real-Time Assembler	PJ27633
CTCFM	CTAL	Changed	Real-Time Assembler	PJ27633
CTCFMD	CTAL	Changed	Real-Time Assembler	PJ27633
CTCPOR	CTAL	Changed	Real-Time Assembler	PJ27633
CTCPTR	CTAL	Changed	Real-Time Assembler	PJ27633
CTDEAL	CTAL	Changed	Real-Time Assembler	PJ27633
CTFLUS	CTAL	Changed	Real-Time Assembler	PJ27633
CTGATT	CTAL	Changed	Real-Time Assembler	PJ27633
CTGTYP	CTAL	Changed	Real-Time Assembler	PJ27633
CTRCV	CTAL	Changed	Real-Time Assembler	PJ27633
CTRTS	CTAL	Changed	Real-Time Assembler	PJ27633
CTSEND	CTAL	Changed	Real-Time Assembler	PJ27633
CTSERR	CTAL	Changed	Real-Time Assembler	PJ27633
CTTEST	CTAL	Changed	Real-Time Assembler	PJ27633
CTWAIT	CTAL	Changed	Real-Time Assembler	PJ27633
PUT 14				
CATOF	CISO	Changed	Object Code Only	PJ27367, PJ27558

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CBD FMT	CISO	Changed	Object Code Only	PJ27367
CCINT	CISO	Changed	Object Code Only	PJ27367
CCPRTF	CISO	Changed	Object Code Only	PJ27367
CDDNPI	COMX	Changed	C Language	PJ27565
CECVBF	CISO	New	Object Code Only	PJ27367
CECVFB	CISO	New	Object Code Only	PJ27367
CEDFMT	CISO	New	Object Code Only	PJ27367
CEECVT	CISO	New	Object Code Only	PJ27367
CEFCVT	CISO	New	Object Code Only	PJ27367
CEFPCI	CISO	New	Object Code Only	PJ27367
CENANC	CISO	New	Object Code Only	PJ27367
CEXFMT	CISO	New	Object Code Only	PJ27367
CFPRTF	CISO	Changed	Object Code Only	PJ27367
CFSZES	CISO	Changed; only recompiled	Object Code Only	PJ27367
CFS015	COMX	Changed	C Language	PJ27453
CGSCAN	CISO	Changed	Object Code Only	PJ27367
CHDDEL	CISO	Changed	Object Code Only	PJ27759
CLABS	CISO	Changed	Object Code Only	PJ27367
CLDIV	CISO	Changed	Object Code Only	PJ27367
CLDK	CLDK	No Longer Supported	C Language	PJ27746
CLMINT	CISO	Changed	Assembler	PJ27557, PJ27440, PJ27563
CSPRTF	CISO	Changed	Object Code Only	PJ27367
CSSDLL	CISO	Changed	C Language	PJ27627
CSTOLL	CISO	New	Object Code Only	PJ27367
CTCM64	CISO	Changed	Object Code Only	PJ27367
CVPRTF	CISO	Changed	Object Code Only	PJ27367
CWTOL	CISO	Changed	Object Code Only	PJ27367
CXXFUN	CISO	Changed	Object Code Only	PJ27691
C536	COMX	Changed	C Language	PJ27247
C538	COMX	Changed	C Language	PJ26712
PUT 13				
C515	COMX	Changed	Object Code Only	PJ27031
C530	COMX	Changed	C Language	PJ27346
CASSRT	CISO	Changed	C Language	PJ26958, PJ27306
CCGETS	CISO	Changed	Object Code Only	PJ26958, PJ27306
CCPRTF	CISO	Changed	Object Code Only	PJ26958, PJ27306
CCPUTS	CISO	Changed	Object Code Only	PJ26958, PJ27306
CCSCNF	CISO	Changed	Object Code Only	PJ26958, PJ27306
CDBINT	CISO	Changed	Object Code Only	PJ27335
CENASM	CISO	Changed	Assembler	PJ27254
CEXITF	CISO	Changed	C Language	PJ27306
CFCA	COMX	Changed	C Language	PJ27427
CFM8	CLM8	New	Assembler	PJ27302

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CFS024	COMX	Changed	C Language	PJ27013
CFS107	COMX	Changed	C Language	PJ27013
CGLOBA	CTAL	Changed	Assembler	PJ27340
CGSCAN	CISO	Changed	Object Code Only	PJ27267, PJ27471
CHDLDI	CISO	Changed	Object Code Only	PJ27392
CHDLOR	CISO	Changed	Object Code Only	PJ27392
CHDTLC	CISO	Changed	Assembler	PJ27254
CJ005	CJ00	Changed	Assembler	PJ27353
CLMINT	CISO	Changed	Assembler	PJ27252
CLM8	CLM8	Changed	C Language	PJ27302
CMCSLL	CTAL	Changed	C Language	PJ27386
COFNMA	CISO	Changed	Object Code Only	PJ27317
CSIGDP	COMX	Changed	Assembler	PJ27306
CSWSCC	CTAL	Changed	Assembler	PJ27155
PUT 12				
CABS	CISO	Changed	Object Code Only	PJ21337
CACOS	CISO	No Longer Supported – Replaced with the C4DACS library member.	Object Code Only	PJ21337
CASCTM	CISO	Changed	Object Code Only	PJ21337
CASIN	CISO	No Longer Supported – Replaced with the C4DASN library member.	Object Code Only	PJ21337
CASSRT	CISO	Changed	C Language	PJ21337
CATAN	CISO	No Longer Supported – Replaced with the C4DATN library member.	Object Code Only	PJ21337
CATAN2	CISO	No Longer Supported – Replaced with the C4DAT2 library member.	Object Code Only	PJ21337
CATEX	CISO	Changed	Object Code Only	PJ21337
CATOF	CISO	Changed	Object Code Only	PJ21337
CATOI	CISO	New	Object Code Only	PJ21337
CATOIA	CISO	No Longer Supported – Replaced with the CATOI library member.	Object Code Only	PJ21337
CBCLSE	CISO	Changed	Object Code Only	PJ21337
CBDFMT	CISO	Changed	Object Code Only	PJ21337
CBEPEG	CISO	Changed	Object Code Only	PJ21337
CBFLGS	CISO	Changed	Object Code Only	PJ21337
CBFLSH	CISO	Changed	Object Code Only	PJ21337
CBGETC	CISO	Changed	Object Code Only	PJ21337
CBGPOS	CISO	Changed	Object Code Only	PJ21337
CBKFCB	CISO	Changed	Object Code Only	PJ21337
CBOPEN	CISO	Changed	Object Code Only	PJ21337
CBPERR	CISO	Changed	Object Code Only	PJ21337
CBPUTC	CISO	Changed	Object Code Only	PJ21337
CBPUTS	CISO	Changed	Assembler	PJ21337
CBREAD	CISO	Changed	Object Code Only	PJ21337
CBREOP	CISO	Changed	Object Code Only	PJ21337
CBRPOS	CISO	Changed	Object Code Only	PJ21337

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CBSERR	CISO	Changed	Object Code Only	PJ21337
CBSRCH	CISO	Changed	Object Code Only	PJ21337
CBSTBF	CISO	Changed	Object Code Only	PJ21337
CBSTER	CISO	Changed	C Language	PJ21337
CBUNGT	CISO	Changed	Object Code Only	PJ21337
CBWGET	CISO	New	Object Code Only	PJ21337
CBWPUT	CISO	New	Object Code Only	PJ21337
CBWRIT	CISO	Changed	Object Code Only	PJ21337
CCALOC	CISO	Changed	Assembler	PJ21337
CCEIL	CISO	Changed	Object Code Only	PJ21337
CCGETS	CISO	Changed	Object Code Only	PJ21337
CCINT	CISO	Changed	Object Code Only	PJ21337
CCLOCK	CISO	Changed	Assembler	PJ21337
CCLOCP	CISO	Changed	Object Code Only	PJ21337
CCLOCS	CISO	Changed	Object Code Only	PJ21337
CCNVRT	CISO	Changed	Object Code Only	PJ21337
CCOLEL	CISO	New	Object Code Only	PJ21337
CCOS	CISO	No Longer Supported – Replaced with the C4DCOS library member.	Object Code Only	PJ21337
CCPRTF	CISO	Changed	Object Code Only	PJ21337
CCPUTS	CISO	Changed	Object Code Only	PJ21337
CCREEC	CTAL	Changed	Assembler	PJ26728
CCSCNF	CISO	Changed	Object Code Only	PJ21337
CCSID	CISO	Changed	Object Code Only	PJ21337
CCSIDC	CISO	Changed	C Language	PJ21337
CCTERM	CISO	Changed	Object Code Only	PJ21337
CCTEST	CISO	Changed	Object Code Only	PJ21337, PJ27009
CCTIME	CISO	Changed	Object Code Only	PJ21337
CDBINT	CISO	Changed	Object Code Only	PJ21337
CDECHX	CISO	Changed	Object Code Only	PJ21337
CDFTME	CISO	Changed	Object Code Only	PJ21337
CDIV	CISO	Changed	Object Code Only	PJ21337
CDOECV	CISO	Changed	Object Code Only	PJ21337
CDOFCV	CISO	Changed	Object Code Only	PJ21337
CDSASM	CISO	Changed	Assembler	PJ21337, PJ26804
CDTOP	CISO	Changed	Object Code Only	PJ21337
CENASM	CISO	Changed	Assembler	PJ21337, PJ26804
CEXITF	CISO	Changed	C Language	PJ21337
CEXP2	CISO	No Longer Supported – Replaced with the C4DEXP library member.	Object Code Only	PJ21337
CFABS	CISO	Changed	Object Code Only	PJ21337
CFIXFP	CISO	Changed	Assembler	PJ21337
CFMOD	CISO	No Longer Supported – Replaced with the C4DMOD library member.	Object Code Only	PJ21337
CFPRTF	CISO	Changed	Object Code Only	PJ21337

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CFREE	CISO	Changed	Assembler	PJ21337
CFREXP	CISO	Changed	Object Code Only	PJ21337
CFSCNF	CISO	Changed	Object Code Only	PJ21337
CFSINT	CISO	No Longer Supported	Object Code Only	PJ21337
CFSZES	CISO	Changed	Object Code Only	PJ21337
CFS169	CISO	Changed	C Language	PJ21337
CGETNV	CISO	Changed	Assembler	PJ21337
CGMTME	CISO	Changed	Object Code Only	PJ21337
CGSCAN	CISO	Changed	Object Code Only	PJ21337
CGSWBC	CTAL	Changed – Moved from CISO to CTAL.	Assembler	PJ21337
CGSYN	CISO	New	Object Code Only	PJ21337
CGTHBA	COMX	Changed	Object Code Only	PJ2934
CGTHBN	COMX	Changed	Object Code Only	PJ2934
CGTIME	CISO	Changed	C Language	PJ21337
CGTLGD	CISO	Changed	Assembler	PJ21337
CHCDTR	CISO	Changed	Object Code Only	PJ21337
CHDDEL	CISO	Changed	Object Code Only	PJ21337
CHDEST	CPP1	Changed	Object Code Only	PJ26967
CHDFRE	CISO	Changed	Object Code Only	PJ21337
CHDGFN	CISO	Changed	Object Code Only	PJ21337, PJ26805
CHDLDE	CISO	Changed	Object Code Only	PJ21337
CHDLDI	CISO	Changed	Object Code Only	PJ21337
CHDLOK	CISO	Changed	Object Code Only	PJ21337
CHDLOR	CISO	Changed	Object Code Only	PJ21337
CHDQRF	CISO	Changed	Object Code Only	PJ21337
CHDQRV	CISO	Changed	Object Code Only	PJ21337
CHDTLC	CISO	Changed	Object Code Only	PJ21337
CHDTLR	CISO	Changed	Object Code Only	PJ21337
CHEXDC	CISO	Changed	Object Code Only	PJ21337
CHEXPT	CPP1	Changed	Object Code Only	PJ26967
CHICXX	CISO	Changed	Object Code Only	PJ21337
CHOOKS	CISO	Changed	Object Code Only	PJ21337
CHTERM	CPP1	Changed	Object Code Only	PJ26967
CHTHRW	CPP1	Changed	Object Code Only	PJ26967
CHTHR2	CPP1	New	Object Code Only	PJ26967
CHUXPT	CPP1	Changed	Object Code Only	PJ26967
CHXDSM	CISO	Changed	Object Code Only	PJ21337
CHXDTB	CISO	Changed	Object Code Only	PJ21337
CICONT	CISO	Changed	Object Code Only	PJ21337
CILG10	CISO	Changed	Object Code Only	PJ21337
CISA	CISO	Changed	Object Code Only	PJ21337
CISAN	CISO	Changed	Object Code Only	PJ21337
CISB	CISO	New	Object Code Only	PJ21337
CISC	CISO	Changed	Object Code Only	PJ21337

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CISD	CISO	Changed	Object Code Only	PJ21337
CISG	CISO	Changed	Object Code Only	PJ21337
CISL	CISO	Changed	Object Code Only	PJ21337
CISPR	CISO	Changed	Object Code Only	PJ21337
CISPU	CISO	Changed	Object Code Only	PJ21337
CISSP	CISO	Changed	Object Code Only	PJ21337
CISU	CISO	Changed	Object Code Only	PJ21337
CISXD	CISO	Changed	Object Code Only	PJ21337
CLABS	CISO	Changed	Object Code Only	PJ21337
CLCLCO	CISO	Changed	Object Code Only	PJ21337
CLCLDT	CISO	Changed	Object Code Only	PJ21337
CLCNM	CISO	New	Assembler	PJ21337
CLCTOD	CISO	Changed	Object Code Only	PJ21337
CLDIV	CISO	Changed	Object Code Only	PJ21337
CLDTPF	CISO	Changed	Assembler	PJ21337
CLEINT	CISO	Changed	Object Code Only	PJ21337
CLGJMP	CISO	Changed	Object Code Only	PJ21337
CLLENG	CLLEBS	Changed	Assembler	PJ21337
CLLFRN	CLLFBS	Changed	Assembler	PJ21337
CLLGER	CLLGBS	Changed	Assembler	PJ21337
CLLITL	CLLIBS	Changed	Assembler	PJ21337
CLLOAD	CISO	Changed	Object Code Only	PJ21337
CLLSPA	CLLSBS	Changed	Assembler	PJ21337
CLLTPF	CLLTBS	Changed	Assembler	PJ21337
CLLUSA	CLLUBS	Changed	Assembler	PJ21337
CLMINT	CISO	Changed	Assembler	PJ21337, PJ26804, PJ26967
CLMODN	CISO	New	C Language	PJ21337
CLOG2	CISO	No Longer Supported – Replaced with the C4DLOG library member.	Object Code Only	PJ21337
CLOG10	CISO	No Longer Supported – Replaced with the C4DLG1 library member.	Object Code Only	PJ21337
CLWAID	CISO	No Longer Supported	Object Code Only	PJ21337
CMALOC	CISO	Changed	Assembler	PJ21337
CMBINI	CISO	Changed	Object Code Only	PJ21337
CMBLEN	CISO	Changed	Object Code Only	PJ21337
CMBLN	CISO	Changed	Object Code Only	PJ21337
CMBWC	CISO	Changed	Object Code Only	PJ21337
CMBWCS	CISO	Changed	Object Code Only	PJ21337
CMCHR	CISO	Changed	Object Code Only	PJ21337
CMCMP	CISO	Changed	Object Code Only	PJ21337
CMCPY	CISO	Changed	Object Code Only	PJ21337
CMKTME	CISO	Changed	Object Code Only	PJ21337
CMMOVE	CISO	Changed	Object Code Only	PJ21337
CMQCOL	CMQS	Changed	C++ Language	PJ27199

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CMQFRM	CMQF	Changed	C++ Language	PJ27199
CMQMCA	CMQS	Changed	Object Code Only	PJ27199
CMQMGC	CMQS	Changed	C++ Language	PJ27199
CMQMGR	CMQS	Changed	C++ Language	PJ27199
CMQUTL	CMQS	Changed	C++ Language	PJ26921, PJ27199
CMSET	CISO	Changed	Object Code Only	PJ21337
CNLINF	CISO	Changed	Object Code Only	PJ21337
CNLSET	CISO	Changed	Object Code Only	PJ21337
COBMEM	CISO	Changed	Object Code Only	PJ21337
COFLNO	CISO	Changed	Object Code Only	PJ21337
COFLOK	CISO	Changed	Object Code Only	PJ21337
COPSTR	CISO	Changed	C Language	PJ21337
COSTRD	CISO	New	C Language	PJ27028
COSTRN	CISO	Changed	Object Code Only	PJ21337
CPADD	CISO	Changed	Object Code Only	PJ21337
CPCMP	CISO	Changed	Object Code Only	PJ21337
CPDASM	CISO	Changed	Object Code Only	PJ21337
CPDIV	CISO	Changed	Object Code Only	PJ21337
CPMPY	CISO	Changed	Object Code Only	PJ21337
CPOW	CISO	No Longer Supported – Replaced with the C4DXPD library member.	Object Code Only	PJ21337
CPP2	CPP2	Changed	C Language	PJ26981, PJ27037
CPRSMA	CISO	Changed	C Language	PJ21337
CPRTF	CISO	No Change – This library member must be recompiled even though it was not changed.	C Language	PJ21337
CPTOD	CISO	Changed	Object Code Only	PJ21337
CPTOSB	CISO	Changed	Object Code Only	PJ21337
CPTOUB	CISO	Changed	Object Code Only	PJ21337
CPVAL	CISO	Changed	Object Code Only	PJ21337
CQMDSA	CISO	New	Object Code Only	PJ21337
CQMINR	CISO	New	Object Code Only	PJ21337
CQSORT	CISO	Changed	Object Code Only	PJ21337
CQT001	CISO	New	Object Code Only	PJ21337
CQT002	CISO	New	Object Code Only	PJ21337
CQT003	CISO	New	Object Code Only	PJ21337
CQT004	CISO	New	Object Code Only	PJ21337
CQT006	CISO	New	Object Code Only	PJ21337
CQT007	CISO	New	Object Code Only	PJ21337
CQT008	CISO	New	Object Code Only	PJ21337
CRALOC	CISO	Changed	Assembler	PJ21337
CRAND	CISO	Changed	Object Code Only	PJ21337
CRCOMP	CISO	Changed	Object Code Only	PJ21337
CREDBG	CTAL	Changed	Assembler	PJ26923, PJ26961
CRERR	CISO	Changed	Object Code Only	PJ21337

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CREXEC	CISO	Changed	Object Code Only	PJ21337
CRFREE	CISO	Changed	Object Code Only	PJ21337
CRMSG	CISO	Changed	Object Code Only	PJ21337
CRPMTH	CISO	Changed	Object Code Only	PJ21337
CRSWBC	CTAL	Changed	Assembler	PJ21337
CSBTOP	CISO	Changed	Object Code Only	PJ21337
CSCAT	CISO	Changed	Object Code Only	PJ21337
CSEHR	CISO	Changed	Object Code Only	PJ21337
CSCMP	CISO	Changed	Object Code Only	PJ21337
CSCNH	CISO	No Longer Supported – Replaced with the C4DCSH library member.	Object Code Only	PJ21337
CSCOLL	CISO	Changed	Object Code Only	PJ21337
CSCSPN	CISO	Changed	Object Code Only	PJ21337
CSCPY	CISO	Changed	Object Code Only	PJ21337
CSENV	CISO	Changed	Assembler	PJ21337
CSFMN	CISO	Changed	Object Code Only	PJ21337
CSFNMM	CISO	New	Object Code Only	PJ21337
CSFTME	CISO	Changed	Object Code Only	PJ21337
CSIGR	CISO	Changed	Object Code Only	PJ21337
CSIN	CISO	No Longer Supported – Replaced with the C4DSIN library member.	Object Code Only	PJ21337
CSITOA	CISO	Changed	Object Code Only	PJ21337
CSLEN	CISO	Changed	Object Code Only	PJ21337
CSNAM	CISO	Changed	Assembler	PJ21337
CSNCPY	CISO	Changed	Object Code Only	PJ21337
CSPBRK	CISO	Changed	Object Code Only	PJ21337
CSPRTF	CISO	Changed	Object Code Only	PJ21337
CSPTME	CISO	Changed	Object Code Only	PJ21337
CSQRT	CISO	No Longer Supported – Replaced with the C4DSQT library member.	Object Code Only	PJ21337
CSRCHR	CISO	Changed	Object Code Only	PJ21337
CSSCNF	CISO	Changed	Object Code Only	PJ21337
CSSDLL	CISO	Changed	C Language	PJ21337
CSSPN	CISO	Changed	Object Code Only	PJ21337
CSSTR	CISO	Changed	Object Code Only	PJ21337
CSTJMP	CISO	Changed	Object Code Only	PJ21337
CSTLCL	CISO	Changed	Object Code Only	PJ21337
CSTOK	CISO	New	Object Code Only	PJ21337
CSTOKA	CISO	No Longer Supported – Replaced with the CSTOK library member.	Object Code Only	PJ21337
CSTOL	CISO	New	Object Code Only	PJ21337
CSTOLD	CISO	Changed	Object Code Only	PJ21337
CSTZDF	CISO	Changed	Object Code Only	PJ21337
CSWPRT	CISO	New	Object Code Only	PJ21337
CSWSCN	CISO	New	Object Code Only	PJ21337

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CSYSTEM	CISO	Changed	C Language	PJ21337
CSXFRM	CISO	Changed	Object Code Only	PJ21337
CTAN	CISO	No Longer Supported – Replaced with the C4DTAN library member.	Object Code Only	PJ21337
CTANH	CISO	No Longer Supported – Replaced with the C4DTNH library member.	Object Code Only	PJ21337
CTASCN	CISO	No Longer Supported	Object Code Only	PJ21337
CTCM64	CISO	New	Object Code Only	PJ27159
CTCNTL	CTAL	Changed	Assembler	PJ26411
CTDXPD	CISO	No Longer Supported	Object Code Only	PJ21337
CTEXP	CISO	No Longer Supported	Object Code Only	PJ21337
CTID64	CISO	New	Object Code Only	PJ27159
CTIMEF	CISO	Changed	Object Code Only	PJ21337
CTLGNC	CISO	No Longer Supported	Object Code Only	PJ21337
CTOD	CISO	Changed	Object Code Only	PJ21337
CTOL	CISO	Changed	Object Code Only	PJ21337
CTOU	CISO	Changed	Object Code Only	PJ21337
CTRINT	CISO	Changed	Object Code Only	PJ21337
CTRT	CISO	Changed	Object Code Only	PJ21337
CTSCSN	CISO	No Longer Supported	Object Code Only	PJ21337
CTSRAZ	CISO	No Longer Supported	Object Code Only	PJ21337
CTTAT	CISO	No Longer Supported	Object Code Only	PJ21337
CUBTOP	CISO	Changed	Object Code Only	PJ21337
CUNSTV	CISO	Changed	Assembler	PJ21337
CVFPTF	CISO	Changed	Object Code Only	PJ21337
CVPRTF	CISO	Changed	Object Code Only	PJ21337
CVSPTF	CISO	Changed	Object Code Only	PJ21337
CVSWPT	CISO	New	Object Code Only	PJ21337
CWCAT	CISO	New	Object Code Only	PJ21337
CWCBW	CISO	New	Object Code Only	PJ21337
CWCHR	CISO	New	Object Code Only	PJ21337
CWCMB	CISO	Changed	Object Code Only	PJ21337
CWCMBS	CISO	Changed	Object Code Only	PJ21337
CWCMP	CISO	New	Object Code Only	PJ21337
CWCOLL	CISO	Changed	Object Code Only	PJ21337
CWCPY	CISO	New	Object Code Only	PJ21337
CWCSID	CISO	Changed	Object Code Only	PJ21337
CWCSPN	CISO	New	Object Code Only	PJ21337
CWCTYP	CISO	Changed	Object Code Only	PJ21337
CWCWDT	CISO	Changed	Object Code Only	PJ21337
CWFTME	CISO	Changed	Object Code Only	PJ21337
CWISA	CISO	New	Object Code Only	PJ21337
CWISAN	CISO	New	Object Code Only	PJ21337
CWISB	CISO	New	Object Code Only	PJ21337
CWISC	CISO	New	Object Code Only	PJ21337

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CWISD	CISO	New	Object Code Only	PJ21337
CWISG	CISO	New	Object Code Only	PJ21337
CWISL	CISO	New	Object Code Only	PJ21337
CWISPR	CISO	New	Object Code Only	PJ21337
CWISPU	CISO	New	Object Code Only	PJ21337
CWISSP	CISO	New	Object Code Only	PJ21337
CWISTY	CISO	Changed	Object Code Only	PJ21337
CWISU	CISO	New	Object Code Only	PJ21337
CWISXD	CISO	New	Object Code Only	PJ21337
CWLEN	CISO	Changed	Object Code Only	PJ21337
CWMCHR	CISO	New	Object Code Only	PJ21337
CWMCMP	CISO	New	Object Code Only	PJ21337
CWMCOPY	CISO	New	Object Code Only	PJ21337
CWMOVE	CISO	New	Object Code Only	PJ21337
CWMSET	CISO	New	Object Code Only	PJ21337
CWNCAT	CISO	New	Object Code Only	PJ21337
CWNCMP	CISO	New	Object Code Only	PJ21337
CWNCPY	CISO	Changed	Object Code Only	PJ21337
CWSMBS	CISO	Changed	Object Code Only	PJ21337
CWSPBR	CISO	New	Object Code Only	PJ21337
CWSRCH	CISO	New	Object Code Only	PJ21337
CWSSPN	CISO	New	Object Code Only	PJ21337
CWSTR	CISO	New	Object Code Only	PJ21337
CWSWCS	CISO	New	Object Code Only	PJ21337
CWSWDT	CISO	Changed	Object Code Only	PJ21337
CWTOD	CISO	New	Object Code Only	PJ21337
CWTOK	CISO	New	Object Code Only	PJ21337
CWTOL	CISO	New	Object Code Only	PJ21337
CWTOLW	CISO	Changed	Object Code Only	PJ21337
CWTOUL	CISO	New	Object Code Only	PJ21337
CWTOUP	CISO	Changed	Object Code Only	PJ21337
CWXFRM	CISO	Changed	Object Code Only	PJ21337
CXXFUN	CISO	Changed	Object Code Only	PJ21337
CZLBVC	CISO	New	Object Code Only	PJ21337
CZMATH	CISO	New	Object Code Only	PJ21337
C1FDOP	CISO	Changed	Object Code Only	PJ21337
C1MHFS	CISO	Changed	Object Code Only	PJ21337
C1OHFS	CISO	Changed	Object Code Only	PJ21337
C1OPST	CISO	Changed	Object Code Only	PJ21337
C1P124	CISO	Changed	Object Code Only	PJ21337
C390CN	CISO	Changed	C Language	PJ21337
C4DACS	CISO	New	Object Code Only	PJ21337
C4DASN	CISO	New	Object Code Only	PJ21337
C4DATN	CISO	New	Object Code Only	PJ21337

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
C4DAT2	CISO	New	Object Code Only	PJ21337
C4DCOS	CISO	New	Object Code Only	PJ21337
C4DCSH	CISO	New	Object Code Only	PJ21337
C4DEXP	CISO	New	Object Code Only	PJ21337
C4DLG1	CISO	New	Object Code Only	PJ21337
C4DLOG	CISO	New	Object Code Only	PJ21337
C4DMOD	CISO	New	Object Code Only	PJ21337
C4DSIN	CISO	New	Object Code Only	PJ21337
C4DSNH	CISO	New	Object Code Only	PJ21337
C4DSQT	CISO	New	Object Code Only	PJ21337
C4DTAN	CISO	New	Object Code Only	PJ21337
C4DTNH	CISO	New	Object Code Only	PJ21337
C4DXPD	CISO	New	Object Code Only	PJ21337
C511	COMX	Changed	C Language	PJ26346
C511	COMX	Changed	C Language	PJ26793, PJ26971
C512	COMX	Changed	C Language	PJ26346
C513	COMX	Changed	C Language	PJ26346
C514	COMX	Changed	C Language	PJ26346
C515	COMX	Changed	C Language	PJ26346
C518	COMX	Changed	C Language	PJ26346
C519	COMX	Changed	C Language	PJ26346
C524	COMX	Changed	C Language	PJ26346
C524	COMX	Changed	C Language	PJ26917
C525	COMX	Changed	C Language	PJ26346
C528	COMX	Changed	C Language	PJ26895
C529	COMX	Changed	C Language	PJ26346
C530	COMX	Changed	C Language	PJ26895
C533	COMX	Changed	C Language	PJ26346
C534	COMX	Changed	C Language	PJ26346
C537	COMX	Changed	C Language	PJ26895
C539	COMX	Changed	C Language	PJ26346
C540	COMX	Changed	C Language	PJ26346
C549	COMX	New	C Language	PJ26895
C550	COMX	New	C Language	PJ26895
EDCCPRDB	CISO	Changed	Object Code Only	PJ21337, PJ27009
PUT 11				
CEVNTC	CTAL	Changed	Assembler	PJ26380
CFS028	COMX	Changed	C Language	PJ26713
CFS108	COMX	Changed	C Language	PJ26713
CFS111	COMX	Changed	C Language	PJ26713
CFS121	COMX	Changed	C Language	PJ26713
CFS130	COMX	Changed	C Language	PJ26713
CFS131	COMX	Changed	C Language	PJ26713
CFS148	COMX	Changed	C Language	PJ26713

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CFS152	COMX	Changed	C Language	PJ26713
CFS157	COMX	Changed	C Language	PJ26713
CFS160	COMX	Changed	C Language	PJ26713
CGTHBA	COMX	Changed	Object Code Only	PJ26470
CHOOKS	CISO	Changed	Object Code Only	PJ26310
CJ000	CJ00	Changed	Assembler	PJ26522
CJ004	CJ00	Changed	Assembler	PJ26522
CJ005	CJ00	Changed	Assembler	PJ26522
CJ006	CJ00	Changed	Assembler	PJ26522
CLGJMP	CISO	Changed	Object Code Only	PJ26147
CPMPY	CISO	Changed	Object Code Only	PJ26806
CPWGR0	COMX	Changed	C Language	PJ26669
CXXFUN	CISO	Changed	Object Code Only	PJ26310, PJ26435
C1OHFS	CISO	Changed	Object Code Only	PJ26453
CSSDLL	CISO	Changed	C Language	PJ26685
C535	COMX	Changed	C Language	PJ26403
EDCCPRDB	CISO	Changed	Object Code Only	PJ26392
PUT 10				
CDBINT	CISO	Changed	Object Code Only	PJ25981, PJ25983, PJ26008
CFIXFP	CISO	Changed	Assembler	PJ26008
CHOOKS	CISO	New	Object Code Only	PJ26008
CLEINT	CISO	Changed	Object Code Only	PJ25981
CLMINT	CISO	Changed	Assembler	PJ25981, PJ25983, PJ26008
COBMEM	CISO	New	C Language	PJ26174
COSTRN	CISO	New	C Language	PJ26174
CREDBG	CISO	Changed	Object Code Only	PJ25981, PJ26008
CTRINT	CISO	Changed	Object Code Only	PJ25981
CXXFUN	CISO	Changed	Object Code Only	PJ25983, PJ26336
PUT 9				
CGTLGD	CISO	Changed	Assembler	PJ24659
CLCTOD	CISO	Changed	Object Code Only	PJ24659
CSTZDF	CISO	Changed	Object Code Only	PJ24659
CTIMEF	CISO	Changed	Object Code Only	PJ24659
PUT 8				
CASSRT	CISO	Changed	C Language	PJ25240
CBGETS	CIO\$	Changed	Assembler	PJ25240
CBPUTS	CIO\$	Changed	Assembler	PJ25240
CCGETS	CISO	Changed	Object Code Only	PJ25240
CCPUTS	CISO	Changed	Object Code Only	PJ25240
CCSCNF	CISO	Changed	Object Code Only	PJ25240
CHELP	CTBX	New	C Language	PJ25174
CMESG	CTBX	New	C Language	PJ25174
COPSTR	CISO	Changed	C Language	PJ25240

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Table 1272. Library Member (Object File) Changes by PUT and APAR (continued)

Library Member (Object File)	Library Source File	New, Changed, or No Longer Supported?	Type	APAR Number
CMSPTR		Changed	C Language	PJ21907
CMSRC		Changed	C Language	PJ21907
CMSSL		Changed	C Language	PJ21907
CMSST		Changed	C Language	PJ21907
CMSTPN		Changed	C Language	PJ21907
CMT RTS		Changed	C Language	PJ21907
CREHKA		Changed	C Language	PJ21907
CSERRO		Changed	C Language	PJ21907
CSERRS		Changed	C Language	PJ21907
CSERRX		Changed	C Language	PJ21907
CUNFRC		Changed	C Language	PJ21907
CUNHKA		Changed	C Language	PJ21907

Link-Edited Modules

Table 1273 summarizes changes to the link-edited modules shipped by IBM, which should go into a data set with attributes DCB=(RECFM=U,LRECL=80,BLKSIZE=1200). This information is presented in alphabetic order by the name of the link-edited module.

Table 1273. Link-Edited Module Changes by PUT and APAR

Link-Edited Module	New, Changed, or No Longer Supported?	APAR Number
PUT 15		
CDBG	Changed	PJ27824, PJ27862, PJ28041
CISO	Changed	PJ27856, PJ27786
CLEJ	Changed	PJ27975
CL13	Changed	PJ27925
CL14	Changed	PJ27925
CMQF	Changed	PJ27925
CMQK	Changed	PJ27674
CMQM	Changed	PJ27925, PJ27674
CMQS	Changed	PJ27925, PJ27830, PJ28170
CMQX	Changed	PJ27925
CPA0	Changed	PJ27853
CPLX	Changed	PJ27842
CPS0	No Changes – Must be relinked and loaded.	PJ28133
CSYL	Changed	PJ27962
CTAL	Changed	PJ27925, PJ28105
CUIU	Changed	PJ27925, PJ27892
CUSC	Changed	PJ27830
PUT 14		

Table 1273. Link-Edited Module Changes by PUT and APAR (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	APAR Number
CDBG	Changed	PJ27585, PJ27434, PJ27398, PJ27578
CDNF	Changed	PJ27619
CDNS	Changed	PJ27619
CEXP	Changed	PJ27585, PJ27639, PJ27578
CLTV	Changed	PJ27619
CLTW	Changed	PJ27619
CLTX	Changed	PJ27619
CLTY	Changed	PJ27619
CLTZ	Changed	PJ27619
CMAT	Changed	PJ27619
CMQM	Changed	PJ27698
CMQS	Changed	PJ27619, PJ27559
CPLX	Changed – The TPFASM segment, which is object code only (OCO), was changed (APAR PJ27449).	PJ27449, PJ27578
CPP1	Changed	PJ27664
CPP2	Changed	PJ27627
CPP3	New	PJ27627
CRPC	Changed	PJ27619
CTFT	Changed	PJ27619
CUPH	Changed	PJ27626
PIUPRT	Changed	PJ27479
PUT 13		
CDBG	Changed	PJ27104, PJ27237, PJ27270
CDB2	Changed	PJ27261
CDB3	Changed	PJ27052, PJ27261
CDB4	Changed	PJ27261
CEXP	Changed	PJ27261, PJ27286
CPA0	Changed	PJ27088, PJ27089
CPLX	Changed	PJ27254, PJ27266, PJ27335
CPRS	Changed	PJ27261
GNTAGH	Changed	PJ27339
PUT 12		
CDBG	Changed	PJ26804, PJ26815, PJ26824, PJ26831
CDB3	Changed	PJ26967, PJ26866
CEXP	Changed	PJ26866
CPA0	Changed	PJ26729, PJ26818
CPLX	Changed	PJ26804, PJ26923

Table 1273. Link-Edited Module Changes by PUT and APAR (continued)

Link-Edited Module	New, Changed, or No Longer Supported?	APAR Number
CPS0	Changed	PJ25893, PJ26823, PJ26737, PJ26869, PJ26966
PUT 11		
CDBG	Changed	PJ26219, PJ26352, PJ26468, PJ26481, PJ26543
CDB3	Changed	PJ26319, PJ26404
CEXP	Changed	PJ26319
CPA0	Changed	PJ26353, PJ26435, PJ26487, PJ26548
CPLX	Changed	PJ26667
CPS0	Changed	PJ26452
PUT 10		
CDBG	Changed	PJ25982
CDB2	Changed	PJ25982
CDB3	Changed	PJ25982
CDB4	New	PJ25982
CEXP	Changed	PJ25982
CLEY	Changed	PJ25880
CPA0	New	PJ25983, PJ26217
CPLX	Changed	PJ25982
CPRS	Changed	PJ25982
CPS0	Changed	PJ25841
PPCP	Changed	PJ25841, PJ25981

Members (Object Files)

Table 1274 summarizes member (object file) changes.

Notes:

1. You must recompile or reassemble a member (object file) if it has changed.
2. You must prelink and link a dynamic load module (DLM) if it has changed.

This information is presented in alphabetic order by the name of the member (object file).

Table 1274. Member (Object File) Changes by PUT and APAR

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
PUT 15				
CCCITA	CMQS	Changed	Object Code Only	PJ27830
CINET7	CLTZ	Changed	C Language	PJ27934
CLA3	CLA3	Changed	C Language	PJ27379
CLCE	CLCE	Changed	C Language	PJ27379

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CLCF	CLCF	Changed	C Language	PJ27379
CLCR	CLCR	Changed	C Language	PJ27379
CLCW	CLCW	Changed	C Language	PJ27379
CLEJ	CLEJ	Changed	C Language	PJ27975
CL13	CL13	Changed	C Language	PJ27925
CL14	CL14	Changed	C Language	PJ27925
CL4A	CL40	Changed	C Language	PJ28163
CMAP	CMAP	Changed	C Language	PJ28001
CMATAB	CMAT	Changed	C Language	PJ28001, PJ28065
CMQBLD	CMQK	Changed	C++ Language	PJ27674, PJ28145
CMQCKP	CUIU	Changed	C++ Language	PJ27925, PJ27892
CMQFRM	CMQF	Changed	C++ Language	PJ27925
CMQL	CMQS	Changed	Object Code Only	PJ27830
CMQMGR	CMQS	Changed	C++ Language	PJ28170 corrects PJ28136
CMQMRM	CMQM	Changed	C++ Language	PJ27925, PJ27674
CMQRCV	CMQS	Changed	C++ Language	PJ27925
CMQRM	CMQS	Changed	C++ Language	PJ27925
CMQSWP	CMQS	Changed	C++ Language	PJ28170
CMQXLR	CMQX	Changed	C++ Language	PJ27925
CMQXRM	CMQX	Changed	C++ Language	PJ27925
CRMSAA	CMQS	Changed	Object Code Only	PJ27830
CSYLGD	CSYL	Changed	C++ Language	PJ27962
CUSCCA	CMQS	Changed	Object Code Only	PJ27830
CUSCCD	CMQS	Changed	Object Code Only	PJ27830
CUSCRW	CUSC	Changed	C Language	PJ27830
CUSCUL	CMQS	Changed	C++ Language	PJ27830
CXQPRP	CTAL	Changed	Real-Time Assembler	PJ27925
PUT 14				
BJ02	BJ02	Changed	C Language	PJ27606
BJ10	BJ10	Changed	C++ Language	PJ27274
BJ10	BJ10	Changed	C++ Language	PJ27874
CDBP	CDBP	Changed	C Language	PJ27406
CDBTBT	CDB0	Changed	C Language	PJ27445
CELE	CELE	Changed	C Language	PJ27530
CELT	CELT	Changed	C Language	PJ27530
CEL2	CEL2	Changed	C Language	PJ27605
CELP	CELP	Changed	C Language	PJ27605
CFIA	CFIA	No Longer Supported	C Language	PJ27094
CINET1	CDNS, CLTV	Changed	C Language	PJ27619, PJ27436

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CINET2	CDNS, CLTV, CLTY, CMAT, CMQS	Changed	C Language	PJ27619
CINET3	CLTW	Changed	C Language	PJ27619
CINET4	CLTX	Changed	C Language	PJ27619, PJ27011
CINET5	CDNS, CLTV, CLTY, CMAT, CMQS	Changed	C Language	PJ27619, PJ27436
CINET6	CDNF, CDNS, CLTV, CLTY, CMAT, CMQS, CRPC, CTFT	Changed	C Language	PJ27619
CINET7	CLTZ	Changed	C Language	PJ27619
CJ01	CJ01	Changed	Assembler	PJ27380
CJ06	CJ01	New	C Language	PJ27380
CJ105	CJ10	Changed	C Language	PJ27380
CJ107	CJ10	Changed	C Language	PJ27380
CJ110	CJ10	Changed	C Language	PJ27380
CJ112	CJ10	Changed	C Language	PJ27614
CJ113	CJ10	Changed	C Language	PJ27380
CLCA	CLCA	Changed	C Language	PJ27628
CLDG	CELA	Changed	C Language	PJ27530
CLDH	CELA	Changed	C Language	PJ27530
CLDI	CLDI	Changed	C Language	PJ27530
CLDJ	CEL2	Changed	C Language	PJ27530
CLDO	CLDO	Changed	C Language	PJ27530
CLEJ	CLEJ	Changed	C Language	PJ27605
CLSU	CLSU	Changed	C Language	PJ27379
CLS01	CFIA	New	C Language	PJ27094
CLS02	CFIA	New	C Language	PJ27094
CLS03	CFIA	New	C Language	PJ27094
CLS04	CFIA	New	C Language	PJ27094
CLS05	CFIA	New	C Language	PJ27094
CLS06	CFIA	New	C Language	PJ27094
CLTN	CLTN	Changed	C Language	PJ27624
CLZE	CLZK	Changed	C Language	PJ27586
CMACMD	CMAT	Changed	C Language	PJ27726
CMAP	CMAP	Changed	C Language	PJ27621
CMATAB	CMAT	Changed	C Language	PJ27726
CMQMRM	CMQM	Changed	C++ Language	PJ27698
COLC	COLC	Changed	C Language	PJ27605
COLK	COLH	Changed	C Language	PJ27605
COL7	COL7	Changed	C Language	PJ27530
CORD	CORD	Changed	C Language	PJ27455
CRMTRA	CMQS	Changed	Object Code Only	PJ27555, PJ27559

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CSYLGD	CSYL	Changed	C++ Language	PJ27458
CUDAPV	CUDA	Changed	C++ Language	PJ27552
CUDN	CUDN	Changed – Recompile CUDN and relink the CUDN DLM using the CUDNBS build script.	C++ Language	PJ27612
CUD5	CUD2	Changed	C++ Language	PJ27673
CUD8	CUD2	Changed	C++ Language	PJ27635
CUPH	CUPH	Changed	C Language	PJ27626
I\$ENV	CFIR, CFIS, CFJE	Changed	C++ Language	PJ27532
PUT 13				
C190	CORD, CORM	Changed	Assembler	PJ27272
CBOT	CBOT	Changed	C Language	PJ26996
CDBS	CDBS	Changed	C Language	PJ27160, PJ27224
CDCR	CDCP	Changed	Real-Time Assembler	PJ27343
CDMDSP	CDM0	Changed	C Language	PJ27096
CFIL	CFIL	Changed	C Language	PJ27091
CFMADD	CFLN	Changed	C Language	PJ27299 – Provides the ability to remove a processor's inactive connections to a CF structure with the ZMCFT REMOVE command.
CFMDIS	CFLN	Changed	C Language	PJ27299 – Provides the ability to remove a processor's inactive connections to a CF structure with the ZMCFT REMOVE command.
CFMFRE	CFLN	Changed	C Language	PJ27299 – Provides the ability to remove a processor's inactive connections to a CF structure with the ZMCFT REMOVE command.
CFMPAR	CFLM	Changed	C Language	PJ27299 – Provides the ability to remove a processor's inactive connections to a CF structure with the ZMCFT REMOVE command.
CFMREM	CFLN	New	C Language	PJ27299 – Provides the ability to remove a processor's inactive connections to a CF structure with the ZMCFT REMOVE command.
CFMSGs	CFLU	Changed	C Language	PJ27299 – Provides the ability to remove a processor's inactive connections to a CF structure with the ZMCFT REMOVE command.
CINET1	CLTV	Changed	C Language	PJ27255

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CINET4	CLTX	Changed	C Language	PJ27363
CINET5	CLTV, CLTY	Changed	C Language	PJ27363
CINET7	CLTZ	Changed	C Language	PJ27363, PJ27474
CLDL	CEL2	Changed	C Language	PJ26891
CLDO	CLDO	Changed	C Language	PJ26891
CLTS	CLTN	Changed	C Language	PJ27271
CLZI	CLZK	Changed	C Language	PJ27288
CMQBAT	CMQS	Changed	Object Code Only	PJ27182
CMQMCA	CMQS	Changed	C++ Language	PJ27355
CMQMGC	CMQS	Changed	Object Code Only	PJ27213
CMQMGR	CMQS	Changed	C++ Language	PJ27355
CORH	CORD	Changed	C Language	PJ27272
CRMCLA	CMQS	Changed	C++ Language	PJ27355
CRMTRA	CMQS	Changed	C++ Language	PJ27355
CUDA	CUDA	Changed	C++ Language	PJ27102
CUDD	CUDA	Changed	C++ Language	PJ27342
CUDXDB	CDBP, CDBS, CLDF, COLH, CPS0, CRL1, CUD2	Changed	Assembler	PJ26951
CUDE	CUDA	Changed	C++ Language	PJ27342
CUD2	CUD2	Changed	C++ Language	PJ27388
CUD4	CUD2	Changed	C++ Language	PJ27388
CUD5	CUD2	Changed	C++ Language	PJ27102, PJ27304
CUSCCA	CMQS	Changed	C++ Language	PJ27355
PUT 12				
CBOT	CBOT	Changed	C Language	PJ26779
CDBTBT	CDB0	Changed	C Language	PJ26793
CDCP	CDCP	New	C Language	PJ27095
CDCQ	CDCO, CDCP	Changed	C Language	PJ27095
CELE	CELE	Changed	C Language	PJ26849
CFLB	CFLB	Changed	C Language	PJ26841
CFMADD	CFLN	Changed	C Language	PJ26841
CFMDEL	CFLN	Changed	C Language	PJ26841
CFMDIS	CFLN	Changed	C Language	PJ26919
CFMPAR	CFLM	Changed	C Language	PJ26841
CFMSGs	CFLU	Changed	C Language	PJ26841, PJ26919
CFTPD1	CFTP	New	C Language	PJ27028
CFTPD2	CFTP	New	C Language	PJ27028
CFTPD3	CFTP	New	C Language	PJ27028
CINET1	CLTV	Changed	C Language	PJ26434, PJ26848
CINET2	CLTV, CLTY	Changed	C Language	PJ26515
CINET4	CLTX	Changed	C Language	PJ26848

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CINET4	CLTX	Changed	C Language	PJ27080
CINET5	CLTV, CLTY	Changed	C Language	PJ26848
CINET5	CLTV, CLTY, CMAT, CMQS	Changed	C Language	PJ27080
CINET7	CLTZ	Changed	C Language	PJ26848
CINET7	CLT2	Changed	C Language	PJ27080
CJ17	CJ17	Changed	Real-Time Assembler	PJ26829 – Updated to insert a DETAC CHECK=NO to remove any possible block from D5 before issuing the GETCC macro.
CLCA	CLCA	Changed	C Language	PJ26727
CLCF	CLCB	Changed	C Language	PJ26742
CLCJ	CLCJ	Changed	C Language	PJ26727
CLCW	CLCW	Changed	C Language	PJ26917, PJ26742
CLM8	CLM8	Changed	C Language	PJ26841, PJ26919
CLTN	CLTN	Changed	C Language	PJ26398
CLZP	CLZP	Changed	C Language	PJ26727
CL4A	CL4A	Changed	C Language	PJ26925
CMACMD	CMAT	Changed	C Language	PJ26873
CMAP	CMAP	Changed	C Language	PJ26398
CMAP	CMAP	Changed	C Language	PJ26873
CMOA	CMOA	Changed	C Language	PJ26873
COLP	COLH	Changed	C Language	PJ26849
CRII	CRII	Changed	C Language	PJ26873
CRLX	COLM	Changed	C Language	PJ26744
CUDA	CUDA	Changed	C++ Language	PJ26765, PJ27009
CUDB	CUDA	Changed	C Language	PJ27009
CUDC	CUDA	Changed	C++ Language	PJ26787, PJ26864
CUDE	CUDA	Changed	C Language	PJ27009
CUDK	CUDA	Changed	C Language	PJ27009
CUDXDB	CDBP, CDBS, CLDF, COLH, CRL1, CUD2	Changed	Assembler	PJ27009, PJ26864, PJ26984
CUD0	CUD0	Changed	C Language	PJ27009
CUD2	CUD2	Changed	C++ Language	PJ26864, PJ27009
CUD3	CUD2	Changed	C++ Language	PJ27009
CUD4	CUD2	Changed	C++ Language	PJ26747, PJ26864, PJ27009
CUD5	CUD2	Changed	C++ Language	PJ26747, PJ27009
CUD6	CUD2	Changed	C++ Language	PJ26864, PJ27009
CUD8	CUD2	Changed	C++ Language	PJ27009
CUD9	CUD2	Changed	C Language	PJ27009
CUIS	CMQS	Changed	C Language	PJ26710
CUPH	CUPH	Changed	C Language	PJ26862
CVXS	CVXS	Changed	C Language	PJ26810
CVXSF8	CVXS	Changed	Assembler	PJ26810

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
UMATCH	CMAT	Changed	C Language	PJ26873
PUT 11				
CBOT	CBOT	Changed	C Language	PJ26713
CDBTBT	CDB0	Changed	C Language	PJ26407
CDPLT	CDPL	Changed	C Language	PJ26413
CEXTDV	CTAL	Changed	C Language	PJ26139
CFCNC	CFLZ	Changed	C Language	PJ26403, PJ26579
CFDSC	CFLY	Changed	C Language	PJ26403
CFIN	CFIN	Changed	C Language	PJ26713
CFMENA	CFLN	Changed	C Language	PJ26403
CFRST1	CFLR	Changed	C Language	PJ26403
CFRST2	CFLS	Changed	C Language	PJ26403
CFSBFD	CFLZ	Changed	C Language	PJ26403
CFSBFL	CFLY, CFLZ	Changed	C Language	PJ26403
CFSTBE	CFLP	Changed	C Language	PJ26403
CFSTRF	CFLQ	Changed	C Language	PJ26403
CFZF	CFZF	Changed	C Language	PJ26713
CFZI	CFZI	Changed	C Language	PJ26713
CINET1	CLTV	Changed	C Language	PJ25761, PJ26515, PJ26671
CINET2	CLTV, CLTY	Changed	C Language	PJ26515
CINET3	CLTW	Changed	C Language	PJ25761
CINET4	CLTX	Changed	C Language	PJ26515
CINET5	CLTV, CLTY	Changed	C Language	PJ26140, PJ26280, PJ26355
CINET7	CLTZ	New	C Language	PJ25761, PJ26515
CINET8	CLTV, CLTY, CLTZ	New	C Language	PJ26515, PJ26671
CJ105	CJ10	Changed	C Language	PJ26522
CJ106	CJ10	Changed	C Language	PJ26522
CJ107	CJ10	Changed	C Language	PJ26522
CJ109	CJ10	Changed	C Language	PJ26522
CJ110	CJ10	Changed	C Language	PJ26522
CJ111	CJ10	New	C Language	PJ26522
CJ112	CJ10	New	C Language	PJ26522
CJ113	CJ10	New	C Language	PJ26522
CJ13	CJ13	Changed	Real-Time Assembler	PJ26728 – Updated to allow recoup BLOBs to be recouped PJ25207 – Miscellaneous TPF collection support recoup enhancements and corrections.
CJ17	CJ17	Changed	Real-Time Assembler	PJ26216 PJ26738 – Updated to allow recoup BLOBs to be recouped.
CLA3	CLA3	Changed	C Language	PJ26403
CLA4	CLA4, CMQS	Changed	C Language	PJ26403

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CLCA	CLCA	Changed	C Language	PJ26378
CLCC	CLCC	Changed	C Language	PJ26378
CLCE	CLCE	Changed	C Language	PJ26142
CLCF	CLCB	Changed	C Language	PJ26142
CLCJ	CLCJ	Changed	C Language	PJ26378
CLCW	CLCW	Changed	C Language	PJ26142
CLZG	CLZK	Changed	C Language	PJ26532
CLZP	CLZK	Changed	C Language	PJ26378
CL4D	CL4D	Changed	C Language	PJ26469
CL40	CL40	Changed	C Language	PJ26469
COLC	COLC	Changed	C Language	PJ26441
COLK	COLK	Changed	C Language	PJ26441
CRDJ	CRDA, CREA	Changed	C Language	PJ26403
CRDK	CRDA, CREA	Changed	C Language	PJ26403
CRDL	CREA	Changed	C Language	PJ26403
CRDT	CRDA, CREA	Changed	C Language	PJ26403
CREQ	CRDA, CREA	Changed	C Language	PJ26403
CTFTP1	CTFT	Changed	Object Code Only	PJ26408
CTFTP2	CTFT	Changed	Object Code Only	PJ26408
CUD3	CUD2	Changed	C++ Language	PJ26503
CUD4	CUD2	Changed	C++ Language	PJ26503
CUD5	CUD2	Changed	C++ Language	PJ26507
CUSCRW	CUSC	Changed	C Language	PJ26498
CVXS	CVXS	New	C Language	PJ26534
CVXSF0	CVXS	New	Assembler	PJ26534
CVXSF1	CVXS	New	Assembler	PJ26534
CVXSF2	CVXS	New	Assembler	PJ26534
CVXSF3	CVXS	New	Assembler	PJ26534
CVXSF4	CVXS	New	Assembler	PJ26534
CVXSF5	CVXS	New	Assembler	PJ26534
CVXSF6	CVXS	New	Assembler	PJ26534
CVXSF7	CVXS	New	Assembler	PJ26534
CVXSF8	CVXS	New	Assembler	PJ26534
JCI1	JCI1	Changed	C Language	PJ26713
PUT 10				
CCOPY1	CFI7	New	C Language	PJ26174
CDBP	CDBP	Changed	C Language	PJ25981, PJ25983
CDBPUX	CDBP	Changed	C Language	PJ25983
CDBS	CDBS	Changed	C Language	PJ25981, PJ25983
CDBTBT	CDBO	Changed	C Language	PJ25981, PJ25983, PJ26008
CDD001	CDD001	New	C Language	PJ26174
CDD002	CDD002	New	C Language	PJ26174

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CDD003	CDD003	New	C Language	PJ26174
CDD004	CDD004	New	C Language	PJ26174
CFIF	CFIF	New	C Language	PJ26174
CFIG	CFIG	New	C Language	PJ26174
CFIH	CFIH	New	C Language	PJ26174
CFIJ	CFIJ	New	C Language	PJ26174
CFIK	CFIK	New	C Language	PJ26174
CFIL	CFIL	New	C Language	PJ26174
CFIO	CFIO	New	C Language	PJ26174
CFIP	CFIP	New	C++ Language	PJ26174
CFIQ	CFIQ	New	C Language	PJ26174
CFIR	CFIR	New	C++ Language	PJ26174
CFIS	CFIS	New	C++ Language	PJ26174
CFIV	CFIV	New	C++ Language	PJ26174
CFI1	CFI1	New	C Language	PJ26174
CFI2	CFI2	New	C Language	PJ26174
CFI7	CFI7	New	C Language	PJ26174
CFTS1	CFI7	New	C Language	PJ26174
CGETOP	CGETOP	New	C Language	PJ26174
CGLOBB	CGLOBB	New	C Language	PJ26174
CIL7	CILA	Changed	C Language	PJ25880
CLDJ	CEL2	Changed	C Language	PJ25880
CLD2	CELA	Changed	C Language	PJ25880
CLEJ	CLEJ	Changed	C Language	PJ25880
CLEW	CLEW	Changed	C Language	PJ25880
CLEY	CLEY	Changed	C Language	PJ25880
CLTR	CLTR	Changed	C Language	PJ26324
COLC	COLC	Changed	C Language	PJ25880
COLK	COLH	Changed	C Language	PJ25880
COLO	COLO	Changed	C Language	PJ25880
COLP	COLH	Changed	C Language	PJ25981
CPGS	CPGS	Changed	C Language	PJ25983
CRLD	CELA	Changed	C Language	PJ25880
CRL1	CRL1	Changed	C Language	PJ25981
CUDA	CUDA	New	C++ Language	PJ25981, PJ26008
CUDB	CUDB	New	Assembler	PJ25981, PJ26008
CUDC	CUDA	New	C++ Language	PJ25981, PJ26008
CUDD	CUDA	New	C++ Language	PJ25981
CUDE	CUDA	New	C++ Language	PJ25981, PJ26008
CUDK	CUDA	New	C++ Language	PJ25981
CUDX	CDBP, CLDF, COLH, CRLL	New	Assembler	PJ25981
CUDXDB	CDBP, CUD2	New	Assembler	PJ25981, PJ26008
CUD0	CUD0	New	C Language	PJ25981

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CUD1	CUD1	New	C++ Language	PJ25981
CUD2	CUD2	New	C++ Language	PJ25981, PJ26008
CUD3	CUD2	New	C++ Language	PJ25981
CUD4	CUD2	New	C++ Language	PJ25981, PJ26008
CUD5	CUD2	New	C++ Language	PJ25981, PJ26008
CUD6	CUD2	New	C++ Language	PJ25981, PJ26008
CUD7	CUD2	New	C++ Language	PJ25981
CUD8	CUD2	New	C++ Language	PJ25981
CUD9	CUD2	New	C++ Language	PJ25981
CUPH	CUPH	New	C Language	PJ25880
CUPT	CUPT	New	C Language	PJ25880
EYAA	CPGA	New	C Language	PJ25983
PUT 9				
CJ17	CJ17	Changed	Real-Time Assembler	PJ25805, PJ25414
PUT 8				
CBOT	CBOT	Changed	C Language	PJ25240, PJ25266
CJ106	CJ10	Changed	C Language	PJ25379
CJ13	CJ13	Changed	Real-Time Assembler	PJ25379
CJ17	CJ17	Changed	Real-Time Assembler	PJ25207 – Miscellaneous TPF collection support recoup enhancements and corrections.
PUT 7				
COLO	COLO	Changed	C Language	PJ24881
CRLB	CRLB	Changed	C Language	PJ24881
CRLY	COLO	Changed	C Language	PJ24881
PUT 6				
CDFT	CDFT	New	C Language	PJ23297
CENV	CENV	New	C Language	PJ23923
CIMN	CIMN	Changed	C Language	PJ23526
CSRA	CSRA	Changed	C Language	PJ21693
CSRB	CSRA	Changed	C Language	PJ21693
CSRD	CSRA	Changed	C Language	PJ21693
CSRE	CSRA	Changed	C Language	PJ21693
CSRF	CSRA	Changed	C Language	PJ21693
CSRG	CSRA	Changed	C Language	PJ21693
CSRH	CSRA	Changed	C Language	PJ21693
CSRI	CSRA	Changed	C Language	PJ21693
CSRJ	CSRA	Changed	C Language	PJ21693
CSRK	CSRA	Changed	C Language	PJ21693
CSRL	CSRA	Changed	C Language	PJ21693
CVRI	CVRI	Changed	C Language	PJ23526
CVRI01	CVRI	New	C Language	PJ23526
CZXG	CZXG	Changed	C Language	PJ21708

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CZXH	CZXG	Changed	C Language	PJ21708
CZXK	CZXK	Changed	C Language	PJ21708
CZXL	CZXK	Changed	C Language	PJ21708
UENV	UENV	New	C Language	PJ23923
PUT 5				
CLCS	CLCS	New	C Language	PJ22389
CLCU	CLCU	New	C Language	PJ22389
CNAM	CNAM	Changed	C Language	PJ21705
CORD	CORD	Changed	C Language	PJ21709
CORF	CORD	Changed	C Language	PJ21709
CORG	CORD	Changed	C Language	PJ21709
CORH	CORD	Changed	C Language	PJ21709
CORI	CORD	Changed	C Language	PJ21709
CORJ	CORD	Changed	C Language	PJ21709
CSFU	CSFX	Changed	C Language	PJ21706
CSFW	CSFX	Changed	C Language	PJ21706
CSFX	CSFX	Changed	C Language	PJ21706
CSFY	CSFX	Changed	C Language	PJ21706
CSFZ	CSFX	Changed	C Language	PJ21706
CSF6	CSFX	Changed	C Language	PJ21706
CSF7	CSFX	Changed	C Language	PJ21706
CSF8	CSFX	Changed	C Language	PJ21706
CSF9	CSFX	Changed	C Language	PJ21706
CTUU	CTUU	Changed	C Language	PJ21701
CTU1	CTUU	Changed	C Language	PJ21701
CTU2	CTUU	Changed	C Language	PJ21701
CTU3	CTUU	Changed	C Language	PJ21701
CTU4	CTUU	Changed	C Language	PJ21701
CTU5	CTUU	Changed	C Language	PJ21701
CTU6	CTUU	Changed	C Language	PJ21701
CTU7	CTUU	Changed	C Language	PJ21701
C190	CORD	Changed	Assembler	PJ21709
PUT 4				
CEATAD	CLEE, CLEF	New	C Language	PJ20388
CEATFI	CLEE, CLEF	New	C Language	PJ20388
CEATRE	CLED, CLEF	New	C Language	PJ20388
CELA	CELA	Changed	C Language	PJ20388
CELB	CELA	Changed	C Language	PJ20388
CELC	CELC	Changed	C Language	PJ20388
CELD	CELD	Changed	C Language	PJ20388
CELE	CELE	Changed	C Language	PJ20388
CELF	CELF	Changed	C Language	PJ20388
CELH	CELF	Changed	C Language	PJ20388

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CELJ	CELF	Changed	C Language	PJ20388
CELK	CELF	Changed	C Language	PJ20388
CELL	CELA	Changed	C Language	PJ20388
CELM	CELM	Changed	C Language	PJ20388
CELN	CELN	Changed	C Language	PJ20388
CELO	CELO	Changed	C Language	PJ20388
CELP	CELP	Changed	C Language	PJ20388
CELR	CELR	Changed	C Language	PJ20388
CELS	CELF	Changed	C Language	PJ20388
CELT	CELT	Changed	C Language	PJ20388
CELU	CELU	Changed	C Language	PJ20388
CELV	CELV	Changed	C Language	PJ20388
CELW	CELW	Changed	C Language	PJ20388
CELX	CELX	Changed	C Language	PJ20388
CELY	CELY	Changed	C Language	PJ20388
CELZ	CELZ	Changed	C Language	PJ20388
CEL0	CEL0	Changed	C Language	PJ20388
CEL1	CELA	Changed	C Language	PJ20388
CEL2	CEL2	Changed	C Language	PJ20388
CEL4	CEL4	Changed	C Language	PJ20388
CEL5	CEL5	Changed	C Language	PJ20388
CEL6	CEL6	Changed	C Language	PJ20388
CEL7	CEL7	Changed	C Language	PJ20388
CEL8	CEL8	Changed	C Language	PJ20388
CLDA	CLDA	Changed	C Language	PJ20388
CLDB	CLDB	Changed	C Language	PJ20388
CLDC	CLDC	Changed	C Language	PJ20388
CDLG	CELA	Changed	C Language	PJ20388
CLDH	CELA	Changed	C Language	PJ20388
CLDI	CLDI	Changed	C Language	PJ20388
CLDJ	CEL2	Changed	C Language	PJ20388
CLDK	CLDK	Changed	C Language	PJ20388
CLDL	CEL2	Changed	C Language	PJ20388
CLDM	CEL2	Changed	C Language	PJ20388
CLDN	CELA	Changed	C Language	PJ20388
CLDO	CLD0	Changed	C Language	PJ20388
CLDP	CLDP	Changed	C Language	PJ20388
CLDQ	CLDQ	Changed	C Language	PJ20388
CLDR	CLDR	Changed	C Language	PJ20388
CLDS	CLDS	Changed	C Language	PJ20388
CLDT	CLDT	Changed	C Language	PJ20388
CLDU	CELA	Changed	C Language	PJ20388
CLDV	CELA	Changed	C Language	PJ20388

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CLDW	CELA	Changed	C Language	PJ20388
CLDX	CLDX	Changed	C Language	PJ20388
CLDY	CELA	Changed	C Language	PJ20388
CLDZ	CELA	Changed	C Language	PJ20388
CLD0	CELA	Changed	C Language	PJ20388
CLD3	CELA	Changed	C Language	PJ20388
CLD6	CELA	Changed	C Language	PJ20388
CLD7	CLD7	Changed	C Language	PJ20388
CLD8	CLD8	Changed	C Language	PJ20388
CLD9	CLDT	Changed	C Language	PJ20388
CLEA	CLEA	Changed	C Language	PJ20388
CLEB	CELP	Changed	C Language	PJ20388
CLEC	CLEC	Changed	C Language	PJ20388
CLED	CLED	Changed	C Language	PJ20388
CLEE	CLEE	Changed	C Language	PJ20388
CLEF	CLEF	Changed	C Language	PJ20388
CLEG	CLEG	Changed	C Language	PJ20388
CLEI	CLEI	Changed	C Language	PJ20388
CLEJ	CLEJ	Changed	C Language	PJ20388
CLEL	CLEL	Changed	C Language	PJ20388
CLEM	CLEM	Changed	C Language	PJ20388
CLEN	CLEM	Changed	C Language	PJ20388
CELO	CELA	Changed	C Language	PJ20388
CELP	CELA	Changed	C Language	PJ20388
CLEQ	CLEQ	Changed	C Language	PJ20388
CLER	CLER	Changed	C Language	PJ20388
CLES	CLES	Changed	C Language	PJ20388
CLET	CLET	Changed	C Language	PJ20388
CLEV	CLEV	Changed	C Language	PJ20388
CLEW	CLEW	Changed	C Language	PJ20388
CLEX	COLH	Changed	C Language	PJ20388
CLEY	CLEY	Changed	C Language	PJ20388
CLEZ	CLEZ	Changed	C Language	PJ20388
CLE1	CELA	Changed	C Language	PJ20388
CLE2	CELA	Changed	C Language	PJ20388
CLE3	CELA	Changed	C Language	PJ20388
CLE4	CLE4	Changed	C Language	PJ20388
CLE5	COL1	Changed	C Language	PJ20388
CLE6	CLE6	Changed	C Language	PJ20388
CLE7	CLE7	Changed	C Language	PJ20388
CLE8	CLE8	Changed	C Language	PJ20388
COLA	CELA	Changed	C Language	PJ20388
COLC	COLC	Changed	C Language	PJ20388

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
COLE	CELA	Changed	C Language	PJ20388
COLF	COLF	Changed	C Language	PJ20388
COLG	CELA	Changed	C Language	PJ20388
COLH	COLH	Changed	C Language	PJ20388
COLI	COLI	Changed	C Language	PJ20388
COLJ	CELA	Changed	C Language	PJ20388
COLK	COLH	Changed	C Language	PJ20388
COLM	COLM	Changed	C Language	PJ20388
COLN	COLH	Changed	C Language	PJ20388
COLO	COLO	Changed	C Language	PJ20388
COLP	COLH	Changed	C Language	PJ20388
COLQ	COLQ	Changed	C Language	PJ20388
COLS	COLS	Changed	C Language	PJ20388
COLT	COLH	Changed	C Language	PJ20388
COLV	COLV	Changed	C Language	PJ20388
COLW	COLW	Changed	C Language	PJ20388
COLX	COLX	Changed	C Language	PJ20388
COLY	COLY	Changed	C Language	PJ20388
COLZ	COLZ	Changed	C Language	PJ20388
COL0	COL0	Changed	C Language	PJ20388
COL1	COL1	Changed	C Language	PJ20388
COL2	COL1	Changed	C Language	PJ20388
COL3	COL3	Changed	C Language	PJ20388
COL4	COL4	Changed	C Language	PJ20388
COL5	COL5	Changed	C Language	PJ20388
COL6	COL6	Changed	C Language	PJ20388
COL7	COL7	Changed	C Language	PJ20388
COL8	COL8	Changed	C Language	PJ20388
COL9	CELA	Changed	C Language	PJ20388
CRLA	CLDT	Changed	C Language	PJ20388
CRLB	CRLB	Changed	C Language	PJ20388
CRLC	CRLC	Changed	C Language	PJ20388
CRLD	CELA	Changed	C Language	PJ20388
CRLE	CELA	Changed	C Language	PJ20388
CRLF	CELA	Changed	C Language	PJ20388
CRLG	CRLG	Changed	C Language	PJ20388
CRLH	CRLH	Changed	C Language	PJ20388
CRLI	CRLI	Changed	C Language	PJ20388
CRLJ	CRLI	Changed	C Language	PJ20388
CRLK	CELA	Changed	C Language	PJ20388
CRLM	CELA	Changed	C Language	PJ20388
CRLN	CELA	Changed	C Language	PJ20388
CRLO	CELA	Changed	C Language	PJ20388

Table 1274. Member (Object File) Changes by PUT and APAR (continued)

Member (Object File)	DLM/DLL	New, Changed, or No Longer Supported?	Type	APAR Number
CRLP	CRLI	Changed	C Language	PJ20388
CRLQ	CRLQ	Changed	C Language	PJ20388
CRLR	COLM	Changed	C Language	PJ20388
CRLS	CLEL	Changed	C Language	PJ20388
CRLT	CELA	Changed	C Language	PJ20388
CRLV	COLH	Changed	C Language	PJ20388
CRLW	CLEM	Changed	C Language	PJ20388
CRLX	COLM	Changed	C Language	PJ20388
CRLY	COLO	Changed	C Language	PJ20388
CVA7	CVA7	Changed	C Language	PJ20388
CYB2	CYB2	Changed	C Language	PJ20388
UELC	UELC	Changed	C Language	PJ20388
UELD	UELD	Changed	C Language	PJ20388
UELE	UELE	Changed	C Language	PJ20388
UELF	UELF	Changed	C Language	PJ20388
UELG	UELG	Changed	C Language	PJ20388
UELH	UELH	Changed	C Language	PJ20388
UELL	UELL	Changed	C Language	PJ20388
UELM	UELM	Changed	C Language	PJ20388
UELN	UELN	Changed	C Language	PJ20388
UELU	UELU	Changed	C Language	PJ20388
UELW	UELW	Changed	C Language	PJ20388
UELX	UELX	Changed	C Language	PJ20388
UEL1	UEL1	Changed	C Language	PJ20388

Object Code Only (OCO) Stubs

Table 1275 summarizes changes to stubs that are object code only (OCO). This information is presented in alphabetic order by the name of the OCO stub.

Table 1275. Changes to OCO Stubs By PUT and APAR

Object Code Only (OCO) Stub	New, Changed, or No Longer Supported?	APAR Number
PUT 15		
CLEINT	Changed	PJ27856
PUT 14		
CTS7	Changed	PJ27428
@@USRDL	New	PJ27692
@@USRDM	New	PJ27692
@@USRLB	New	PJ27692
PUT 13		
@@CHKHKS	New	PJ27254
@@FNMTC	New	PJ27317
CEESG003	Changed	PJ27361, PJ27522

Table 1275. Changes to OCO Stubs By PUT and APAR (continued)

Object Code Only (OCO) Stub	New, Changed, or No Longer Supported?	APAR Number
PUT 12		
@@GETFN	New	PJ26805
PUT 11		
CEESG003	Changed	PJ26377
PUT 9		
CEEBETBL	Changed	PJ25632
CEEBLLST	New	PJ25632
CEESTART	Changed	PJ25632
PUT 7		
@@TRGLOC	New	PJ25084
@@TRGLOR	New	PJ25084
CEESG003	Changed	PJ25084
PUT 6		
CBCSG003	New	PJ24472
CEEBETBL	New	PJ24472
CEEMAIN	New	PJ24472
CEEROOTA	New	PJ24472
CEESG003	New	PJ24472
CEESTART	New	PJ24472
EDCINPL	New	PJ24472

Configuration Constant (CONKC) Tags

Table 1276 summarizes the configuration constant (CONKC) tag changes. This information is presented in alphabetic order by the name of the CONKC tag.

Table 1276. CONKC Tag Changes by PUT and APAR

CONKC Tag	New, Changed, or No Longer Supported?	APAR Number
There are no changes.		

Control Program Interface (CINFC) Tags

Table 1277 summarizes the control program interface (CINFC) tag changes. The information in this table is ordered numerically by the equate value.

Table 1277. CINFC Tag Changes by PUT and APAR

CINFC Tag	Equate Value	New, Changed, or No Longer Supported?	APAR Number
PUT 13			
CMMTALK	362	New	PJ26794
PUT 12			
CMMCMS2	385	New	PJ26721
CMMCMS3	386	New	PJ26721

Copy Members

Table 1278 summarizes copy member changes. This information is presented in alphabetic order by the name of the copy member.

Table 1278. Copy Member Changes by PUT and APAR

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
PUT 15					
CBU2	Control Program	Changed	CC3088	Not Applicable	PJ27391
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ27976, PJ28055—Reassemble the CCENBK CSECT and relink the CPS0 link-edited module. PJ27816—Reassemble the CCENBK CSECT and relink the CPS0 link-edited module.
CEDT	Control Program	Changed	CCCPSE	Not Applicable	PJ27562
CEFA	Control Program	Changed	CCTAPE	Not Applicable	PJ27670
CJ521	Real-Time Assembler	Changed	CJ004	CJ00	PJ27706
CJ572	Real-Time Assembler	Changed	CJ004	CJ00	PJ27992
CJ601	Real-Time Assembler	Changed	CJ006	CJ00	PJ27191
CJ673	Real-Time Assembler	Changed	CJ006	CJ00	PJ27935—The T02_nextPut function for binary large objects (BLOBs) has been changed to position the cursor to the last byte that was added by the T02_nextPut operation. To incorporate this change, review and modify any application code that uses this function to process BLOBs.
CLHV	Control Program	Changed	CCSTOR	Not Applicable	PJ27915—Reassemble the CCSTOR CSECT and relink the CPS0 link-edited module.
CMIS	Control Program	Changed	CCNUCL	Not Applicable	PJ27892
CPSE	Control Program	Changed	CCCPSE	Not Applicable	PJ28089—Reassemble the CCCPSE CSECT and relink the CPS0 link-edited module.
CPSM	Control Program	Changed	CCCPSE	Not Applicable	PJ27801—Reassemble the CCCPSE CSECT and relink the CPS0 link-edited module.
CS0E	Control Program	Changed	CCSNA4	Not Applicable	PJ28024—Updated to correct a possible CTL-1 out of CCSNA4.
CS0F	Control Program	Changed	CCSNA4	Not Applicable	PJ28024—Updated to correct a possible CTL-1 out of CCSNA4.
CS10	Assembler	Changed	CCSNA2	Not Applicable	PJ27547
CS96	Real-Time Assembler	Changed	CCSNA3	Not Applicable	PJ27693
CS97	Real-Time Assembler	Changed	CCSNA3	Not Applicable	PJ27693
CTI2	Control Program	Changed	CCTCP2	Not Applicable	PJ27819, PJ27845, PJ28143

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CTME	Control Program	Changed	CCNUCL	Not Applicable	PJ27709, PJ28117 –The CCNUCL CSECT must be reassembled and the CPS0 link-edit module must be relinked.
CTSM	Control Program	Changed	CCTCP3	Not Applicable	PJ27968–Updated to verify socket descriptor is not in use.
CTS0	Real-Time Assembler	Changed	Not Applicable	Not Applicable	PJ27968–Updated to verify socket descriptor is not in use.
CT05	Control Program	Changed	CCCTIN	Not Applicable	PJ27831–Reassemble the CCCTIN CSECT and relink the CPS0 link-edit module. You might need to run SIP stage 1.
CT41	Control Program	Changed – Corrects APAR PJ27446.	CCCTIN – This must be reassembled.	Not Applicable	PJ28133
CUDU	Control Program	Changed	CCVAGE	Not Applicable	PJ27871
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ28014
GRFS	Control Program	Changed	CCSONP	Not Applicable	PJ28014
PUT 14					
CAPT	Control Program	Changed	CCNUCL	Not Applicable	PJ27530, PJ27747–The CCNUCL CSECT must be reassembled and the CPS0 link-edited module must be relinked.
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ27530, PJ27461, PJ27584, PJ27746
CCED	Control Program	Changed	CCENBK	Not Applicable	PJ27604 – The CCENBK CSECT must be reassembled and the CPS0 link-edited module must be relinked.
CCIO	Control Program	Changed	IPLB	Not Applicable	PJ27477
CCIO	Control Program	Changed	IPLB	Not Applicable	PJ27904 – Reassemble IPLB.
CEDI	Control Program	Changed	CCNUCL	Not Applicable	PJ27352
CEDT	Control Program	Changed	CCCPSE	Not Applicable	PJ27444
CEFA	Control Program	Changed	CCTAPE	Not Applicable	PJ27493
CEFE	Control Program	Changed	CCTAPE	Not Applicable	PJ27477
CEFR	Control Program	Changed	CCTAPE	Not Applicable	PJ27400
CEFR	Control Program	Changed	CCTAPE	Not Applicable	PJ27410
CEFS	Control Program	Changed	CCTAPE	Not Applicable	PJ27543
CEFT	Control Program	Changed	CCTAPE	Not Applicable	PJ27196, PJ27477
CHSZ	Control Program	Changed	CCNUCL	Not Applicable	PJ27530, PJ27746
CICR	Control Program	Changed	CCNUCL	Not Applicable	PJ27530
CJ001	Real-Time Assembler	Changed	CJ003	CJ00	PJ27380
CJ002	Real-Time Assembler	Changed	CJ000, CJ003, CJ004, CJ005, CJ006	CJ00	PJ27380
CJ101	Real-Time Assembler	Changed	CJ100	CJ10	PJ27380
CJ103	Real-Time Assembler	Changed	CJ100	CJ10	PJ27380

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CJ301	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380
CJ302	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380
CJ303	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380
CJ306	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380, PJ27390
CJ314	Real-Time Assembler	Changed	CJ000	CJ00	PJ27390
CJ316	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380, PJ27390
CJ321	Real-Time Assembler	Changed	CJ005	CJ00	PJ27380
CJ322	Real-Time Assembler	Changed	CJ005	CJ00	PJ27380
CJ322	Real-Time Assembler	Changed	CJ005	CJ00	PJ27874
CJ327	Real-Time Assembler	Changed	CJ005	CJ00	PJ27380
CJ334	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380
CJ351	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ361	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380
CJ362	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380, PJ27390
CJ364	Real-Time Assembler	Changed	CJ005	CJ00	PJ27380
CJ365	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ367	Real-Time Assembler	Changed	CJ000	CJ00	PJ27380
CJ401	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380, PJ26899
CJ460	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ461	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ463	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ465	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ471	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ473	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ475	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ481	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CJ491	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ501	Real-Time Assembler	Changed	CJ004	CJ00	PJ27380
CJ562	Real-Time Assembler	Changed	CJ004	CJ00	PJ27380
CJ569	Real-Time Assembler	Changed	CJ004	CJ00	PJ26906
CJ601	Real-Time Assembler	Changed	CJ006	CJ00	PJ27380
CJ697	Real-Time Assembler	Changed	CJ004	CJ00	PJ27380
CJIE	Control Program	Changed	CCSONS	Not Applicable	PJ27396
CJIY	Control Program	Changed	CCSONS	Not Applicable	PJ27396
CLBV	Control Program	Changed	CCLAW1	Not Applicable	PJ27568
CLB3	Control Program	Changed	CCLAW1	Not Applicable	PJ27568
CLHL	Control Program	Changed	CCCLHR	Not Applicable	PJ27530
CLOC	Control Program	Changed	CCCCP4	Not Applicable	PJ27480
CLOE	Control Program	Changed	CCCCP4	Not Applicable	PJ27480
CLXK	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ27505
CL20	Real-Time Assembler	Changed	CCTLOG	Not Applicable	PJ27460
CMIS	Control Program	Changed	CCNUCL	Not Applicable	PJ27352
CNP6	Control Program	Changed	CCSICF	Not Applicable	PJ27530
CPSF	Control Program	Changed	CCCPSF	Not Applicable	PJ26826 – The CCCPSF CSECT must be reassembled.
CPSL	Control Program	Changed	CCCSPE	Not Applicable	PJ27445 PJ27530 – Link-edit the PS0 link-edited module. PJ27481 – Reassemble the CCCPSE CSECT and link-edit the CPS0 link-edited module.
CRSM	Control Program	Changed	CCCSAS	Not Applicable	PJ27530
CS2A	Control Program	Changed	CCSNAE	Not Applicable	PJ27478
CS9B	Control Program	Changed	CCSNAF	Not Applicable	PJ27593
CTIN	Control Program	Changed	CCCTIN	Not Applicable	PJ27446
CTT1	Control Program	Changed	CCTCP1	Not Applicable	PJ27719
CTT3	Control Program	Changed	CCTCP1	Not Applicable	PJ27719
CTT5	Control Program	Changed	CCTCP1	Not Applicable	PJ27608
CTT6	Control Program	Changed	CCTCP1	Not Applicable	PJ27792, PJ27573
CTT8	Control Program	Changed	CCTCP1	Not Applicable	PJ27719
CT09	Control Program	Changed	CCCTIN	Not Applicable	PJ27446
CT24	Control Program	Changed	CCCTIN	Not Applicable	PJ27530
CT38	Control Program	Changed	CCCTIN	Not Applicable	PJ27475
CT41	Control Program	Changed	CCCTIN	Not Applicable	PJ27446
CUDT	Control Program	Changed	CCVAGE	Not Applicable	PJ27441

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CUDU	Control Program	Changed	CCVAGE	Not Applicable	PJ27441, PJ27563
GRFS	Control Program	Changed	CCSONP	Not Applicable	PJ27703
IB06	Control Program	Changed	IPLB	Not Applicable	PJ26826, PJ27773 – Reassemble IPLB.
UFZ0	Control Program	Changed	CCNUCL	Not Applicable	PJ27530
PUT 13					
CAPT	Control Program	Changed	CCNUCL	Not Applicable	PJ27087, PJ27373
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ27161, PJ26932
CCED	Control Program	Changed	CCENBK	Not Applicable	PJ27019
CCEG	Control Program	Changed	CCENBK	Not Applicable	PJ27456
CCE4	Control Program	Changed	CCIISC	Not Applicable	PJ27090
CEDT	Control Program	Changed	CCCPSE	Not Applicable	PJ27178
CEFL	Control Program	Changed	CCFADC	Not Applicable	PJ27443 – Updated to correct a CTRL-4 dump during FIND/FILE processing with DECBs.
CICR	Control Program	Changed	CCNUCL	Not Applicable	PJ26102, PJ27019, PJ26794
CIS0	Control Program	Changed	CCISOC	Not Applicable	PJ27108
CJ002	Real-Time Assembler	Changed	CJ000, CJ003, CJ004, CJ005, CJ006	CJ00	PJ27076
CJ321	Real-Time Assembler	Changed	CJ005	CJ00	PJ27425
CJ322	Real-Time Assembler	Changed	CJ005	CJ00	PJ27076
CJ327	Real-Time Assembler	Changed	CJ005	CJ00	PJ27076, PJ27194, PJ27409, PJ27353
CJ328	Real-Time Assembler	Changed	CJ005	CJ00	PJ27409, PJ26518
CJ341	Real-Time Assembler	Changed	CJ005	CJ00	PJ27076
CJ475	Real-Time Assembler	Changed	CJ006	CJ00	PJ26935, PJ26518
CJ511	Real-Time Assembler	Changed	CJ004	CJ00	PJ26518
CJ521	Real-Time Assembler	Changed	CJ004	CJ00	PJ27409, PJ27242, PJ26518
CJ572	Real-Time Assembler	Changed	CJ004	CJ00	PJ26518
CJ576	Real-Time Assembler	Changed	CJ004	CJ00	PJ26518
CJ676	Real-Time Assembler	Changed	CJ004	CJ00	PJ26813
CJ677	Real-Time Assembler	Changed	CJ004	CJ00	PJ26518
CLWB	Control Program	Changed	CCLAW3	Not Applicable	PJ27295
CLWU	Real-Time Assembler	Changed	CCLAW3	Not Applicable	PJ26995
CLWX	Control Program	Changed	CCLAW3	Not Applicable	PJ27295

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CLXA	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ27071
CMUB	Control Program	Changed	CCURSP	Not Applicable	PJ27202
CMUC	Control Program	Changed	CCURSP	Not Applicable	PJ27202
CPSE	Control Program	Changed	CCCPSE	Not Applicable	PJ27186
CPSL	Control Program	Changed	CCCPSE	Not Applicable	PJ27223
CPSM	Control Program	Changed	CCCPSE	Not Applicable	PJ27199
CRD0	Assembler	Changed	CCNUCL	Not Applicable	PJ27107
CS0E	Control Program	Changed	CCSNA4	Not Applicable	PJ27004
CS0E40	Real-Time Assembler	Changed	CCSNA4	CPS0	PJ27029
CS0F40	Real-Time Assembler	Changed	CCSNA4	CPS0	PJ27029
CS96	Real-Time Assembler	Changed	CCSNA3	Not Applicable	PJ27004
CTT5	Control Program	Changed	CCTCP1	Not Applicable	PJ27204
CT38	Control Program	Changed	CCCTIN	Not Applicable	PJ27263
CUDU	Control Program	Changed	CCVAGE	Not Applicable	PJ26951
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ27019
IB04	Control Program	Changed	IPLB	Not Applicable	PJ27105 – Assemble IPLB.
PUT 12					
CAPT	Control Program	Changed	CCNUCL	Not Applicable	PJ26880
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ26774, PJ26914, PJ26599, PJ26967
CCED	Control Program	Changed	CCENBK	Not Applicable	PJ26907
CCE4	Control Program	Changed	CCIISC	Not Applicable	PJ26793, PJ27016
CCIO	Control Program	Changed	IPLB	Not Applicable	PJ25496
CCIT	Control Program	Changed	CCNUCL	Not Applicable	PJ26966
CEDI	Control Program	Changed	CCNUCL	Not Applicable	PJ26991
CEDT	Control Program	Changed	CCCPSE	Not Applicable	PJ26427, PJ26964
CEFA	Control Program	Changed	CCTAPE	Not Applicable	PJ26427, PJ26720
CEFB	Control Program	Changed	CCTAPE	Not Applicable	PJ26427
CEFE	Control Program	Changed	CCTAPE	Not Applicable	PJ26427, PJ26545, PJ26720, PJ26737, PJ26869, PJ26823
CEFM	Control Program	Changed	CCTAPE	Not Applicable	PJ26427, PJ26745, PJ26823
CEFR	Control Program	Changed	CCTAPE	Not Applicable	PJ26427, PJ26869, PJ26823
CEFS	Control Program	Changed	CCTAPE	Not Applicable	PJ26427, PJ26869, PJ26823
CFCR	Control Program	Changed	CCCFCC	Not Applicable	PJ26841
CFL1	Control Program	Changed	CCCFLC	Not Applicable	PJ26841
CHSZ	Control Program	Changed	CCNUCL	Not Applicable	PJ26793, PJ26746, PJ26818
CICR	Control Program	Changed	CCNUCL	Not Applicable	PJ26721, PJ26793
CICS	Control Program	Changed	CCNUCL	Not Applicable	PJ26541, PJ26803
CIDP	Control Program	Changed	CCCPSE	Not Applicable	PJ26427
CJIT	Control Program	Changed	CCSONS	Not Applicable	PJ26841
CJ322	Real-Time Assembler	Changed	CJ005	CJ00	PJ26662

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CJ696	Real-Time Assembler	Changed	CJ004	CJ00	PJ26894
CLBC	Control Program	Changed	CCLAW1	CPS0	PJ26719
CLB2	Control Program	Changed	CCLAW1	CPS0	PJ26719
CLB3	Control Program	Changed	CCLAW1	CPS0	PJ26719
CLWG	Control Program	Changed	CCLAW3	CPS0	PJ26719
CLW8	Control Program	Changed	CCLAW3	CPS0	PJ26719
CLHL	Control Program	Changed	CCCLHR	Not Applicable	PJ26880
CLWP	Real-Time Assembler	Changed	CCLAW3	Not Applicable	PJ27032
CLXA	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ26873
CLXC	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ26873
CLXC	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ27103
CLXG	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ26873
CLXK	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ26873
CLXM	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ26873
CLXV	Real-Time Assembler	Changed	CCCCP1	Not Applicable	PJ26873
CPER	Control Program	Changed	CCCPSE	Not Applicable	PJ26801
CPSE	Control Program	Changed	CCCPSE	Not Applicable	PJ25496, PJ26719, PJ26900
CPSM	Control Program	Changed	CCCPSE	Not Applicable	PJ25496, PJ26900
CS0B	Control Program	Changed	CCSNA4	Not Applicable	PJ26880
CS0E	Control Program	Changed	CCSNA4	Not Applicable	PJ25893
CS13	Real-Time Assembler	Changed	CCSNA0	Not Applicable	PJ25713
CTME	Control Program	Changed	CCNUCL	Not Applicable	PJ26880
CTT6	Control Program	Changed	CCTCP1	Not Applicable	PJ26842
CT38	Control Program	Changed	CCCTIN	Not Applicable	PJ26211
CUDT	Control Program	Changed	CCVAGE	Not Applicable	PJ26784, PJ26923
CUDU	Control Program	New	CCVAGE	Not Applicable	PJ26784, PJ26923
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ26907
CYSN	Control Program	Changed	CCNUCL	Not Applicable	PJ26580
PUT 11					
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ26022, PJ26514, PJ26688, PJ26713
CDC1	Control Program	Changed	CCDCOL	Not Applicable	PJ26713
CEDT	Control Program	Changed	CCCPSE	Not Applicable	PJ26416, PJ26563
CEFB	Control Program	Changed	CCTAPE	Not Applicable	PJ26139
CEFE	Control Program	Changed	CCTAPE	Not Applicable	PJ26361
CICR	Control Program	Changed	CCNUCL	Not Applicable	PJ26215, PJ26384, PJ26568
CIDP	Control Program	Changed	CCCPSE	Not Applicable	PJ26384, PJ26686

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CIS2	Control Program	Changed	CCISOC	Not Applicable	PJ26312
CJID	Control Program	Changed	CCSONS, IPLB	Not Applicable	PJ26511
CJIF	Control Program	Changed	CCSONS	Not Applicable	PJ26686
CJII	Control Program	Changed	CCSONS	Not Applicable	PJ26511, PJ26686
CJIM	Control Program	Changed	CCSONS	Not Applicable	PJ26686
CJIS	Control Program	Changed	CCCWTN	Not Applicable	PJ26511
CJIT	Control Program	Changed	CCSONS	Not Applicable	PJ26686
CJIU	Control Program	Changed	CCSONS	Not Applicable	PJ26511, PJ26686
CJIV	Control Program	Changed	CCSONS	Not Applicable	PJ26686
CJIX	Control Program	Changed	CCSONS	Not Applicable	PJ26511, PJ26686
CJIY	Control Program	Changed	CCSONS	Not Applicable	PJ26686
CJ015	Real-Time Assembler	No Longer Supported	CJ005	CJ00	PJ26522
CJ020	Real-Time Assembler	Changed	CJ000	CJ00	PJ26139
CJ020	Real-Time Assembler	No Longer Supported	CJ000	CJ00	PJ26522
CJ021	Real-Time Assembler	No Longer Supported	CJ006	CJ00	PJ26522
CJ022	Real-Time Assembler	No Longer Supported	CJ005	CJ00	PJ26522
CJ025	Real-Time Assembler	No Longer Supported	CJ006	CJ00	PJ26522
CJ026	Real-Time Assembler	No Longer Supported	CJ006	CJ00	PJ26522
CJ030	Real-Time Assembler	No Longer Supported	CJ004	CJ00	PJ26522
CJ036	Real-Time Assembler	No Longer Supported	CJ004	CJ00	PJ26522
CJ037	Real-Time Assembler	No Longer Supported	CJ004	CJ00	PJ26522
CJ038	Real-Time Assembler	No Longer Supported	CJ004	CJ00	PJ26522
CJ039	Real-Time Assembler	No Longer Supported	CJ004	CJ00	PJ26522
CJ101	Real-Time Assembler	Changed	CJ100	CJ10	PJ26522
CJ103	Real-Time Assembler	Changed	CJ100	CJ10	PJ26522
CJ301	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ302	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ303	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ304	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ305	Real-Time Assembler	New	CJ000	CJ00	PJ26522

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CJ306	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ311	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ312	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ314	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ316	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ317	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ318	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ321	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ322	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ323	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ324	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ327	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ328	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ330	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ331	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ332	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ333	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ334	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ341	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ351	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ352	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ361	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ362	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ363	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ364	Real-Time Assembler	New	CJ005	CJ00	PJ26522
CJ365	Real-Time Assembler	New	CJ006	CJ00	PJ26522

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CJ365	Real-Time Assembler	Changed	CJ006	CJ00	PJ26738
CJ366	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ366	Real-Time Assembler	Changed	CJ006	CJ00	PJ26738
CJ367	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ371	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ372	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ373	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ401	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ460	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ461	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ463	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ465	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ471	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ473	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ475	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ481	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ491	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ501	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ511	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ521	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ522	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ523	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ524	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ561	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ562	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ563	Real-Time Assembler	New	CJ004	CJ00	PJ26522

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CJ566	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ567	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ568	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ569	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ571	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ572	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ573	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ576	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ581	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ582	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ583	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ584	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ585	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ586	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ591	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ592	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ593	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ594	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ601	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ602	Real-Time Assembler	New	CJ000	CJ00	PJ26522
CJ661	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ663	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ665	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ667	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ668	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ671	Real-Time Assembler	New	CJ006	CJ00	PJ26522

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CJ672	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ673	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ676	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ677	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ681	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ686	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ687	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ691	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CJ696	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ697	Real-Time Assembler	New	CJ004	CJ00	PJ26522
CJ901	Real-Time Assembler	New	CJ006	CJ00	PJ26522
CLXA	Assembler	Changed	CCCCP1	Not Applicable	PJ25980
CLXA	Control Program	Changed	CCCCP1	Not Applicable	PJ26426
CMKH	Control Program	Changed	CCMCKH	Not Applicable	PJ26512 – Assemble IPLB and link the CPS0 link-edited module.
CPIO	Control Program	Changed	IPLB	Not Applicable	PJ26512 – Reassemble IPLB and link-edit the CPS0 link-edited module.
CPSE	Control Program	Changed	CCCPSE	Not Applicable	PJ26284, PJ26412
CPSF	Control Program	Changed	CCCPSF	Not Applicable	PJ26686
CPSL	Control Program	Changed	CCCPSE	Not Applicable	PJ26284
CRSM	Control Program	Changed	CCCSAS	Not Applicable	PJ26389
CSOF	Assembler	Changed	CCSNA4	Not Applicable	PJ25482
CS10	Assembler	Changed	CCSNA2	CPS0	PJ25583
CS1040	Assembler	Changed	CCSNA2	Not Applicable	PJ25575
CS1340	Assembler	Changed	CCSNA0	Not Applicable	PJ25575
CS4540	Assembler	Changed	CCSNA2	Not Applicable	PJ25575
CS9040	Assembler	Changed	CCSNA2	Not Applicable	PJ25575
CS9640	Assembler	Changed	CCSNA3	Not Applicable	PJ25575
CS9740	Assembler	Changed	CCSNA3	Not Applicable	PJ25575
CTME	Control Program	Changed	CCNUCL	Not Applicable	PJ26219
CT00	Control Program	Changed	CCCTIN	Not Applicable	PJ26452
CT09	Control Program	Changed	CCCTIN	Not Applicable	PJ26687
CT24	Control Program	Changed	CCCTIN	Not Applicable	PJ23684
CT41	Control Program	Changed	CCCTIN	Not Applicable	PJ26687
CT0540	Control Program	Changed	CCCTIN	Not Applicable	PJ26686
CTIN	Control Program	Changed	CCCTIN	Not Applicable	PJ23684

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ26284
CVF3	Control Program	Changed	CCVFAC	Not Applicable	PJ26509 – Reassemble CCVFAC and link-edit the CPS0 link-edited module.
IB04	Control Program	Changed	IPLB	Not Applicable	PJ26686
IB06	Control Program	Changed	IPLB	Not Applicable	PJ26686
PUT 10					
CAAA	Control Program	Changed	CCNUCL	Not Applicable	PJ25981
CAPT	Control Program	Changed	CCNUCL	Not Applicable	PJ25981
CBU3	Control Program	Changed	CC3088	Not Applicable	PJ25981
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ25981, PJ26008
CCEC	Control Program	Changed	CCENBK	Not Applicable	PJ25981
CCED	Control Program	Changed	CCENBK	Not Applicable	PJ25981, PJ25983, PJ26008
CCEF	Control Program	Changed	CCENBK	Not Applicable	PJ25981
CCE4	Control Program	Changed	CCIISC	Not Applicable	PJ25981
CCIO	Control Program	Changed	IPLB	Not Applicable	PJ25673
CCIO	Control Program	Changed	IPLB	Not Applicable	PJ26144
CCIO	Control Program	Changed	IPLB	Not Applicable	PJ25841
CCIT	Control Program	Changed	CCNUCL	Not Applicable	PJ25981
CEDT	Control Program	Changed	CCCPSE	Not Applicable	PJ25841
CEFE	Control Program	Changed	CCTAPE	Not Applicable	PJ25841
CEFE	Control Program	Changed	CCTAPE	Not Applicable	PJ25665
CEFM	Control Program	Changed	CCTAPE	Not Applicable	PJ25841
CHSZ	Control Program	Changed	CCNUCL	Not Applicable	PJ25981, PJ26008
CICR	Control Program	Changed	CCNUCL	Not Applicable	PJ25981
CIDP	Control Program	Changed	CCCPSE	Not Applicable	PJ25981
CJID	Control Program	Changed	CCSONS, IPLB	Not Applicable	PJ26160
CJII	Control Program	Changed	CCSONS	Not Applicable	PJ26144
CJII	Control Program	Changed	CCSONS	Not Applicable	PJ26160
CJIR	Control Program	Changed	CCSONS	Not Applicable	PJ26160
CJIT	Control Program	Changed	CCSONS	Not Applicable	PJ26144
CJIU	Control Program	Changed	CCSONS	Not Applicable	PJ26144, PJ26160
CJIX	Control Program	Changed	CCSONS	Not Applicable	PJ25841
CLHL	Control Program	Changed	CCCLHR	Not Applicable	PJ25981
CLW6	Control Program	Changed	CCLAW3	Not Applicable	PJ25673
CL10	Control Program	Changed	CCTLOG	Not Applicable	PJ25981, PJ26008
CPER	Control Program	Changed	CCCPSE	Not Applicable	PJ25981
CPIO	Control Program	Changed	IPLB	Not Applicable	PJ25673
CPSE	Control Program	Changed	CCCPSE	Not Applicable	PJ25981
CPSL	Control Program	Changed	CCCPSE	Not Applicable	PJ25981
CPSM	Control Program	Changed	CCCPSE	Not Applicable	PJ25981
CTR9	Control Program	Changed	CCISOC	Not Applicable	PJ25983
CT01	Control Program	Changed	CCCTIN	Not Applicable	PJ25981
CT85	Control Program	Changed	CCCTIN	Not Applicable	PJ25981

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CUDR	Control Program	New	CCVAGE	Not Applicable	PJ25981, PJ26008
CUDS	Control Program	New	CCVAGE	Not Applicable	PJ25981
CUDT	Control Program	New	CCVAGE	Not Applicable	PJ25981
CUDU	Control Program	New	CCVAGE	Not Applicable	PJ25981, PJ26008
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ25981, PJ26008
IB04	Control Program	Changed	IPLB	Not Applicable	PJ25841
IB04	Control Program	Changed	IPLB	Not Applicable	PJ26160
PUT 9					
CEFL	Control Program	Changed	CCFADC	Not Applicable	PJ25524
CJ020	CSECT	Changed	CJ000	CJ00	PJ25805
CJ030	CSECT	Changed	CJ004	CJ00	PJ25524
CJ104	CSECT	Changed	CJ100	CJ10	PJ25405
CTIN	Control Program	Changed	CCCTIN	Not Applicable	PJ24659
CT00	Control Program	Changed	CCCTIN	Not Applicable	PJ24659
PUT 8					
CCED	Control Program	Changed	CCENBK	Not Applicable	PJ25266
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ24609
CEFL	Control Program	Changed	CCFADC	Not Applicable	PJ25207
CJ001	Real-Time Assembler	Changed	CJ003	CJ00	PJ25207
CJ002	Real-Time Assembler	Changed	CJ000, CJ003, CJ004, CJ005, CJ006	CJ00	PJ25207
CJ015	Real-Time Assembler	Changed	CJ005	CJ00	PJ25207
CJ020	Real-Time Assembler	Changed	CJ000	CJ00	PJ25207
CJ021	Real-Time Assembler	Changed	CJ006	CJ00	PJ25207
CJ022	Real-Time Assembler	Changed	CJ005	CJ00	PJ25207
CJ025	Real-Time Assembler	Changed	CJ006	CJ00	PJ25207
CJ030	Real-Time Assembler	Changed	CJ004	CJ00	PJ25207
CJ036	Real-Time Assembler	Changed	CJ004	CJ00	PJ25207
CJ037	Real-Time Assembler	Changed	CJ004	CJ00	PJ25207
CJ038	Real-Time Assembler	Changed	CJ004	CJ00	PJ25207
CJ101	Real-Time Assembler	Changed	CJ100	CJ10	PJ25207
CJ103	Real-Time Assembler	Changed	CJ100	CJ10	PJ25207
CSYN	Control Program	Changed	CCNUCL	Not Applicable	PJ25225
PUT 7					
CT38	Control Program	Changed	CCCTIN	Not Applicable	PJ24670

Table 1278. Copy Member Changes by PUT and APAR (continued)

Copy Member	Type	New, Changed, or No Longer Supported?	CSECT Where Copy Member Is Located	DLM Where CSECT Is Located	APAR Number
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ24528 – Only comments were changed. The prologs for the UCCCLE and UCCCLX user exits were updated to document the changed interface.
PUT 6					
CAPT	Control Program	Changed	CCNUCL	Not Applicable	PJ23493
CEET	Control Program	Changed	CCNUCL	Not Applicable	PJ20868
CCEB	Control Program	Changed	CCENBK	Not Applicable	PJ23923
CCE4	Control Program	Changed	CCIISC	Not Applicable	PJ23923
CHSZ	Control Program	Changed	CCNUCL	Not Applicable	PJ23923
CICR	Control Program	Changed	CCNUCL	Not Applicable	PJ23923
CICS	Control Program	Changed	CCNUCL	Not Applicable	PJ23923
CIEF	Control Program	Changed	CCCIEF	Not Applicable	PJ23923
CIS1	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CLHH	Control Program	Changed	CCSTOR	Not Applicable	PJ23923
CTRY	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CTR0	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CTR1	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CTR2	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CTR3	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CTR8	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CTR9	Control Program	Changed	CCISOC	Not Applicable	PJ23493
CT05	Control Program	Changed	CCCTIN	Not Applicable	PJ23923
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ23493, PJ23923
PUT 5					
CCED	Control Program	Changed	CCENBK	Not Applicable	PJ21907
CEFH	Control Program	Changed	CCSONA	Not Applicable	PJ23103
CEFJ	Control Program	Changed	CCFADC	Not Applicable	PJ23103
CIS1	Control Program	Changed	CCISOC	Not Applicable	PJ21907
CIS2	Control Program	Changed	CCISOC	Not Applicable	PJ21907
CJIE	Control Program	Changed	CCSONS	Not Applicable	PJ23103
CICR	Control Program	Changed	CCNUCL	Not Applicable	PJ23103
CPSL	Control Program	Changed	CCCPSE	Not Applicable	PJ21907
CTME	Control Program	Changed	CCNUCL	Not Applicable	PJ22936
CTR0	Control Program	Changed	CCISOC	Not Applicable	PJ21907
CTR2	Control Program	Changed	CCISOC	Not Applicable	PJ21907
CTR3	Control Program	Changed	CCISOC	Not Applicable	PJ21907
CUSR	Control Program	Changed	CCUEXT	Not Applicable	PJ22936

Fixed File Records

Table 1279 summarizes fixed file record changes.

Table 1279. Fixed File Record Changes by PUT and APAR

Fixed File Record	New, Changed, or No Longer Supported?	APAR Number
PUT 12		
#IBMMP4	Changed	PJ27095
PUT 11		
#IZERO	Changed	PJ26713
PUT 10		
#IPSFB	New	PJ25880
PUT 8		
#INODE	Changed	PJ25266
PUT 6		
#IBMM4 Ordinal 139	Changed	PJ23526 - If fewer than 140 #IBMM4 ordinals are allocated, additional ordinals must be added before applying this APAR.

Commands

Table 1280 summarizes command changes. This information is presented in alphabetic order by the name of the command. See *TPF Operations* for a complete description of all commands.

Attention: Changes to commands can impact any automation programs you are using in your complex.

Table 1280. Command Changes by PUT and APAR

Command	New, Changed, or No Longer Supported?	APAR Number
PUT 15		
8-byte file address support commands (see "8-Byte File Address Support (APAR PJ28097)" on page 1111)	New, Changed, and No Longer Supported	PJ28097
ZCLAW	Changed	PJ27785
ZDTCP	Changed	PJ28029
ZINET ADD	Changed	PJ27785, PJ28026
ZINET ALTER	Changed	PJ27785, PJ28026
ZINET DELETE	Changed	PJ27785
ZINET DISPLAY	Changed	PJ28026
ZKPTR	New	PJ27785
ZMAIL	Changed	PJ27966
ZMIGR	New	PJ27785
ZMPIF	Changed	PJ27785
ZMQSC ALT PROCESS	New	PJ28136
ZMQSC ALT QL	Changed	PJ28136
ZMQSC DEF PROCESS	New	PJ28136

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZMQSC DEF QL	Changed	PJ28136
ZMQSC DEL	Changed	PJ28136
ZMQSC DISPLAY	Changed	PJ28136
ZNKEY	Changed	PJ28118, PJ28034, PJ28064
ZSNMP	New	PJ27932
ZSSLD	New	PJ28118
PUT 14		
ZACRS	Changed	PJ27804
ZBROW COLLECTION	Changed	PJ27380
ZCTKA ALTER	Changed	PJ27446
ZCTKA DISPLAY	Changed	PJ27446
ZFMSG	Changed	PJ27804
ZINET ADD	Changed	PJ27619
ZINET ALTER	Changed	PJ27619
ZINET DELETE	Changed	PJ27619
ZINET DISPLAY	Changed	PJ27619
ZINIP	New	PJ27617
ZMAIL	New	PJ27784, PJ27865
ZMAIL CREATEMAILBOX	New	PJ27784, PJ27865
ZMAIL DELETEACLMailbox	New	PJ27784, PJ27865
ZMAIL DELETEMAILBOX	New	PJ27784, PJ27865
ZMAIL LISTACLMailbox	New	PJ27784, PJ27865
ZMAIL LISTMAILBOX	New	PJ27784, PJ27865
ZMAIL LISTQUOTA	New	PJ27784, PJ27865
ZMAIL LISTQUOTAROOT	New	PJ27784, PJ27865
ZMAIL PASSWORD	New	PJ27784, PJ27865
ZMAIL PATH	New	PJ27784, PJ27865
ZMAIL RENAMEMAILBOX	New	PJ27784, PJ27865
ZMAIL SETACLMailbox	New	PJ27784, PJ27865
ZMAIL SETQUOTA	New	PJ27784, PJ27865
ZMCPY ALL	Changed	PJ27430
ZMCPY UP	Changed	PJ27430
ZNCNS INITIALIZE	Changed	PJ27468
ZNETW ACT	Changed	PJ27468
ZNKEY	Changed	PJ27617
ZOODB DELETE	Changed	PJ27380
ZOODB MIGRATE	New	PJ27380
ZOODB RECREATE	New	PJ27380
ZOSAE	Changed	PJ27625
ZOSAE	Changed	PJ27650
ZPMIG	Changed	PJ27686
ZPOOL DISPLAY	Changed	PJ27484
ZPOOL GENERATION	Changed	PJ27484
ZPOOL GENERATION	Changed	PJ27686

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZPOOL INIT	Changed	PJ27484, PJ27804
ZRBKD	Changed	PJ27804
ZRECP DISPLAY	Changed	PJ27484
ZRECP PROFILE	Changed	PJ27804
ZRDIR CAPTURE	Changed	PJ27686
ZRDIR START RESTORE	Changed	PJ27686
ZRPDU CREATE	Changed	PJ27484
ZRTDM MODIFY	Changed	PJ27000
ZSOCK	Changed	PJ27650
ZSTIM A	Changed	PJ27804
ZTTCP CLEAR	New	PJ27451
ZTTCP DISPLAY	Changed	PJ27451
ZTTCP TRACE	Changed	PJ27617
ZVIPA	Changed	PJ27451
PUT 13		
ZCACH	New	PJ27083
ZCFCH	New	PJ27083
ZDECB	Changed	PJ27393
ZDLCK DELETE	New	PJ27302
ZDPAT	Changed	PJ27422
ZDUPD	Changed	PJ27469
ZFCAP STATUS	Changed	PJ27197
ZFECB	Changed	PJ27393
ZFILE	New	PJ27277
ZFILE cat	Changed	PJ27277
ZFILE cd	Changed	PJ27277
ZFILE chmod	Changed	PJ27277
ZFILE chown	Changed	PJ27277
ZFILE cp	Changed	PJ27277
ZFILE dd	Changed	PJ27277
ZFILE echo	Changed	PJ27277
ZFILE export	New	PJ27277
ZFILE find	New	PJ27277
ZFILE grep	New	PJ27277
ZFILE head	Changed	PJ27277
ZFILE hex	New	PJ27277
ZFILE kill	Changed	PJ27277
ZFILE ln	Changed	PJ27277
ZFILE ls	Changed	PJ27214
ZFILE ls	Changed	PJ27277
ZFILE mkdir	Changed	PJ27277
ZFILE mkfifo	New	PJ27214
ZFILE mknod	Changed	PJ27277
ZFILE mv	Changed	PJ27277

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZFILE ps	New	PJ27277
ZFILE pwd	Changed	PJ27277
ZFILE rm	Changed	PJ27277
ZFILE rmdir	Changed	PJ27277
ZFILE sed	New	PJ27277
ZFILE tail	Changed	PJ27277
ZFILE tee	New	PJ27277
ZFILE touch	Changed	PJ27277
ZFILE tr	New	PJ27277
ZFILE unset	New	PJ27277
ZFILE xargs	New	PJ27277
ZIMAG COPY	Changed	PJ27422
ZMCFT DISPLAY	Changed	PJ27083
ZMCFT REMOVE	New	PJ27299
ZMCPY ALL	Changed	PJ27347
ZMCPY UP	Changed	PJ27347
ZMQID ALTER	Changed	PJ27230
ZMQID DEFINE	Changed	PJ27230
ZMQID DISPLAY	Changed	PJ27230
ZMQSC ALT MQP	Changed	PJ27351, PJ27431
ZMQSC ALT QL	Changed	PJ27351, PJ27431
ZMQSC DEF MQP	Changed	PJ27351, PJ27431
ZMQSC DEF QL	Changed	PJ27351, PJ27431
ZMQSC DISPLAY	Changed	PJ27351, PJ27431
ZMQSC MOVEMSGS	New	PJ27351, PJ27431
ZNKEY	Changed	PJ27333
ZOSAE	New	PJ27333
ZPOOL DISPLAY	New	PJ27469
ZPOOL GENERATION	New	PJ27469
ZPOOL INIT	New	PJ27469
ZRBKD	New	PJ27469
ZRDIR CAPTURE	New	PJ27469
ZRDIR START RESTORE	New	PJ27469
ZRECP ABORT	Changed	PJ27469
ZRECP ADD	New	PJ27469
ZRECP CONTINUE	Changed	PJ27469
ZRECP DEL	New	PJ27469
ZRECP DISPLAY	New	PJ27469
ZRECP ELOG	New	PJ27469
ZRECP EXIT	New	PJ27469
ZRECP FLUSH	New	PJ27469
ZRECP IGNORE	New	PJ27469
ZRECP LEVEL	Changed	PJ27469
ZRECP LOAD	No Longer Supported	PJ27469

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZRECP MIGRATE	No Longer Supported	PJ27469
ZRECP NOREBUILD	New	PJ27469
ZRECP OFLMR	New	PJ27469
ONEL	New	PJ27469
ZRECP PRIM	No Longer Supported	PJ27469
ZRECP PROCEED	Changed	PJ27469
ZRECP PROFILE	New	PJ27469
ZRECP PROTECT	New	PJ27469
ZRECP REBUILD	New	PJ27469
ZRECP RECALL	Changed	PJ27469
ZRECP RERUN	Changed	PJ27469
ZRECP RESTART	Changed	PJ27469
ZRECP RESUME	Changed	PJ27469
ZRECP RETRY	Changed	PJ27469
ZRECP SEL	Changed	PJ27469
ZRECP SETUP	New	PJ27469
ZRECP SKIP	Changed	PJ27469
ZRECP START	Changed	PJ27469
ZRECP STATUS	Changed	PJ27469
ZRECP STOP	New	PJ27469
ZRECP TO2	No Longer Supported	PJ27469
ZRECP VERIFY	New	PJ27469
ZRFPC	Changed	PJ27469
ZRHLD DELETE	Changed	PJ27302
ZRPDU ABORT	New	PJ27469
ZRPDU CREATE	New	PJ27469
ZRPDU DISP	New	PJ27469
ZRPDU OFLMR	New	PJ27469
ZRPDU PURGE	New	PJ27469
ZRPDU STATUS	New	PJ27469
ZRREC BACKUP	New	PJ27469
ZRREC RESET	New	PJ27469
ZRREC SWITCH	New	PJ27469
ZSDEA	Changed	PJ27469
ZSOCK	Changed	PJ27333
ZTTCP ACTIVATE	Changed	PJ27333
ZTTCP CHANGE	Changed	PJ27333
ZTTCP DISPLAY	Changed	PJ27333
ZTTCP INACTIVATE	Changed	PJ27333
ZTTCP TRACE	Changed	PJ27333
ZVIPA	New	PJ27333
PUT 12		
ZBROW COLLECTION	Changed	PJ26887
ZBROW RECOUP	New	PJ26887

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZCDCO	New	PJ27095
ZDECB	Changed	PJ26810
ZDLCK DISPLAY	Changed	PJ26919
ZDTCP	Changed	PJ26398, PJ26904
ZINET DISPLAY	Changed	PJ26848
ZMATP	Changed	PJ26398
ZMATP	Changed	PJ26873
ZMCFT ADD	Changed	PJ26841
ZMCFT DELETE	Changed	PJ26841
ZMCFT DISPLAY	Changed	PJ26919
ZMQSC ALT CHL	Changed	PJ27023
ZMQSC ALT MQP	Changed	PJ27023
ZMQSC ALT QA	Changed	PJ27023
ZMQSC ALT QL	Changed	PJ27023
ZMQSC ALT QR	Changed	PJ27023
ZMQSC DEF MQP	Changed	PJ27023
ZMQSC DEF QA	Changed	PJ27023
ZMQSC DEF QL	Changed	PJ27023
ZMQSC DEF QR	Changed	PJ27023
ZMQSC DEL	Changed	PJ27023
ZMQSC DISPLAY	Changed	PJ27023
ZMQSC MIGRATE	New	PJ27023
ZMQSC START	Changed	PJ27023
ZMQSC STOP	Changed	PJ27023
ZMQSC SWQ	Changed	PJ27023
ZNKEY	Changed	PJ26890, PJ27079
ZSOCK	New	PJ26904
ZSQLD	Changed	PJ27079
ZSTRC	Changed	PJ26880
ZTRTE	New	PJ26890
ZTTCP	Changed	PJ26890
PUT 11		
ZASER	Changed	PJ26575
ZCFLK ADD	New	PJ26707
ZCFLK DELETE	New	PJ26707
ZCFLK DISPLAY	New	PJ26707
ZCFLK INITIALIZE	New	PJ26707
ZCFLK MIGRATE	New	PJ26707
ZCORO	Changed	PJ26687
ZCTKA ALTER	Changed	PJ26575
ZCTKA DISPLAY	Changed	PJ26575
ZDEBUG	Changed	PJ26666
ZDECB	New	PJ26534
ZDSER	Changed	PJ26575

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZDLCK DISPLAY	New	PJ26707
ZDMFS	Changed	PJ26707
ZDTCP	Changed	PJ26683
ZFINT	Changed	PJ26713
ZINET ADD	Changed	PJ26575
ZINET ADD	Changed	PJ25761, PJ26515
ZINET ALTER	Changed	PJ26575
ZINET ALTER	Changed	PJ25761, PJ26515
ZINET DISPLAY	Changed	PJ26515
ZIPTR	New	PJ26683
ZMATP	Changed	PJ26693
ZMCFT ADD	New	PJ26707
ZMCFT CLEAR	New	PJ26707
ZMCFT DELETE	New	PJ26707
ZMCFT ENABLE	New	PJ26707
ZMCPY ABORT	Changed	PJ26686
ZMCPY ALL	Changed	PJ26686
ZMCPY DOWN	New	PJ26686
ZMCPY PAUSE	New	PJ26686
ZMCPY RESTART	Changed	PJ26686
ZMCPY SET	New	PJ26686
ZMCPY STATUS	New	PJ26686
ZMCPY UP	New	PJ26686
ZMQSC DISPLAY	Changed	PJ26498
ZMQSC STOP	Changed	PJ26498
ZNKEY	Changed	PJ26683
ZPLMT	Changed	PJ26437
ZSTAT	Changed	PJ26098
ZTDEV	Changed	PJ26577
ZTTCP ACTIVATE	New	PJ26683
ZTTCP CHANGE	New	PJ26683
ZTTCP DEFINE	New	PJ26683
ZTTCP DELETE	New	PJ26683
ZTTCP DISPLAY	New	PJ26683
ZTTCP INACTIVATE	New	PJ26683
ZTTCP TRACE	New	PJ26683
PUT 10		
ZACOR	Changed	PJ26146
ZADCA	Changed	PJ26146
ZAPAT	Changed	PJ25981
ZAREC	Changed	PJ26146
ZBROW COLLECTION	Changed	PJ26143
ZBROW DISPLAY	Changed	PJ26143
ZBROW KEYPATH	New	PJ26143

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZBROW PATH	New	PJ26143
ZDADD	Changed	PJ26146
ZDBRO INIT	Changed	PJ26146
ZDCOR	Changed	PJ26146
ZDDCA	Changed	PJ26146
ZDEBB	Changed	PJ25471
ZDECD	Changed	PJ26146
ZDPAT	Changed	PJ25981
ZDREC	Changed	PJ26146
ZFCAP CHANGE	Changed	PJ26160
ZFILE cat	New	PJ26174
ZFILE cd	New	PJ26174
ZFILE chmod	Changed	PJ26174
ZFILE chown	Changed	PJ26174
ZFILE cp	New	PJ26174
ZFILE dd	New	PJ26174
ZFILE echo	New	PJ26174
ZFILE head	New	PJ26174
ZFILE kill	New	PJ26174
ZFILE ln	New	PJ26174
ZFILE ls	Changed	PJ26174
ZFILE mkdir	New	PJ26174
ZFILE mv	New	PJ26174
ZFILE pwd	New	PJ26174
ZFILE rm	Changed	PJ26174
ZFILE rmdir	New	PJ26174
ZFILE tail	New	PJ26174
ZFILE touch	New	PJ26174
ZIFIL	Changed	PJ26146
ZMATP	New	PJ26161
ZMQSC ALT QA	New	PJ26156
ZMQSC ALT QL	Changed	PJ26156
ZMQSC ALT QR	Changed	PJ26156
ZMQSC DEF QA	New	PJ26156
ZMQSC DEF QL	Changed	PJ26156
ZMQSC DEF QR	Changed	PJ26156
ZMQSC DEL	Changed	PJ26156
ZMQSC DISPLAY	Changed	PJ26156
ZMQSC START	Changed	PJ26156
ZMQSC STOP	Changed	PJ26156
ZMQSC SWQ	Changed	PJ26156
ZMQSC TRACE	Changed	PJ26156
ZNKEY	Changed	PJ26161
ZRPGM	Changed	PJ26146

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZSTTD	Changed	PJ26146
PUT 9		
ZBROW DISPLAY	Changed	PJ25332
ZDEBUG	New	PJ25632
ZDCFT	New	PJ25781
ZFILE chmod	New	PJ25589
ZFILE chown	New	PJ25589
ZFILE ls	New	PJ25589
ZFILE mknod	New	PJ25703
ZFILE rm	New	PJ25589
ZINET ADD	New	PJ25589
ZINET ALTER	New	PJ25589
ZINET DELETE	New	PJ25589
ZINET DISPLAY	New	PJ25589
ZINET START	New	PJ25589
ZINET STOP	New	PJ25589
ZMCFT ADD	New	PJ25781
ZMCFT DELETE	New	PJ25781
ZMCFT DISPLAY	New	PJ25781
ZMCFT ENABLE	New	PJ25781
ZMCFT RESETLOCK	New	PJ25781
ZMQSC ALT CHL	New	PJ25780
ZMQSC ALT MQP	New	PJ25780
ZMQSC ALT QL	New	PJ25780
ZMQSC ALT QR	New	PJ25780
ZMQSC DEF CHL	New	PJ25780
ZMQSC DEF MQP	New	PJ25780
ZMQSC DEF QL	New	PJ25780
ZMQSC DEF QR	New	PJ25780
ZMQSC DEL	New	PJ25780
ZMQSC DISPLAY	New	PJ25780
ZMQSC RESET	New	PJ25780
ZMQSC RESOLVE	New	PJ25780
ZMQSC START	New	PJ25780
ZMQSC STOP	New	PJ25780
ZMQSC SWQ	New	PJ25780
ZMQSC TRACE	New	PJ25780
ZNAPN	Changed	PJ25760
ZNCVT	Changed	PJ25760
ZNDLU	Changed	PJ25760
ZNKEY	Changed	PJ25760
ZNMON	Changed	PJ25760
ZNPIU	Changed	PJ25760
ZNRTP DISPLAY	New	PJ25760

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZN RTP HPR	New	PJ25760
ZN RTP INACT	New	PJ25760
ZN RTP INITIALIZE	New	PJ25760
ZN RTP ROUTE	New	PJ25760
ZN RTP SUMMARY	New	PJ25760
ZN RTP SWITCH	New	PJ25760
ZN TRP	Changed	PJ25760
ZOO DB CHANGE	Changed	PJ25332
ZOO DB DEFINE	Changed	PJ25332
ZRECP TO2	Changed	PJ25332
ZSONS ALTER	Changed	PJ25445
ZSONS DISPLAY	Changed	PJ25445
PUT 8		
ZBROW ALTER	New	PJ25207
ZBROW COLLECTION	Changed	PJ25207
ZBROW DISPLAY	New	PJ25207
ZCTKA	Changed	PJ24945
ZDPLT	New	PJ25075
ZDTCP	New	PJ25375
ZFECB	New	PJ23981
ZFINT	Changed	PJ25266
PUT 7		
ZAPAT	Changed	PJ25084
ZAPGM	Changed	PJ21730
ZBROW CLASS	New	PJ25098
ZBROW COLLECTION	New	PJ25098
ZBROW NAME	New	PJ25098
ZBROW PROPERTY	New	PJ25098
ZBROW QUALIFY	New	PJ25098
ZCORO	New	PJ25094
ZCTKA ALTER	Changed	PJ25094
ZCTKA DISPLAY	Changed	PJ25094
ZDDSI	New	PJ23984
ZDMAP	New	PJ24845
ZDPAT	Changed	PJ25084
ZDPGM	Changed	PJ21730
ZFINT	New	PJ25084
ZOO DB CHANGE	New	PJ25098
ZOO DB DEFINE	New	PJ25098
ZOO DB DELETE	New	PJ25098
ZOO DB DISPLAY	New	PJ25098
ZOO DB INIT	New	PJ25098
ZOO DB SET	New	PJ25098
ZPSMS	Changed	PJ25094

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
ZRECP RECALL	Changed	PJ25098
ZRECP SEL	Changed	PJ25098
ZRECP TO2	New	PJ25098
ZRHLD DELETE	Changed	PJ25094
ZRHLD DISPLAY	Changed	PJ25094
ZRTDM DISPLAY	Changed	PJ25094
ZRTDM MODIFY	Changed	PJ25094
ZRTDM RESET	New	PJ25094
ZSYSG ALTER	Changed	PJ25094
ZVFAC DISPLAY	Changed	PJ25094
PUT 6		
ZCHCH	New	PJ23430
ZDEBB	New	PJ22843
ZDECD	Changed for ISO-CMigration	PJ21708
ZDFCT	New	PJ23297
ZDTOD	New	PJ23434
ZDWGT	Changed	PJ23338
ZIFIL	Changed the Processing	PJ24134
ZMODE	Changed for ISO-CMigration	PJ21708
ZNCNS INITIALIZE	Changed	PJ23620
ZNETW ACT	Changed	PJ23620
ZNKEY	Changed	PJ24525
ZNTRP	Changed for ISO-C Migration	PJ21693
ZSQLD	Changed	PJ23931
ZSTTD	Changed	PJ23931
ZSTRC	Changed	PJ23493
ZSYSG	Changed	PJ22727
ZTINT	Changed	PJ24563
ZTLBL	Changed	PJ24563
ZTMNT	Changed	PJ24563
PUT 5		
ZECBL	Changed	PJ23103, PJ23178
ZMQID ALTER	New	PJ22434
ZMQID DEFINE	New	PJ22434
ZMQID DELETE	New	PJ22434
ZMQID DISPLAY	New	PJ22434
ZMQIT	New	PJ22434
ZNKEY	Changed	PJ22434
ZNPIU	Changed for ISO-C Migration	PJ21706
ZPSMS	Changed for ISO-C Migration	PJ21705
ZSTAT	Changed	PJ23178
ZSYSL	New	PJ23178
ZTMSL	New	PJ23178
ZTPLF	Changed for ISO-C Migration	PJ21709

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
PUT 4		
ZAPAT	Changed for ISO-C Migration	PJ20833
ZAPGM	Changed for ISO-C Migration	PJ20833
ZCLAW ACTIVATE	New	PJ21791
ZCLAW ADD	New	PJ21791
ZCLAW DELETE	New	PJ21791
ZCLAW DISPLAY	New	PJ21791
ZCLAW INACTIVATE	New	PJ21791
ZCLAW RESET	New	PJ21791
ZCLAW STATUS	New	PJ21791
ZCLAW TRACE	New	PJ21791
ZDEAT	Changed for ISO-C Migration	PJ20833
ZDMOD	New	PJ21584
ZDPAT	Changed for ISO-C Migration	PJ20833
ZDPGM	Changed for ISO-C Migration	PJ20833
ZDRCT	Changed	PJ21044
ZMPIF TRACE	Changed	PJ21596
ZNDLU	Changed	PJ21044
ZNDYN ADD	New	PJ21044
ZNDYN CHANGE	New	PJ21044
ZNDYN DISPLAY	New	PJ21044
ZNDYN RECYCLE	New	PJ21044
ZNKEY	Changed	PJ21044, PJ21791
ZNNCB	Changed	PJ21044
ZNNCB DISPLAY	New	PJ21044
ZNNCB RECON	New	PJ21044
ZNNCB REORG	New	PJ21044
ZNOPL BUILD	New	PJ21044
ZNOPL FALLBACK	Changed	PJ21044
ZNOPL LOAD	Changed	PJ21044
ZNOPL MERGE	New	PJ21044
ZNOPL STATUS	Changed	PJ21044
ZNOPL UPDATE	Changed	PJ21044
ZOLDR	Changed for ISO-C Migration	PJ20833
ZSTAT	Changed	PJ21167
PUT 3		
ZAPGM	Changed	PJ18754
ZMEAS Q	New	PJ18660
ZNAPN	New	PJ19949
ZNDLU	Changed	PJ19949
ZNETW ACT	Changed	PJ19949
ZNETW INACT	Changed	PJ19949
ZNKEY	Changed	PJ19949
ZSTRC	Changed	PJ19422

Table 1280. Command Changes by PUT and APAR (continued)

Command	New, Changed, or No Longer Supported?	APAR Number
PUT 2		
ZAPAT	Changed	PJ17852
ZAPGM	Changed	PJ17852
ZCTKA	Changed	PJ17852
ZDPAT	Changed	PJ17852
ZDPGM	Changed	PJ17852
ZPMIG	New	PJ17912

Macros

The following section summarizes the macro changes.

Advanced Program-to-Program Communications (APPC) Macros

There are no changes.

Communication Macros and Statements

Table 1281 summarizes changes to the communication macros and statements. This information is presented in alphabetic order by the name of the SNA communication macro or statement.

Table 1281. Communication Macros and Statement Changes by PUT and APAR

Communication Macro or Statement	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 14				
SNAKEY	Changed	No	PJ26334	Not Applicable

Data Macros

Table 1282 summarizes data macro changes.

Table 1282. Data Macro Changes by PUT and APAR

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?	APAR Number	Programs to Reassemble
PUT 15				
DCTUCL	Changed	No	PJ28014	Not Applicable
ICRCR	Changed	No	PJ27925	Not Applicable
ICRCT	Changed	No	PJ28059, PJ27925	Not Applicable
IMQRM	Changed	No	PJ27925	Not Applicable
IOSAB	Changed	Yes	PJ28143	Reassemble CCTCP1, CCOSAE, and COE9, and link-edit CPS0.
SNAEQ	Changed	No	PJ27969	Not Applicable
PUT 14				
CK1KE	Changed	No – Added a new field for the RLVAL keyword.	PJ27446	Not Applicable
CK2SN	Changed	No	PJ26334	Not Applicable

Table 1282. Data Macro Changes by PUT and APAR (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?	APAR Number	Programs to Reassemble
DCTUCL	Changed	No	PJ27530	Not Applicable
EB0EB	Changed	No	PJ27530	Not Applicable
ICNOS	Changed	No	PJ27468	Not Applicable
ICRCT	Changed	No	PJ27460, PJ27446	Not Applicable
IDSDMP	Changed	No	PJ27530	Not Applicable
IDSEMR	Changed	No	PJ27530	Not Applicable
IDSLST	Changed	No	PJ27692	Not Applicable
IFLDDF	No Longer Supported	No	PJ27530	Not Applicable
IPCCW	Changed	No	PJ27719	Not Applicable
ISCB	Changed	No	PJ27593	Not Applicable
ITO2	Changed	No	PJ27380, PJ27390	Not Applicable
LOCORE	Changed	No	PJ27530	Not Applicable
SR0RT	Changed	No	PJ27279	Not Applicable
PUT 13				
CK1KE	Changed	Yes	PJ27087	
CY3DR	Changed	No	PJ27354	Not Applicable
DC0DC	Changed	No	PJ25743	Not Applicable
DCTUCL	Changed	No	PJ27019	Not Applicable
IB0CT	Changed	No	PJ27105	Not Applicable
ICFEQ	Changed	No	PJ27299	Not Applicable
ICOPY	Changed	Yes	PJ27347	Not Applicable
IDSICD	Changed	No	PJ27108	Not Applicable
IDSTCA	Changed	Yes	PJ27275	Reassemble ICDF and STPP, and link-edit PPCP.
IFMSG	Changed	No	PJ27246	Not Applicable
IUCIN	New	No	PJ26102	Not Applicable
STDHD	Changed	No	PJ27250	Not Applicable
UI0OM	Changed	No	PJ27250	Not Applicable
UI2PF	Changed	No	PJ27250	Not Applicable
VSACB	Changed	No	PJ27038	Not Applicable
PUT 12				
DB0DB	Changed	No	PJ26782	Not Applicable
EB0EB	Changed	No	PJ26746, PJ26914, PJ26721, PJ26999	Not Applicable
ICADAP	Changed	Yes	PJ26719	
ICDCCB	New	Yes	PJ27095	
ICLAWB	Changed	Yes	PJ26719	
ICLWRC	Changed	Yes	PJ26719	
IDSCID	Changed	Yes	PJ21337	
IDSPAT	Changed	No	PJ26211	Not Applicable
IDSTCA	Changed	No	PJ26967	Not Applicable
IEQCE2	Changed	No	PJ26793	Not Applicable

Table 1282. Data Macro Changes by PUT and APAR (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?	APAR Number	Programs to Reassemble
IPWBL	Changed	No	PJ26895, PJ26917	Not Applicable
ISCFDT	Changed	No	PJ26917	Not Applicable
ISOCK	Changed	Yes	PJ26842, PJ26895, PJ26917	
VF0AC	Changed	Yes	PJ26919	
WG0TA	Changed	No	PJ26873	Not Applicable
PUT 11				
CJ6KP	Changed	No	PJ26686	Not Applicable
DC0DC	Changed	No	PJ26713	Not Applicable
DCTMFS	Changed	No	PJ26511, PJ26686	Not Applicable
DCTMIO	Changed	No	PJ26686	Not Applicable
ICACH	Changed	No	PJ26713	Not Applicable
ICOPY	New	No	PJ26686	Not Applicable
ICPTH	Changed	No	PJ26713	Not Applicable
ICRCT	Changed	No	PJ26687	Not Applicable
ICRCT	Changed	No	PJ26439	Not Applicable
IDCKV	Changed	No	PJ26686	Not Applicable
IDSCS2	Changed	No	PJ26511	Not Applicable
IDSISC	Changed	No	PJ26511	Not Applicable
IPCID	Changed	No	PJ25482	Not Applicable
ISCB	Changed	No	PJ25482	Not Applicable
IRTCEC	New	No	PJ26100	Not Applicable
ITO2	Changed	Yes	PJ26139, PJ26522	
RTCEQ	Changed	No	PJ26100	Not Applicable
RV1VT	Changed	No	PJ25482	Not Applicable
PUT 10				
DCTCTL	Changed	No	PJ26144	Not Applicable
DCTDDB	Changed	No	PJ26144	Not Applicable
DCTDDB	Changed	No	PJ25841	Not Applicable
DCTDOR	Changed	No	PJ26144	Not Applicable
DCTIRB	Changed	No	PJ26144	Not Applicable
DCTMDR	Changed	No (PJ25673) PJ25841, PJ26144 (Yes)	PJ25673, PJ25841, PJ26144	Not Applicable
DCTMFS	Changed	No	PJ26144, PJ26160	Not Applicable
DCTORB	Changed	No	PJ25841, PJ26144	Not Applicable
DCTPFX	Changed	No	PJ25981	Not Applicable
DCTUCL	Changed	No	PJ25981, PJ26008	Not Applicable
GL0BP	Changed	No	PJ26125	Not Applicable
IB0CT	Changed	No	PJ26160	Not Applicable
ICJXWK	Changed	No	PJ26160	Not Applicable
IDSCS2	Changed	No	PJ26160	Not Applicable
IDSDSA	Changed	No	PJ26008	Not Applicable

Table 1282. Data Macro Changes by PUT and APAR (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?	APAR Number	Programs to Reassemble
IDSELD	Changed	No	PJ25880	Not Applicable
IDSPAT	Changed	No	PJ25981	Not Applicable
IDSPER	Changed	No	PJ25981	Not Applicable
IPROG	Changed	Yes	PJ25983	
ITERM	Changed	Yes	PJ25983	
ITSTB	Changed	No	PJ25841	Not Applicable
IUDBG	New	No	PJ25981, PJ26008	Not Applicable
IUXEQ	Changed	No	PJ25981	Not Applicable
LDEVBK	Changed	No	PJ25673, PJ25841	Not Applicable
PUT 9				
CK1KE	Changed	No	PJ24659	Not Applicable
PUT 8				
IDFET	New	No	PJ23981	Not Applicable
IPROC	Changed	No	PJ25240	Not Applicable
ITO2	Changed	No	PJ25207	Not Applicable
PLFAPI	Changed	No	PJ25207	Not Applicable
PUT 7				
IDFSW40	Changed	No	PJ24726	Not Applicable
INODE	New	No	PJ25089	Not Applicable
PUT 6				
CK1KE	Changed	No	PJ23493	Not Applicable
DCTUCL	Changed	No	PJ20868	Not Applicable
EV0BK	Changed	No	PJ23923	Not Applicable
IDENV	New	No	PJ23923	Not Applicable
IDSCID	Changed	Yes	PJ23493	
IDSCTO	Changed	Yes	PJ23493	
IDSCTR	Changed	Yes	PJ23493	
IDSEVN	Changed	No	PJ23923	
IDSTCA	Changed	Yes	PJ23493	
ILUPD	New	No	PJ23526	
MRLNQ	Changed	No	PJ26686	Not Applicable
IDSTTR	Changed	No	PJ23923	Not Applicable
IDSXFC	Changed	No	PJ23923	Not Applicable
IMOVE	Changed	No	PJ23923	Not Applicable
IPROC	Changed	No	PJ23923	Not Applicable
UX1PL	Changed	No	PJ20868	
ZIMAGEQ	Changed	No	PJ23526	Not Applicable
PUT 5				
DCTUCL	Changed	Yes	PJ22936	
IDSCID	Changed	Yes	PJ21907	
IDSCTR	Changed	Yes	PJ21907	

Table 1282. Data Macro Changes by PUT and APAR (continued)

Data Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs That Use This Data Macro?	APAR Number	Programs to Reassemble
IDSLST	Changed	Yes	PJ21907	
IDSTCA	Changed	Yes	PJ21907	
MRLNQ	Changed	Yes	PJ23103	

General Macros

Table 1283 summarizes general macro changes. This information is presented in alphabetic order by the name of the general macro. See *TPF General Macros* for a complete description of all general macros.

Table 1283. General Macro Changes by PUT and APAR

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 15				
CRUSA	Changed	Yes	PJ27820	Reassemble user-defined programs that call CRUSA macros that use data event control blocks (DECBs).
GDSNC	Changed	Yes	PJ27820	Reassemble user-defined programs that call GDSNC macros that use data event control blocks (DECBs).
GDSRC	Changed	Yes	PJ27820	Reassemble user-defined programs that call GDSRC macros that use data event control blocks (DECBs).
GETCC	Changed	Yes	PJ27820	Reassemble user-defined programs that call GETCC macros that use data event control blocks (DECBs).
GETFC	Changed	Yes	PJ27820	Reassemble user-defined programs that call GETFC macros that use data event control blocks (DECBs).
LEVTA	Changed	Yes	PJ27820	Reassemble user-defined programs that call LEVTA macros that use data event control blocks (DECBs).
RELCC	Changed	Yes	PJ27820	Reassemble user-defined programs that call RELCC macros that use data event control blocks (DECBs).

Table 1283. General Macro Changes by PUT and APAR (continued)

General Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
RELFC	Changed	Yes	PJ27820	Reassemble user-defined programs that call RELFC macros that use data event control blocks (DECBs).
PUT 14				
CINFC	Changed	No	PJ27530	Not Applicable
DECBC	Changed	No	PJ27618	Not Applicable
GROUP	Changed	No	PJ27606	Not Applicable
GROUP	Changed	Yes	PJ27861	Reassemble all descriptors that are coded with INDEX and TYP=C, F, or M.
PUT 13				
CINFC	Changed	No	PJ26794	Not Applicable
PUT 12				
BEGIN	Changed	No	PJ26792	Not Applicable
CINFC	Changed	No	PJ26721	Not Applicable
SYNCC	Changed	No	PJ26580	Not Applicable
PUT 11				
CINFC	Changed	No	PJ26384, PJ26713	Not Applicable
PUT 10				
CINFC	Changed	No	PJ25981	Not Applicable
FILKW	Changed	No	PJ26125	Not Applicable
PUT 8				
TMSPC	Changed	No	PJ25240	Not Applicable
PUT 6				
CENVC	New	No	PJ23923	Not Applicable
CINFC	Changed	No	PJ23923	Not Applicable
CNOSC INITIALIZE	Changed	No	PJ23620	Not Applicable
CRESC	New	No	PJ23923	Not Applicable
EXITC	Changed	No	PJ23923	Not Applicable
RALOC	Changed	No	PJ23923	Not Applicable
UXCMC	Changed	No	PJ20868	Not Applicable
UXMAC	New	No	PJ20868	Not Applicable
PUT 5				
TMSPC	Changed	No	PJ21907	Not Applicable

Selected Equate Macros

Table 1284 on page 1360 summarizes selected equate macro changes. This information is presented in alphabetic order by the name of the selected equate macro.

Table 1284. Selected Equate Macro Changes by PUT and APAR

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 15				
CZ1SE	Changed	No	PJ27379	Not Applicable
DADFQ	Changed	No	PJ27727	Not Applicable
ECBEQ	Changed	No	PJ28043	Not Applicable
PUT 14				
BRPEQ	Changed	No	PJ27606	Not Applicable
CZOCP	Changed	No	PJ27530, PJ27445	Not Applicable
CZ1SE	Changed	No	PJ27595	Not Applicable
ECBEQ	Changed	No (PJ27530), Yes (PJ27548)	PJ27530, PJ27548	Not Applicable (PJ27530) Reassemble CCCCCP1, CCNUCL, and CCENBK and link-edit CPS0 (PJ27548).
LINEQ	Changed	Yes	PJ27548	Reassemble CCCCCP1, CCNUCL, and CCENBK and link-edit CPS0.
TAPEQ	Changed	Yes	PJ27400, PJ27689, PJ27410, PJ27543	Reassemble CCTAPE and link-edit CPS0 (APARs PJ27400, PJ27410, PJ27543). See "Segments" on page 1460 for information about segments to reassemble for APAR PJ27689.
PUT 13				
CZ1SE	Changed	No	PJ26891	Not Applicable
PUT 12				
CMFEQ	Changed	No	PJ26909	Not Applicable
CZ1SE	Changed	No	PJ26427, PJ26774, PJ26580, PJ26967	Not Applicable
CZ3CP	Changed	No	PJ26880	Not Applicable
ECBEQ	Changed	No	PJ26721, PJ26914	Not Applicable
SYSEQ	Changed	Yes	PJ27095	
TAPEQ	Changed	No	PJ26545	Not Applicable
TRMEQ	Changed	No	PJ26873	Not Applicable
PUT 11				
CZ1SE	Changed	No	PJ26686, PJ26713	Not Applicable
IEQCE2	Changed	No	PJ26468	Not Applicable
TAPEQ	Changed	No	PJ26417	Not Applicable
PUT 10				
CZOCP	Changed	No	PJ25981	Not Applicable
CZ1SE	Changed	No	PJ25981	Not Applicable
GL0BQ	Changed	No	PJ26125	Not Applicable
IEQCE2	Changed	No	PJ25981, PJ25983	Not Applicable
IEQCE3	Changed	No	PJ25981	Not Applicable

Table 1284. Selected Equate Macro Changes by PUT and APAR (continued)

Selected Equate Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 9				
TAPEQ	Changed	No	PJ25690	Not Applicable
PUT 8				
BRPEQ	Changed	No	PJ25207	Not Applicable
PUT 6				
CZ1SE	Changed	No	PJ23923	Not Applicable
CZ3CP	Changed	No	PJ23493	Not Applicable
IEQCE2	Changed	No	PJ23493, PJ23923	Not Applicable
IEQCE3	Changed	No	PJ23923	Not Applicable
IUXEQ	New	No	PJ20868	Not Applicable
PUT 5				
CZ1SE	Changed	Yes	PJ23103	

Structured Programming Macros (SPMs)

Table 1285 summarizes structured programming macro (SPM) changes. This information is presented in alphabetic order by the name of the SPM. See *TPFDF* and *TPF Structured Programming Macros* for a complete description of all SPMs.

Table 1285. Structured Programming Macro (SPM) Changes by PUT and APAR

SPM	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 5				
#	New	No	PJ22032	Not Applicable
#CASE	New	No	PJ22032	Not Applicable
#CAST	New	No	PJ22032	Not Applicable
#CONB	New	No	PJ22032	Not Applicable
#COND	New	No	PJ22032	Not Applicable
#CONH	New	No	PJ22032	Not Applicable
#CONP	New	No	PJ22032	Not Applicable
#CONS	New	No	PJ22032	Not Applicable
#CONT	New	No	PJ22032	Not Applicable
#CONX	New	No	PJ22032	Not Applicable
#DO	New	No	PJ22032	Not Applicable
#DOEX	New	No	PJ22032	Not Applicable
#ECAS	New	No	PJ22032	Not Applicable
#EDO	New	No	PJ22032	Not Applicable
#EIF	New	No	PJ22032	Not Applicable
#EIFM	New	No	PJ22032	Not Applicable
#ELIF	New	No	PJ22032	Not Applicable
#ELOP	New	No	PJ22032	Not Applicable
#ELSE	New	No	PJ22032	Not Applicable
#ESUB	New	No	PJ22032	Not Applicable

Table 1285. Structured Programming Macro (SPM) Changes by PUT and APAR (continued)

SPM	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
#EXEC	New	No	PJ22032	Not Applicable
#EXIF	New	No	PJ22032	Not Applicable
#GOTO	New	No	PJ22032	Not Applicable
#IF	New	No	PJ22032	Not Applicable
#LOCA	New	No	PJ22032	Not Applicable
#OREL	New	No	PJ22032	Not Applicable
#PERF	New	No	PJ22032	Not Applicable
#SPM	New	No	PJ22032	Not Applicable
#STPC	New	No	PJ22032	Not Applicable
#STPF	New	No	PJ22032	Not Applicable
#STPH	New	No	PJ22032	Not Applicable
#STPR	New	No	PJ22032	Not Applicable
#SUBR	New	No	PJ22032	Not Applicable

Structured Programming Macros (SPMs) (IBM Use Only)

Table 1286 summarizes structured programming macro (SPM) (IBM use only) changes. This information is presented in alphabetic order by the name of the SPM (IBM use only).

Table 1286. Structured Programming Macro (SPM) (IBM Use Only) Changes by PUT and APAR

SPM (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 5				
#ANALOP	New	No	PJ22032	Not Applicable
#BOOLTRN	New	No	PJ22032	Not Applicable
#CHKSTAC	New	No	PJ22032	Not Applicable
#DECODEB	New	No	PJ22032	Not Applicable
#DOPROC#	New	No	PJ22032	Not Applicable
#DOSTAK#	New	No	PJ22032	Not Applicable
#GETBC##	New	No	PJ22032	Not Applicable
#IFPROC#	New	No	PJ22032	Not Applicable
#LBIT	New	No	PJ22032	Not Applicable
#LEVL	New	No	PJ22032	Not Applicable
#POPAAC#	New	No	PJ22032	Not Applicable
#POPINS#	New	No	PJ22032	Not Applicable
#POPMAC#	New	No	PJ22032	Not Applicable
#POPNEST	New	No	PJ22032	Not Applicable
#PUSHAAC	New	No	PJ22032	Not Applicable
#PUSHINS	New	No	PJ22032	Not Applicable
#PUSHLAB	New	No	PJ22032	Not Applicable
#PUSHMAC	New	No	PJ22032	Not Applicable
#PUSHNES	New	No	PJ22032	Not Applicable
#REGR###	New	No	PJ22032	Not Applicable

Table 1286. Structured Programming Macro (SPM) (IBM Use Only) Changes by PUT and APAR (continued)

SPM (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
#RPRT	New	No	PJ22032	Not Applicable
#SPRT	New	No	PJ22032	Not Applicable
#STKINS#	New	No	PJ22032	Not Applicable
#UBACK	New	No	PJ22032	Not Applicable
#UENTR	New	No	PJ22032	Not Applicable
#UEXIT	New	No	PJ22032	Not Applicable
#URTRN	New	No	PJ22032	Not Applicable

System Initialization Program (SIP) Skeleton and Internal Macros (Inner Macros)

Table 1287 summarizes system initialization program (SIP) skeleton and internal macro (inner macro) changes. This information is presented in alphabetic order by the name of the SIP skeleton and internal macro. If the SIP skeleton and internal macro (inner macro) is changed, you must reassemble the SIP Stage I deck and run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1287. SIP Skeleton and Internal Macro (Inner Macro) Changes by PUT and APAR

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?	APAR Number
PUT 15		
SKSIGT	Changed	PJ27769 – Run SIP stage 1 and system globals.
SKSYNC	Changed	PJ27769 – Run SIP stage 1 and system globals.
SPPGML	Changed	PJ27728, PJ27786, PJ27951, PJ27954, PJ27925, PJ27847
SPRIAT	Changed	PJ27570
PUT 14		
SKDEF	Changed	PJ27530
SPPGML	Changed	PJ27530, PJ27627, PJ27430, PJ27636, PJ27647, PJ27380, PJ27094, PJ27746
SPPGML	Changed	PJ27894
SPRIAT	Changed	PJ27570
PUT 13		
GENR	Changed	PJ27305
SKCTKA	Changed	PJ27087
SPASMS	Changed	PJ27328
SPCOMP	Changed	PJ27328, PJ27075
SPGLB	Changed	PJ27328, PJ27180, PJ27291
SPLED	Changed	PJ27328, PJ27291
SPPBLD	Changed	PJ27180, PJ27328
SPPGML	Changed	PJ27246, PJ27180, PJ27302, PJ27328, PJ27305, PJ27299, PJ27345
SPPGML	Changed	PJ25743
SPPROC	Changed	PJ27328

Table 1287. SIP Skeleton and Internal Macro (Inner Macro) Changes by PUT and APAR (continued)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?	APAR Number
SPRIAT	Changed	PJ27305
SPTABS	Changed	PJ27328
VERCHG	Changed	PJ27328
PUT 12		
SKCTKA	Changed	PJ26880
SKGLB	Changed	PJ26880
SKSET	Changed	PJ26880
SPPGML	Changed	PJ26864, PJ21337, PJ27028, PJ26793, PJ26892, PJ26895, PJ26841, PJ26967, PJ27095, PJ27156
PUT 11		
GENC	Changed	PJ26686
SKCYCN	Changed	PJ26686
SPCOMP	Changed	PJ26578
SPEDCC	Changed	PJ26157
SPERR	Changed	PJ26578
SPGLB	Changed	PJ26578
SPPBLD	Changed	PJ26578
SPPGML	Changed	PJ26283, PJ26366, PJ25761, PJ26515, PJ26522, PJ26713, PJ26686, PJ26575, PJ26809
PUT 10		
GENR	Changed	PJ26125
SKFMTR	Changed	PJ26160
SPGLB	Changed	PJ26160
SPPGML	Changed	PJ25880, PJ25981, PJ25982, PJ25983, PJ26008, PJ26125, PJ26174
SPRIAT	Changed	PJ26125
PUT 9		
SKCTKA	Changed	PJ24659
SPGLB	Changed	PJ24659
SPPGML	Changed	PJ25199
PUT 8		
SPPGML	Changed	PJ25266, PJ25207, PJ25174, PJ25379, PJ23981, PJ25075
PUT 7		
SPPGML	Changed	PJ23984
PUT 6		
CONFIG	Changed	PJ23434
SKCTKA	Changed	PJ23493
SKSET	Changed	PJ23434
SPGLB	Changed	PJ23434
SPPGML	Changed	PJ21693, PJ21694, PJ21708, PJ22843, PJ22937, PJ23297, PJ23526, PJ23430, PJ23434, PJ23923
SPREPT	Changed	PJ23434
PUT 5		

Table 1287. SIP Skeleton and Internal Macro (Inner Macro) Changes by PUT and APAR (continued)

SIP Skeleton and Internal Macro	New, Changed, or No Longer Supported?	APAR Number
SPEDCC	Changed	PJ21907
SPPGML	Changed	PJ21701, PJ21705, PJ21706, PJ21709
PUT 4		
SPPBLD	Changed	PJ20388
SPPGML	Changed	PJ20388

System Initialization Program (SIP) Stage I Macros and Statements

Table 1288 summarizes system initialization program (SIP) Stage I macro and statement changes. See *TPF System Generation* for a complete description of the SIP Stage I macros. This information is presented in alphabetic order by the name of the SIP Stage I macro. If the SIP Stage I macro is changed, you must run the appropriate job control language (JCL) jobs from the SIP Stage II deck.

Table 1288. SIP Stage I Macro and Statement Changes by PUT and APAR

SIP Stage I Macro	New, Changed, or No Longer Supported?	APAR Number
PUT 15		
GENSIP	Changed	PJ27960
IODEV	Changed	PJ27831
PUT 14		
GENSIP	Changed	PJ27530, PJ27740
PUT 13		
CONFIG	Changed	PJ27291
GENSIP	Changed	PJ27180, PJ27075, PJ27328, PJ27291, PJ27503
INDSN	Changed	PJ27328
PUT 12		
GENSIP	Changed	PJ27033, PJ27048
PUT 11		
GENSIP	Changed	PJ26576, PJ26578
PUT 10		
GENSIP	Changed	PJ25981, PJ26008
RAMFIL	Changed	PJ26160
PUT 9		
CLOCKS	Changed	PJ24659
PUT 5		
GENSIP	Changed	PJ21907
PUT 4		
MSGRTA	Changed	PJ21180
ONLFIL	Changed	PJ21266
SPERR	Changed	PJ21266

System Initialization Program (SIP) Stage II Macros

Table 1289 summarizes system initialization program (SIP) stage II macro changes. This information is presented in alphabetic order by the name of the SIP Stage II macro. If IBMPAL is changed, you must run the system allocator (SALO) and load the new program allocation table (PAT) to the TPF 4.1 system.

Table 1289. SIP Stage II Macro Changes by PUT and APAR

SIP Stage II Macro	New, Changed, or No Longer Supported?	APAR Number
PUT 15		
IBMPAL	Changed	PJ27728, PJ27951, PJ28119, PJ27847
PUT 14		
IBMPAL	Changed	PJ27627, PJ27530, PJ27430, PJ27636, PJ27647
RIATA	Changed	PJ27000
PUT 13		
IBMPAL	Changed	PJ27299, PJ27305, PJ27246
IBMPAL	Changed	PJ25743
PUT 12		
IBMPAL	Changed	PJ21337, PJ26782, PJ26864, PJ26892, PJ27028, PJ26781, PJ27095
PUT 11		
IBMPAL	Changed	PJ25761, PJ26283, PJ26366, PJ26468, PJ26516, PJ26685, PJ26534, PJ26713, PJ26686
PUT 10		
IBMPAL	Changed	PJ25880, PJ25981, PJ25983, PJ25982, PJ26125, PJ26174, PJ26350
PUT 8		
IBMPAL	Changed	PJ25261, PJ25207, PJ25266, PJ25379, PJ23981, PJ25075
PUT 7		
IBMPAL	Changed	PJ23984
PUT 6		
IBMPAL	Changed	PJ21693, PJ21694, PJ21708, PJ22843, PJ22937, PJ23297, PJ23338, PJ23430, PJ23434, PJ23923
PUT 5		
IBMPAL	Changed	PJ21701, PJ21706, PJ21709
PUT 4		
IBMPAL	Changed	PJ20388

System Communication Keypoint (SCK) Generation Macros

There are no changes.

System Macros

Table 1290 summarizes system macro changes. This information is presented in alphabetic order by the name of the system macro. See *TPF System Macros* for a complete description of all system macros.

Table 1290. System Macro Changes by PUT and APAR

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 15				
FACZC	Changed	Yes	PJ27820	Reassemble user-defined programs that call FACZC macros that use data event control blocks (DECBs).
FTSTC	Changed	Yes	PJ27820	Reassemble user-defined programs that call find- or file-type macros that use data event control blocks (DECBs).
IBMSVC	Changed	Yes	PJ27667	Reassemble the CCMCDC CSECT and relink the CPS0 link-edited module.
UXITC	Changed	No	PJ28014	Not Applicable
PUT 14				
BSYNC	Changed	No	PJ27647	Not Applicable
GROUP	Changed	No	PJ27606	Not Applicable
PUT 13				
UXITC	Changed	No	PJ27019	Not Applicable
PUT 12				
GNAMC	Changed	Yes	PJ21337	Reassemble the CTR1 and CTR3 segments in the CCNUCL CSECT and the CPSL segment in the CCCPSE CSECT. CCNUCL and CCCPSE are part of the CPS0 link-edited module.
\$LOCKC	Changed	No	PJ25496	Not Applicable
TPINC	Changed	No	PJ26545	Not Applicable
PUT 11				
IBMSVC	Changed	No	PJ26410	Not Applicable
IDATB	Changed	No	PJ26686	Not Applicable
TMTKC	New	No	PJ26366	Not Applicable
PUT 10				
CIOSC	Changed	No	PJ26144	Not Applicable
CPLKC	Changed	Yes	PJ25981	Not Applicable
ENATC	Changed	Yes	PJ25722	See the APEDIT for APAR PJ25722 for more information.
FDCTC	Changed	No	PJ26144	Not Applicable
IDATB	Changed	Yes	PJ25981	
ISDAC	Changed	No	PJ26144	Not Applicable

Table 1290. System Macro Changes by PUT and APAR (continued)

System Macro	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
MSDAC	Changed	No	PJ26144	Not Applicable
NXTRC	Changed	Yes	PJ25841	CCNUCL
PROGC	Changed	Yes	PJ25981	
UXITC	Changed	No	PJ25981, PJ26008	Not Applicable
WRSTC	New	Yes	PJ25807	
PUT 9				
RCRTC	New	Yes	PJ23574	
PUT 8				
\$RELRC	Changed	No	PJ25258	Not Applicable
SETOC	New	Yes	PJ24945	
PUT 6				
GNAMC	Changed	Yes	PJ23493	
IBMSVC	Changed	No	PJ23923	Not Applicable
\$MOVEC	New	No	PJ23923	Not Applicable
PUT 5				
GNAMC	New	No	PJ21907	Not Applicable
UXITC	Changed	Yes	PJ21907, PJ22936	
PUT 4				
IBMSVC	Changed	No	PJ21259, PJ23103	Not Applicable
USRSVC	Changed	No	PJ21259	Not Applicable

System Macros (IBM Use Only)

Table 1291 summarizes system macro (IBM use only) changes. This information is presented in alphabetic order by the name of the system macro (IBM use only).

Table 1291. System Macros (IBM Use Only) by PUT and APAR

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
PUT 14				
CFMCC	Changed	Yes	PJ27530, PJ27567	Reassemble ICDF and STPP; link-edit PPCP for both APARs.
CFMDC	Changed	Yes	PJ27530, PJ27595, PJ27746	Reassemble ICDF and STPP; link-edit PPCP.
PUT 13				
CFMDC	Changed	Yes	PJ27275	
PUT 12				
WTO6C	Changed	No	PJ26991	Not Applicable
PUT 11				
DLTEC	Changed	No	PJ26686	Not Applicable
PUT 10				

Table 1291. System Macros (IBM Use Only) by PUT and APAR (continued)

System Macro (IBM Use Only)	New, Changed, or No Longer Supported?	Do You Need to Reassemble Programs?	APAR Number	Programs to Reassemble
CFMCC	Changed	Yes	PJ25981, PJ25841	For PJ275841, reassemble ICDF and STPP; link-edit PPCP.
CFMDC	Changed	Yes	PJ25981	For PJ275841, reassemble ICDF and STPP; link-edit PPCP.
DLTEC	Changed	No	PJ25981	Not Applicable
PUT 6				
CFMCC	Changed	Yes	PJ23493	
CFMDC	Changed	Yes	PJ23923	
DLTEC	Changed	No	PJ23923	Not Applicable
PUT 5				
ECBLC	New	No	PJ23103	Not Applicable

Messages and System Errors

Table 1292 summarizes message and system error changes.

The message IDs or system error numbers are listed in numeric order preceded by their alphabetic prefix. Some offline and online messages do not have a standard message ID. For these, the messages are presented in alphabetic order based on the initial message text; or for those messages that begin with variable information, the initial message text that follows that variable information. See *Messages (System Error and Offline)* and *Messages (Online)* for a complete description of all messages and system errors.

Attention: Changes to offline messages, online messages, and system errors may impact any automation programs you are using in your complex.

Table 1292. Message and System Error Changes by PUT and APAR

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
PUT 15			
8-byte file address support messages (see "8-Byte File Address Support (APAR PJ28097)" on page 1111)	Online and System Error	New, Changed, and No Longer Supported	PJ28097
000074	System Error	Changed	PJ27785
0000EE	System Error	Changed	PJ27785
000296	System Error	New	PJ27785
000297	System Error	New	PJ27785
000298	System Error	New	PJ27785
0004F0	System Error	Changed	PJ27693
005100	System Error	New	PJ27785
005101	System Error	New	PJ27785
005102	System Error	New	PJ27785
005103	System Error	New	PJ27785

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
005104	System Error	New	PJ27785
005105	System Error	New	PJ27785
005106	System Error	New	PJ27785
005107	System Error	New	PJ27785
005108	System Error	New	PJ27785
005109	System Error	New	PJ27785
00510A	System Error	New	PJ27785
00510B	System Error	New	PJ27785
00510C	System Error	New	PJ27785
006543	System Error	New	PJ27785
007701	System Error	Changed	PJ27785
007820	System Error	New	PJ28118
009108	System Error	New	PJ27379
009321	System Error	New	PJ27854
00C115	System Error	Changed	PJ28059
00C116	System Error	Changed	PJ28059
00C117	System Error	Changed	PJ28059
00C13D	System Error	New	PJ27785
097453	System Error	New	PJ27853
09812D	System Error	New	PJ27966
0ADB12	System Error	New	PJ27905
0ADB13	System Error	New	PJ27905
0ADB14	System Error	New	PJ27905
0ADB15	System Error	New	PJ27905
0ADB16	System Error	New	PJ27905
0ADB17	System Error	New	PJ27905
ACPL0104E	Online	New	PJ27785
ACPL0105W	Online	New	PJ27785
ACPL0106E	Online	New	PJ27785
ACPL0107W	Online	New	PJ27785
B0P00006E	Online	New	PJ27785
BOF80003I	Online	No Longer Supported	PJ27785
BOF80008I	Online	New	PJ27785
BRB40002I	Online	No Longer Supported	PJ27848
BKP60003E	Online	New	PJ27848
BKP60004E	Online	New	PJ27848
BKP60005E	Online	New	PJ27848
BKP60006E	Online	New	PJ27848
BOF10029I	Online	New	PJ27848
BREP0001A	Online	New	PJ27848
BREP0002T	Online	New	PJ27848
BREP0003I	Online	New	PJ27848
BREP0004E	Online	New	PJ27848
BREP0005E	Online	New	PJ27848

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
BREP0006E	Online	New	PJ27848
BRV30005E	Online	No Longer Supported	PJ27785
BRV30006E	Online	No Longer Supported	PJ27785
BRV30008E	Online	No Longer Supported	PJ27785
BRV30009E	Online	No Longer Supported	PJ27785
BRV30014E	Online	New	PJ27785
BRV30015E	Online	New	PJ27785
BRV30016E	Online	New	PJ27785
BRV30017E	Online	New	PJ27785
BRV50005E	Online	No Longer Supported	PJ27785
BRV50006E	Online	No Longer Supported	PJ27785
BRV50008E	Online	No Longer Supported	PJ27785
BRV50009E	Online	No Longer Supported	PJ27785
BRV50016E	Online	New	PJ27785
BRV50017E	Online	New	PJ27785
BRV50018E	Online	New	PJ27785
BRV50019E	Online	New	PJ27785
CBG20051I	Online	New	PJ27785
CBG20052I	Online	New	PJ27785
CBG20053I	Online	New	PJ27785
CBG20054I	Online	New	PJ27785
CBR10001E	Online	Changed	PJ27785
CBR10002E	Online	Changed	PJ27785
CBR10003I	Online	New	PJ27785
CBR10004I	Online	New	PJ27785
CBY00040E	Online	Changed	PJ27785
CBY00050E	Online	Changed	PJ27785
CBY00060E	Online	Changed	PJ27785
CLAW0001I	Online	Changed	PJ27785
CLAW0054I	Online	New	PJ27785
CLAW0055I	Online	New	PJ27785
CLTR0001I	Online	Changed	PJ27785
CLTR0006I	Online	New	PJ27785
CL220001E	Online	New	PJ28059
CRZ10009E	Online	No Longer Supported	PJ27685
CRZ10010E	Online	New	PJ27685
CVRQ0001I	Online	No Longer Supported	PJ27785
CVRQ0003I	Online	New	PJ27785
CVZ10002I	Online	New	PJ27785
CVZ10003E	Online	New	PJ27785
CVZ10004E	Online	New	PJ27785
CVZ60001A	Online	New	PJ27785
CVZ60002A	Online	New	PJ27785
CVZ60003E	Online	New	PJ27785

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CVZ60004I	Online	New	PJ27785
CVZ60005W	Online	New	PJ27785
CVZ60006T	Online	New	PJ27785
DADF0064E	Online	New	PJ27727
DSMG0070E	Online	Changed	PJ27785
DSMG0072E	Online	Changed	PJ27785
DSMG0080E	Online	Changed	PJ27785
DSMG0081E	Online	Changed	PJ27785
DSMG0090E	Online	Changed	PJ27785
DSMG0095E	Online	New	PJ27785
DSMG0096I	Online	New	PJ27785
DSMG0099E	Online	New	PJ27785
DSMG0172E	Online	Changed	PJ27785
DTCP0007I	Online	New	PJ28029
FCTB0106I	Offline	Changed	PJ27785
FCTB0122E	Offline	New	PJ27785
FCTB0123W	Offline	New	PJ27785
FMNT0015I	Online	New	PJ27785
FMNT0017E	Online	New	PJ27785
FMNT0018E	Online	New	PJ27785
IMAG0011I	Online	No Longer Supported	PJ27785
IMAG0021I	Online	No Longer Supported	PJ27785
IMAG0211I	Online	New	PJ27785
IMAG0221I	Online	New	PJ27785
IMAP0001E	Online	New	PJ27966
IMAP0002E	Online	New	PJ27966
IMAP0003E	Online	New	PJ27966
IMAP0004E	Online	New	PJ27966
INET0020I	Online	New	PJ27785
INET0119E	Online	New	PJ28026
INET0122E	Online	New	PJ28026
IPLA0050E	Online	Changed	PJ27785
IPLA0055W	Online	New	PJ27785
IPLA0056T	Online	New	PJ27785
IPLB0003T	Online	New	PJ27785
IPLB0008T	Online	New	PJ27785
IPLB0009T	Online	New	PJ27785
IPLB0013E	Online	New	PJ27785
IPLB0018W	Online	New	PJ27785
KPTR0001I	Online	New	PJ27785
KPTR0002T	Online	New	PJ27785
KPTR0003I	Online	New	PJ27785
KPTR0004E	Online	New	PJ27785
KPTR0005I	Online	New	PJ27785

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
KPTR0006E	Online	New	PJ27785
KPTR0007E	Online	New	PJ27785
KPTR0010I	Online	New	PJ27785
KPTR0020I	Online	New	PJ27785
KPTR0030I	Online	New	PJ27785
MATP0033E	Online	New	PJ28065
MATP0034E	Online	New	PJ28065
MIGR0001I	Online	New	PJ27785
MIGR0002I	Online	New	PJ27785
MIGR0003I	Online	New	PJ27785
MIGR0004I	Online	New	PJ27785
MIGR0005T	Online	New	PJ27785
MIGR0006T	Online	New	PJ27785
MIGR0007W	Online	New	PJ27785
MIGR0008T	Online	New	PJ27785
MIGR0009I	Online	New	PJ27785
MIGR0010I	Online	New	PJ27785
MIGR0011I	Online	New	PJ27785
MIGR0012T	Online	New	PJ27785
MIGR0013I	Online	New	PJ27785
MIGR0014I	Online	New	PJ27785
MIGR0015T	Online	New	PJ27785
MIGR0016I	Online	New	PJ27785
MIGR0017T	Online	New	PJ27785
MIGR0018T	Online	New	PJ27785
MIGR0019I	Online	New	PJ27785
MIGR0020T	Online	New	PJ27785
MIGR0021I	Online	New	PJ27785
MIGR0022W	Online	New	PJ27785
MIGR0023E	Online	New	PJ27785
MIGR0025T	Online	New	PJ27785
MIGR0030I	Online	New	PJ27785
MIGR0031I	Online	New	PJ27785
MIGR0032I	Online	New	PJ27785
MIGR0033I	Online	New	PJ27785
MIGR0034E	Online	New	PJ27785
MIGR0035E	Online	New	PJ27785
MIGR0036I	Online	New	PJ27785
MIGR0037E	Online	New	PJ27785
MIGR0038E	Online	New	PJ27785
MIGR0039E	Online	New	PJ27785
MIGR0040I	Online	New	PJ27785
MIGR0041I	Online	New	PJ27785
MIGR0042I	Online	New	PJ27785

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MIGR0043I	Online	New	PJ27785
MIGR0044E	Online	New	PJ27785
MIGR0045E	Online	New	PJ27785
MPIF0038E	Online	Changed	PJ27785
MPIF0054A	Online	Changed	PJ27785
MPIF0064E	Online	Changed	PJ27785
MPIF0079A	Online	Changed	PJ27785
MQSC0176E	Online	Changed	PJ27830
MQSC0700I	Online	New	PJ28136
MQSC0704E	Online	New	PJ28136
MQSC0705E	Online	New	PJ28136
MQSC0721I	Online	New	PJ28136
MQSC0722I	Online	New	PJ28136
MQSC0723I	Online	New	PJ28136
MQSC0724E	Online	New	PJ28136
MQSC0725E	Online	New	PJ28136
PMIG0015E	Online	New	PJ27785
POP30001E	Online	New	PJ27966
POP30002E	Online	New	PJ27966
POP30003E	Online	New	PJ27966
POP30004E	Online	New	PJ27966
PROT0058E	Online	New	PJ27785
RECP0525I	Online	New	PJ27848
SMTP0001E	Online	New	PJ27966
SMTP0002E	Online	New	PJ27966
SMTP0003E	Online	New	PJ27966
SMTP0004E	Online	New	PJ27966
SNMP0001I	Online	New	PJ27932
SNMP0002E	Online	New	PJ27932
SNMP0003E	Online	New	PJ27932
SNMP0004E	Online	New	PJ27932
SNMP0005E	Online	New	PJ27932
SNMP0006E	Online	New	PJ27932
SNMP0007E	Online	New	PJ27932
SNMP0008E	Online	New	PJ27932
SNMP0009E	Online	New	PJ27932
SNMP0010W	Online	New	PJ27932
SNMP0011E	Online	New	PJ27932
SNMP0012E	Online	New	PJ27932
SNMP0013E	Online	New	PJ27932
SNMP0014E	Online	New	PJ27932
SNMP0015E	Online	New	PJ27932
SNMP0016E	Online	New	PJ27932
SNMP0017E	Online	New	PJ27932

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
SSLD0001I	Online	New	PJ28118
SSLD0002I	Online	New	PJ28118
SSLD0003I	Online	New	PJ28118
SSLD0004I	Online	New	PJ28118
SSLD0005I	Online	New	PJ28118
SSLD0007I	Online	New	PJ28118
SSLD0008I	Online	New	PJ28118
SSLD0010I	Online	New	PJ28118
SSLD0011I	Online	New	PJ28118
SSLD0020E	Online	New	PJ28118
SSLD0021E	Online	New	PJ28118
SSLD0022E	Online	New	PJ28118
SSLD0023E	Online	New	PJ28118
SSLD0024E	Online	New	PJ28118
SSLD0025E	Online	New	PJ28118
SSLD0026E	Online	New	PJ28118
SSLD0030E	Online	New	PJ28118
SSLD0032E	Online	New	PJ28118
SSLD0040E	Online	New	PJ28118
SSLD0041E	Online	New	PJ28118
SSLD0050E	Online	New	PJ28118
SSLD0051E	Online	New	PJ28118
SSLD0052E	Online	New	PJ28118
SSLD0053E	Online	New	PJ28118
SSLD0054I	Online	New	PJ28118
TPLD0125E	Online	New	PJ27785
TPLD0126E	Online	New	PJ27785
UDRR0001E	Online	New	PJ27728
UDRS0001E	Online	New	PJ27728
VAGE0001E	Offline	New	PJ27905
VAGE0002E	Offline	New	PJ27905
VAGE0003E	Offline	New	PJ27905
VAGE0004W	Offline	New	PJ27905
VAGE0005W	Offline	New	PJ27905
VAGE0006E	Offline	New	PJ27905
VAGE0007E	Offline	New	PJ27905
VAGE0008W	Offline	New	PJ27905
VAGE0009E	Offline	New	PJ27905
VAGE00010E	Offline	New	PJ27905
VAGE00011E	Offline	New	PJ27905
VAGE00012E	Offline	New	PJ27905
VAGE00013E	Offline	New	PJ27905
VAGE00014E	Offline	New	PJ27905
VAGE00015E	Offline	New	PJ27905

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
VAGE00016E	Offline	New	PJ27905
VAGE00017E	Offline	New	PJ27905
VAGE00018E	Offline	New	PJ27905
VAGE00019E	Offline	New	PJ27905
VAGE00020E	Offline	New	PJ27905
VAGE00021E	Offline	New	PJ27905
VAGE0022I	Offline	New	PJ27905
VAGE9091E	Offline	No Longer Supported	PJ27905
VAGE9092E	Offline	No Longer Supported	PJ27905
PUT 14			
00001A	System Error	Changed	PJ27686
0003CC	System Error	New	PJ27595
000690	System Error	Changed	PJ27686
000691	System Error	Changed	PJ27686
000697	System Error	Changed	PJ27686
000698	System Error	New	PJ27686
000699	System Error	New	PJ27686
00069A	System Error	New	PJ27686
00069B	System Error	New	PJ27686
00069C	System Error	New	PJ27686
004645	System Error	Changed	PJ27452
007813	System Error	New	PJ27617
007814	System Error	New	PJ27617
04100C	System	No Longer Supported	PJ27484
041014	System Error	New	PJ27686
041015	System Error	New	PJ27686
041204	System Error	Changed	PJ27606
041220	System Error	New	PJ27606
041221	System Error	New	PJ27606
041222	System Error	New	PJ27606
041223	System Error	New	PJ27606
041224	System Error	New	PJ27606
041225	System Error	New	PJ27606
041226	System Error	New	PJ27606
0412F0	System Error	Changed	PJ27804
042001	System Error	No Longer Supported	PJ27804
098100	System Error	New	PJ27784, PJ27865
098101	System Error	New	PJ27784, PJ27865
098102	System Error	New	PJ27784, PJ27865
098103	System Error	New	PJ27784, PJ27865
098104	System Error	New	PJ27784, PJ27865
098105	System Error	New	PJ27784, PJ27865
098106	System Error	New	PJ27784, PJ27865
098107	System Error	New	PJ27784, PJ27865

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
098108	System Error	New	PJ27784, PJ27865
098109	System Error	New	PJ27784, PJ27865
09810A	System Error	New	PJ27784, PJ27865
09810B	System Error	New	PJ27784, PJ27865
098120	System Error	New	PJ27784, PJ27865
098121	System Error	New	PJ27784, PJ27865
098122	System Error	New	PJ27784, PJ27865
098123	System Error	New	PJ27784, PJ27865
098124	System Error	New	PJ27784, PJ27865
098125	System Error	New	PJ27784, PJ27865
098126	System Error	New	PJ27784, PJ27865
098127	System Error	New	PJ27784, PJ27865
098128	System Error	New	PJ27784, PJ27865
098129	System Error	New	PJ27784, PJ27865
09812A	System Error	New	PJ27784, PJ27865
09812B	System Error	New	PJ27784, PJ27865
09812C	System Error	New	PJ27784, PJ27865
098130	System Error	New	PJ27784, PJ27865
098131	System Error	New	PJ27784, PJ27865
098132	System Error	New	PJ27784, PJ27865
098133	System Error	New	PJ27784, PJ27865
098134	System Error	New	PJ27784, PJ27865
098135	System Error	New	PJ27784, PJ27865
098136	System Error	New	PJ27784, PJ27865
098137	System Error	New	PJ27784, PJ27865
098138	System Error	New	PJ27784, PJ27865
098139	System Error	New	PJ27784, PJ27865
09813A	System Error	New	PJ27784, PJ27865
09813B	System Error	New	PJ27784, PJ27865
09813C	System Error	New	PJ27784, PJ27865
09813D	System Error	New	PJ27784, PJ27865
09813E	System Error	New	PJ27784, PJ27865
098140	System Error	New	PJ27784, PJ27865
098141	System Error	New	PJ27784, PJ27865
098142	System Error	New	PJ27784, PJ27865
098143	System Error	New	PJ27784, PJ27865
098144	System Error	New	PJ27784, PJ27865
098145	System Error	New	PJ27784, PJ27865
098146	System Error	New	PJ27784, PJ27865
098147	System Error	New	PJ27784, PJ27865
098148	System Error	New	PJ27784, PJ27865
098149	System Error	New	PJ27784, PJ27865
09814A	System Error	New	PJ27784, PJ27865
BBLD0001I	Online	New	PJ27484

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
BBLD0002E	Online	New	PJ27484
BBLD0003E	Online	New	PJ27484
BBLD0004E	Online	New	PJ27484
BBLD0006E	Online	New	PJ27484
BBLD0007E	Online	New	PJ27484
BBLD0008E	Online	New	PJ27484
BCAI0007E	Online	No Longer Supported	PJ27484
BCC0000A	Online	Changed	PJ27606
BCPI0001E	Online	No Longer Supported	PJ27484
BCP00025A	Online	Changed	PJ27804
BCP00030E	Online	No Longer Supported	PJ27484
BCP60001E	Online	No Longer Supported	PJ27484
BOFA0004E	Online	No Longer Supported	PJ27606
BOFA0005E	Online	No Longer Supported	PJ27606
BOFA0008W	Online	No Longer Supported	PJ27606
BOFA0010E	Online	No Longer Supported	PJ27606
BOFA0012E	Online	No Longer Supported	PJ27606
BOFE0002E	Online	No Longer Supported	PJ27636
BOFF0002E	Online	No Longer Supported	PJ27484
BOF20001I	Online	No Longer Supported	PJ27484
BOF20002I	Online	No Longer Supported	PJ27484
BOF20003I	Online	New	PJ27484
BOF20004I	Online	New	PJ27484
BOF20005I	Online	New	PJ27484
BOF20006I	Online	New	PJ27484
BOF20007I	Online	New	PJ27484
BOF20008I	Online	New	PJ27484
BOF20009E	Online	New	PJ27484
BOF30004E	Online	No Longer Supported	PJ27484
BOF30005E	Online	No Longer Supported	PJ27484
BOF30006E	Online	Changed	PJ27484
BOF40004E	Online	Changed	PJ27484
BOF40005E	Online	No Longer Supported	PJ27484
BOF40006E	Online	No Longer Supported	PJ27484
BOF70004E	Online	New	PJ27606
BOF70005E	Online	New	PJ27606
BOF70008W	Online	New	PJ27606
BOF70010E	Online	New	PJ27606
BOF70012E	Online	New	PJ27606
BROW0303I	Online	Changed	PJ27380
BROW0414I	Online	New	PJ27380
BROW0423I	Online	New	PJ27380
BROW0424I	Online	New	PJ27380
BROW0426I	Online	New	PJ27380

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
BRTD0005E	Online	New	PJ27686
BRT00063W	Online	Changed	PJ27606
BRUB0012I	Online	New	PJ27606, PJ27804
BRUB0013I	Online	New	PJ27606
BRUC0009W	Online	No Longer Supported	PJ27804
BRUC0010E	Online	New	PJ27804
BRUC0011W	Online	New	PJ27804
BRV10000I	Online	No Longer Supported	PJ27484
BRV10001I	Online	No Longer Supported	PJ27484
BRV10002E	Online	Changed	PJ27484
BRV10004E	Online	No Longer Supported	PJ27484
BRV10005E	Online	No Longer Supported	PJ27484
BRV10006E	Online	No Longer Supported	PJ27484
BRV10007E	Online	Changed	PJ27484
BRV10010I	Online	New	PJ27484
BRV10011I	Online	New	PJ27484
BRV10016E	Online	New	PJ27484
BRV50001I	Online	No Longer Supported	PJ27484
BRV50002I	Online	No Longer Supported	PJ27484
BRV50010I	Online	New	PJ27484
BRV50011I	Online	New	PJ27484
BRV60001I	Online	Changed	PJ27484
BRV60008E	Online	No Longer Supported	PJ27484
BRYD0001I	Online	No Longer Supported	PJ27636
BRYD0002I	Online	No Longer Supported	PJ27636
BRYN0001E	Online	No Longer Supported	PJ27484, PJ27636
BWRA0400E	Online	Changed	PJ27606
BWRA0401E	Online	Changed	PJ27606
BWRA0402W	Online	Changed	PJ27606
BWRA0403I	Online	Changed	PJ27606
B1A80017E	Online	No Longer Supported	PJ27484
B1A80018E	Online	No Longer Supported	PJ27484
CEFR0347W	Online	No Longer Supported. This message was replaced with CEFR0392W.	PJ27410
CEFR0348W	Online	No Longer Supported. This message was replaced with CEFR0393W.	PJ27410
CEFR0349E	Online	No Longer Supported. This message was replaced with CEFR0394E.	PJ27410
CEFR0391E	Online	New	PJ27400
CEFR0392W	Online	New. This message replaces CEFR0347W.	PJ27410

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CEFR0393W	Online	New. This message replaces CEFR0348W.	PJ27410
CEFR0394E	Online	New. This message replaces CEFR0349E.	PJ27410
CEFR0395E	Online	New	PJ27410
CL210005I	Online	New	PJ27446
CORD0205I	Online	Changed	PJ27455
CORD0215I	Online	Changed	PJ27455
CORD0234I	Online	Changed	PJ27455
COSK0200I	Online	No Longer Supported. This message was replaced with COSK0369A.	PJ27689
COSK0369A	Online	New	PJ27689
COTU0160E	Online	Changed	PJ27283
CTIN0042I	Online	No Longer Supported	PJ27686
CT090001I	Online	New	PJ27446
CT090002W	Online	New	PJ27446
CYA20001I	Online	New	PJ27686
CYEM0099E	Online	Changed	PJ27531
CYGR0002T	Online	New	PJ27686
CYGR0099T	Online	New	PJ27686
DYDD0001T	Online	No Longer Supported	PJ27636
DYDD0002I	Online	No Longer Supported	PJ27636
DYDD0003I	Online	No Longer Supported	PJ27636
DYDD0004T	Online	No Longer Supported	PJ27636
DYDD0005T	Online	No Longer Supported	PJ27636
DYDD0006W	Online	No Longer Supported	PJ27636
DYDD0006W	Online	Changed	PJ27484
DYDG0026E	Online	New	PJ27686
DYDG0027E	Online	New	PJ27686
DYDU0079E	Online	No Longer Supported	PJ27484
DYD30017E	Online	No Longer Supported	PJ27686
DYD50013T	Online	No Longer Supported	PJ27686
DYD50014T	Online	No Longer Supported	PJ27686
DYD90002T	Online	No Longer Supported	PJ27484
DYD90003T	Online	No Longer Supported	PJ27484
DYD90007T	Online	No Longer Supported	PJ27484
DYD90008T	Online	No Longer Supported	PJ27484
DYD90015E	Online	New	PJ27484
DYD90016E	Online	New	PJ27484
GFSP0054E	Online	No Longer Supported	PJ27686
GFSP0055E	Online	No Longer Supported	PJ27686
GFSP0068E	Online	New	PJ27686
GFSP0069E	Online	New	PJ27686
GFSP0071E	Online	New	PJ27686

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
GFSP0072E	Online	New	PJ27686
GFSP0073E	Online	New	PJ27686
GFSP0074E	Online	New	PJ27686
GFSP0080E	Online	New	PJ27686
INET0121E	Online	New	PJ27619
INIP0001I	Online	New	PJ27617
INIP0002I	Online	New	PJ27617
INIP0003I	Online	New	PJ27617
INIP0004I	Online	New	PJ27617
INIP0005I	Online	New	PJ27617
INIP0006I	Online	New	PJ27617
INIP0007I	Online	New	PJ27617
INIP0008I	Online	New	PJ27617
INIP0009I	Online	New	PJ27617
INIP0010I	Online	New	PJ27617
INIP0011I	Online	New	PJ27617
INIP0020E	Online	New	PJ27617
INIP0021E	Online	New	PJ27617
INIP0022E	Online	New	PJ27617
INIP0023E	Online	New	PJ27617
INIP0024E	Online	New	PJ27617
INIP0025E	Online	New	PJ27617
INIP0026E	Online	New	PJ27617
INIP0027E	Online	New	PJ27617
INIP0028E	Online	New	PJ27617
INIP0029E	Online	New	PJ27617
MAIL0001I	Online	New	PJ27784, PJ27865
MAIL0002E	Online	New	PJ27784, PJ27865
MAIL0003I	Online	New	PJ27784, PJ27865
MAIL0007E	Online	New	PJ27784, PJ27865
MAIL0092E	Online	New	PJ27784, PJ27865
MAIL0093E	Online	New	PJ27784, PJ27865
MAIL0094E	Online	New	PJ27784, PJ27865
MAIL0098E	Online	New	PJ27784, PJ27865
MAIL0099E	Online	New	PJ27784, PJ27865
MAIL0100I	Online	New	PJ27784, PJ27865
MQSC0180E	Online	New	PJ27274
OODB0046E	Online	New	PJ27380
OODB0047I	Online	New	PJ27380
OODB0060I	Online	New	PJ27380
OODB0061E	Online	New	PJ27380
OODB0062I	Online	New	PJ27380
OODB0063E	Online	New	PJ27380
OODB0064E	Online	New	PJ27380

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
OODB0065W	Online	New	PJ27380
OODB0071E	Online	New	PJ27380
OODB0072I	Online	New	PJ27380
OODB0098E	Online	New	PJ27380
OODB0211E	Online	New	PJ27380
OODB0212E	Online	New	PJ27380
OSAE0008I	Online	New	PJ27650
OSAE0009I	Online	New	PJ27650
OSAE0010I	Online	New	PJ27650
PMIG0001I	Online	Changed	PJ27686
PMIG0002I	Online	Changed	PJ27686
PMIG0003T	Online	Changed	PJ27686
PMIG0004I	Online	No Longer Supported	PJ27686
PMIG0006W	Online	Changed	PJ27686
PMIG0009T	Online	Changed	PJ27686
PMIG0011I	Online	New	PJ27686
PMIG0012E	Online	New	PJ27686
PMIG0013E	Online	New	PJ27686
PMIG0014E	Online	New	PJ27686
RECP0000T — RECP00FEI	Online	Changed	PJ27606
RECP0032A	Online	No Longer Supported	PJ27484
RECP0051E	Online	New	PJ27606
RECP0053E	Online	New	PJ27606
RECP0055E	Online	Changed	PJ27606
RECP0057E	Online	New	PJ27606
RECP0059E	Online	New	PJ27606
RECP0061E	Online	New	PJ27606
RECP0098E	Online	No Longer Supported	PJ27804
RECP009EE	Online	No Longer Supported	PJ27804
RECP00A0E	Online	No Longer Supported	PJ27804
RECP0302E	Online	No Longer Supported	PJ27484
RECP0310W	Online	New	PJ27606
RECP0311I	Online	New	PJ27606
RECP0312A	Online	New	PJ27606
RECP0313W	Online	New	PJ27606
RECP0314E	Online	New	PJ27606
RECP0315I	Online	New	PJ27606
RECP0316E	Online	New	PJ27606
RECP0319W	Online	New	PJ27606
RECP0410I	Online	Changed	PJ27606
RECP0423E	Online	No Longer Supported	PJ27484
RECP0504I	Online	Changed	PJ27804
RECP0658E	Online	Changed	PJ27804

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
RECP0659E	Online	Changed	PJ27804
RECP0661E	Online	No Longer Supported	PJ27804
RECP0791E	Online	New	PJ27804
RECP0792E	Online	New	PJ27804
RECP0793E	Online	New	PJ27804
RECP0794E	Online	New	PJ27804
RECP0795E	Online	New	PJ27804
RECP0796E	Online	New	PJ27804
RECP0797E	Online	New	PJ27804
RECP0798E	Online	New	PJ27804
RFPC0003T	Online	Changed	PJ27686
RFPC0004T	Online	Changed	PJ27686
RFPC0006T	Online	No Longer Supported	PJ27686
RFPC0019T	Online	Changed	PJ27686
RFPC0020T	Online	No Longer Supported	PJ27686
RFPC0021T	Online	New	PJ27686
RFPC0022T	Online	New	PJ27686
RFPC0023T	Online	New	PJ27686
RTDM0096E	Online	New	PJ27000
SISN0006T	Online	No Longer Supported	PJ27686
SOCK0024I	Online	New	PJ27650
SOCK0025I	Online	New	PJ27650
SOCK0026E	Online	New	PJ27650
SOCK0027E	Online	New	PJ27650
TTCP0020I	Online	No Longer Supported	PJ27451
TTCP0022I	Online	No Longer Supported	PJ27451
TTCP0023I	Online	Changed	PJ27451
TTCP0034I	Online	New	PJ27617
TTCP0035I	Online	New	PJ27617
TTCP0182I	Online	New	PJ27451
TTCP0183I	Online	New	PJ27451
TTCP0184I	Online	New	PJ27451
UCTK0002I	Online	New	PJ27530
VIPA0002I	Online	Changed	PJ27451
VIPA0010I	Online	New	PJ27451
PUT 13			
Integrated online pool maintenance and recoup support messages (see "Messages and System Errors" on page 855)	Online and System Error	New, Changed, and No Longer Supported	PJ27469
000000000	Offline	New	PJ27422
000000000	Offline	New	PJ27422
000000000	Offline	New	PJ27422
000006	System Error	Changed	PJ27393

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
000007	System Error	Changed	PJ27393
00000B	System Error	Changed	PJ27393
000022	System Error	Changed	PJ27393
000023	System Error	Changed	PJ27393
000027	System Error	Changed	PJ27393
00002E	System Error	Changed	PJ27393
0000D1	System Error	Changed	PJ27393
0000D2	System Error	Changed	PJ27393
0006E3	System Error	Changed	PJ27393
0006E8	System Error	Changed	PJ27393
0009E7	System Error	Changed	PJ27387
000E12	System Error	New	PJ27387
000E13	System Error	New	PJ27387
000E14	System Error	New	PJ27387
00460B	System Error	Changed	PJ27083
004628	System Error	Changed	PJ27083
007547	System Error	No Longer Supported	PJ27083
007549	System Error	No Longer Supported	PJ27083
00754A	System Error	New	PJ27083
007622	System Error	New	PJ26891
007850	System Error	New	PJ27333
007851	System Error	New	PJ27333
007852	System Error	New	PJ27333
007853	System Error	New	PJ27333
007854	System Error	New	PJ27333
007855	System Error	New	PJ27333
007856	System Error	New	PJ27333
007857	System Error	New	PJ27333
007858	System Error	New	PJ27333
007859	System Error	New	PJ27333
00785A	System Error	New	PJ27333
00785B	System Error	New	PJ27333
0078E0	System Error	New	PJ27333
0078E1	System Error	New	PJ27333
009117	System Error	New	PJ27268
009118	System Error	New	PJ27268
009119	System Error	New	PJ27268
009120	System Error	New	PJ27268
094320	System Error	New	PJ27422
0DECB0	System Error	New	PJ27393
0DECB1	System Error	New	PJ27393
0DECB2	System Error	New	PJ27393
0DECB3	System Error	New	PJ27393
0DECB4	System Error	New	PJ27393

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
0DECB5	System Error	New	PJ27393
0DECB6	System Error	New	PJ27393
0DECB7	System Error	New	PJ27393
ALDR0401T	Offline	New	PJ27422
CACH0001I	Online	New	PJ27083
CACH0002I	Online	New	PJ27083
CACH0003E	Online	New	PJ27083
CACH0004I	Online	New	PJ27083
CACH0005I	Online	New	PJ27083
CACH0006I	Online	New	PJ27083
CACH0008E	Online	New	PJ27083
CACH0009E	Online	New	PJ27083
CACH0010E	Online	New	PJ27083
CACH0011E	Online	New	PJ27083
CACH0013E	Online	New	PJ27083
CACH0016I	Online	New	PJ27083
CACH0017I	Online	New	PJ27083
CACH0018E	Online	New	PJ27083
CACH0019I	Online	New	PJ27083
CACH0020I	Online	New	PJ27083
CACH0022I	Online	New	PJ27083
CACH0023I	Online	New	PJ27083
CACH0024E	Online	New	PJ27083
CACH0025E	Online	New	PJ27083
CACH0026I	Online	New	PJ27083
CACH0027E	Online	New	PJ27083
CACH0032W	Online	New	PJ27083
CACH0034W	Online	New	PJ27083
CBR00006A	Online	New	PJ27273
CDBS0020E	Online	New	PJ27224
CEFR0154E	Online	New	PJ26739 — This is a book only change; there is no code change.
CEFR0364I	Online	New	PJ26739 — This is a book only change; there is no code change.
CILC0119W	Online	New	PJ27422
CILE0115W	Online	New	PJ27422
CILG0111E	Online	New	PJ27422
CILG0112E	Online	New	PJ27422
CILO0113E	Online	New	PJ27422
CILO0114W	Online	New	PJ27422
CILO0117W	Online	New	PJ27422
CILO0118W	Online	New	PJ27422
CILO0120E	Online	New	PJ27422

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CILX0116W	Online	New	PJ27422
CILX0117W	Online	New	PJ27422
CIL60121W	Online	New	PJ27422
CFCA0002E	Online	New	PJ27083
CFCA0003E	Online	New	PJ27083
CFCA0004E	Online	New	PJ27083
CFCA0006E	Online	New	PJ27083
CFCH0001I	Online	New	PJ27083
CFCH0002I	Online	New	PJ27083
CFCH0003E	Online	New	PJ27083
CFCH0005I	Online	New	PJ27083
CFCH0008E	Online	New	PJ27083
CFCH0009E	Online	New	PJ27083
CFCH0010E	Online	New	PJ27083
CFCH0011E	Online	New	PJ27083
CFCH0016I	Online	New	PJ27083
CFCH0017I	Online	New	PJ27083
CFCH0018E	Online	New	PJ27083
CFLK0046E	Online	New	PJ27083
CLM80027I	Online	New	PJ27302
CMVR0001I	Online	New	PJ27333
CMVR0002I	Online	New	PJ27333
CMVR0003W	Online	New	PJ27333
CORC0289I	Online	New	PJ26527
COSA0094E	Online	New	PJ26739 — This is a book only change; there is no code change.
COSB0106A	Online	New	PJ26739 — This is a book only change; there is no code change.
COSB0114W	Online	New	PJ26739 — This is a book only change; there is no code change.
COSB0198E	Online	New	PJ26739 — This is a book only change; there is no code change.
COSE0296E	Online	New	PJ26739 — This is a book only change; there is no code change.
COSI0045E	Online	New	PJ26739 — This is a book only change; there is no code change.
COSI0303E	Online	New	PJ26739 — This is a book only change; there is no code change.
COSK0039E	Online	New	PJ26739 — This is a book only change; there is no code change.

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
COSK0154E	Online	New	PJ26739 — This is a book only change; there is no code change.
COSK0213I	Online	New	PJ26739 — This is a book only change; there is no code change.
COSK0310I	Online	New	PJ26739 — This is a book only change; there is no code change.
COSK0376E	Online	New	PJ26739 — This is a book only change; there is no code change.
COSK0377W	Online	New	PJ26739 — This is a book only change; there is no code change.
COS30012E	Online	New	PJ26739 — This is a book only change; there is no code change.
COTI0013E	Online	New	PJ26739 — This is a book only change; there is no code change.
COTI0292W	Online	New	PJ26739 — This is a book only change; there is no code change.
COTK0012E	Online	New	PJ26739 — This is a book only change; there is no code change.
COTK0373E	Online	New	PJ26739 — This is a book only change; there is no code change.
COTR0013E	Online	New	PJ26739 — This is a book only change; there is no code change.
COTR0087A	Online	Changed	PJ26739 — This is a book only change; there is no code change.
COTR0172E	Online	New	PJ26739 — This is a book only change; there is no code change.
COTS0087A	Online	Changed	PJ26739 — This is a book only change; there is no code change.
COT70017E	Online	Changed	PJ26739 — This is a book only change; there is no code change.
COT70018E	Online	Changed	PJ26739 — This is a book only change; there is no code change.
DNSC0001E	Online	New	PJ27268
DNSC0002I	Online	New	PJ27268
DNSC0003E	Online	New	PJ27268
DNSC0004I	Online	New	PJ27268
DNSC0005E	Online	New	PJ27268
DNSC0006E	Online	New	PJ27268

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
DNSC0007E	Online	New	PJ27268
DNSC0008E	Online	New	PJ27268
DNSC0009E	Online	New	PJ27268
DNSC0010E	Online	New	PJ27268
DNSC0011I	Online	New	PJ27268
DNSS0001E	Online	New	PJ27268
DNSS0002E	Online	New	PJ27268
DNSS0003E	Online	New	PJ27268
DNSS0004I	Online	New	PJ27268
DNSS0005E	Online	New	PJ27268
DNSS0006E	Online	New	PJ27268
DNSS0007E	Online	New	PJ27268
DNSS0008E	Online	New	PJ27268
DNSS0009E	Online	New	PJ27268
DNSS0010E	Online	New	PJ27268
DNSS0011E	Online	New	PJ27268
DNSS0012E	Online	New	PJ27268
DNSS0013I	Online	New	PJ27268
DNSS0015E	Online	New	PJ27268
DNSS0016E	Online	New	PJ27268
FCAP0126I	Online	New	PJ27197
FCAP0163I	Online	New	PJ27197
FCTB0101E	Offline	Changed	PJ27387
FCTB0109E	Offline	New	PJ27307 – This is a book only change; there is no code change.
FCTB0110E	Offline	New	PJ27307 – This is a book only change; there is no code change.
FCTB0111E	Offline	New	PJ27307 – This is a book only change; there is no code change.
FCTB0112E	Offline	New	PJ27307 – This is a book only change; there is no code change.
FCTB0113W	Offline	New	PJ27307 – This is a book only change; there is no code change.
FCTB0114I	Offline	New	PJ27307 – This is a book only change; there is no code change.
FECB0007I	Online	No Longer Supported	PJ27393
FECB0008I	Online	New	PJ27393
FRST0126I	Online	Changed	PJ27197 – This is a book only change; there is no code change.
IMAG0084E	Online	New	PJ27422
INET0024I	Online	No Longer Supported	PJ27255

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
INET0025I	Online	No Longer Supported	PJ27255
INET0031I	Online	New	PJ27255
INET0032I	Online	New	PJ27255
MCFT0005T	Online	Changed	PJ27299
MCFT0027E	Online	Changed	PJ27299
MCFT0034T	Online	Changed	PJ27299
MCFT0041T	Online	Changed	PJ27299
MCFT0046I	Online	No Longer Supported	PJ27083
MCFT0047I	Online	New	PJ27083
MCFT0048I	Online	New	PJ27299
MCFT0049E	Online	New	PJ27299
MCFT0050E	Online	New	PJ27299
MCFT0051E	Online	New	PJ27299
MCFT0052E	Online	New	PJ27299
MCPY0259T	Online	No Longer Supported	PJ27347
MCPY0262T	Online	No Longer Supported	PJ27347
MEAS0030I	Online	New	PJ25743
MQID0095E	Online	No Longer Supported	PJ27230
MQID0098E	Online	No Longer Supported	PJ27230
MQID0106E	Online	New	PJ27230
MQID0107E	Online	New	PJ27230
MQID0108E	Online	New	PJ27230
MQID0109E	Online	New	PJ27230
MQID0110E	Online	New	PJ27230
MQSC0141E	Online	No Longer Supported	PJ27351, PJ27431
MQSC0179E	Online	New	PJ27351, PJ27431
MQSC0217E	Online	New	PJ27351, PJ27431
MQSC0218E	Online	New	PJ27351, PJ27431
MQSC0220I	Online	New	PJ27351, PJ27431
MQSC0221E	Online	New	PJ27351, PJ27431
MQSC0222E	Online	New	PJ27351, PJ27431
MQSC0223E	Online	New	PJ27351, PJ27431
MQSC0224E	Online	New	PJ27351, PJ27431
NOPL0048E	Online	No Longer Supported	PJ27387
NOPL0049E	Online	No Longer Supported	PJ27387
NOPL0148E	Online	New	PJ27387
NOPL0149E	Online	New	PJ27387
OLDR0091T	Offline	New	PJ27422
OLDR0092W	Offline	New	PJ27422
OLDR0093W	Offline	New	PJ27422
OLDR0094W	Offline	New	PJ27422
OLDR0095W	Offline	New	PJ27422
OLDR3227W	Online	New	PJ27422
OLDR3228W	Online	New	PJ27422

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
OLDR3229W	Online	New	PJ27422
OSAE0001I	Online	New	PJ27333
OSAE0002I	Online	New	PJ27333
OSAE0003I	Online	New	PJ27333
OSAE0004I	Online	New	PJ27333
OSAE0005I	Online	New	PJ27333
OSAE0006I	Online	New	PJ27333
OSAE0007I	Online	New	PJ27333
OSAE0012I	Online	New	PJ27333
OSAE0020E	Online	New	PJ27333
OSAE0021E	Online	New	PJ27333
OSAE0022E	Online	New	PJ27333
OSAE0024E	Online	New	PJ27333
OSAE0025E	Online	New	PJ27333
OSAE0026E	Online	New	PJ27333
OSAE0028E	Online	New	PJ27333
OSAE0029E	Online	New	PJ27333
OSAE0031E	Online	New	PJ27333
OSAE0032E	Online	New	PJ27333
OSAE0033E	Online	New	PJ27333
OSAE0034E	Online	New	PJ27333
OSAE0035E	Online	New	PJ27333
OSAE0036E	Online	New	PJ27333
OSAE0037E	Online	New	PJ27333
OSAE0038E	Online	New	PJ27333
OSAE0039E	Online	New	PJ27333
OSAE0040E	Online	New	PJ27333
OSAE0041E	Online	New	PJ27333
OSAE0042E	Online	New	PJ27333
OSAE0043E	Online	New	PJ27333
OSAE0044E	Online	New	PJ27333
OSAE0045E	Online	New	PJ27333
OSAE0046E	Online	New	PJ27333
OSAE0047E	Online	New	PJ27333
OSAE0048E	Online	New	PJ27333
OSAE0049E	Online	New	PJ27333
OSAE0050E	Online	New	PJ27333
OSAE0051E	Online	New	PJ27333
OSAE0052E	Online	New	PJ27333
OSAE0053E	Online	New	PJ27333
OSAE0054E	Online	New	PJ27333
OSAE0055E	Online	New	PJ27333
OSAE0056E	Online	New	PJ27333
OSAE0057E	Online	New	PJ27333

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
OSAE0058E	Online	New	PJ27333
OSAE0060E	Online	New	PJ27333
OSAE0061E	Online	New	PJ27333
OSAE0062E	Online	New	PJ27333
OSAE0063E	Online	New	PJ27333
OSAE0064E	Online	New	PJ27333
OSAE0065E	Online	New	PJ27333
OSAE0066E	Online	New	PJ27333
OSAE0067E	Online	New	PJ27333
OSAE0068E	Online	New	PJ27333
OSAE0069E	Online	New	PJ27333
OSAE0070E	Online	New	PJ27333
OSAE0071E	Online	New	PJ27333
OSAE0073E	Online	New	PJ27333
OSAE0074E	Online	New	PJ27333
OSAE0075E	Online	New	PJ27333
OSAE0076E	Online	New	PJ27333
OSAE0077E	Online	New	PJ27333
OSAE0100E	Online	New	PJ27333
OSAE0101E	Online	New	PJ27333
OSAE0102E	Online	New	PJ27333
OSAE0103E	Online	New	PJ27333
OSAE0104E	Online	New	PJ27333
OSA00001I	Online	New	PJ27333
OSA00002I	Online	New	PJ27333
OSA00024E	Online	New	PJ27333
OSA00025E	Online	New	PJ27333
OSA00026A	Online	New	PJ27333
OSA00027I	Online	New	PJ27333
OSA00072E	Online	New	PJ27333
RHLD0012E	Online	No Longer Supported	PJ27302
RHLD0027I	Online	New	PJ27302
RHLD0038I	Online	New	PJ27302
RTLP0003E	Offline	No Longer Supported	PJ27387
RTLP0005E	Offline	No Longer Supported	PJ27387
RTLP0033E	Offline	New	PJ27387
RTLP0055E	Offline	New	PJ27387
SYSD0000E	Online	New	PJ27214
SYSD0001E	Online	New	PJ27214
SYSD0002E	Online	New	PJ27214
SYSD0003E	Online	New	PJ27214
SYSD0004E	Online	New	PJ27214
SYSD0005E	Online	New	PJ27214
SYSD0006I	Online	New	PJ27214

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
SYSD0007I	Online	New	PJ27214
TLDR0402T	Offline	New	PJ27422
TPFL1001I	Offline	New	PJ27422
TTCP0023I	Online	Changed	PJ27333
TTCP0030I	Online	Changed	PJ27333
TTCP0032I	Online	Changed	PJ27333
TTCP0040I	Online	Changed	PJ27333
TTCP0042I	Online	Changed	PJ27333
TTCP0060I	Online	New	PJ27333
TTCP0061I	Online	New	PJ27333
TTCP0062I	Online	New	PJ27333
TTCP0065I	Online	New	PJ27333
TTCP0066I	Online	New	PJ27333
TTCP0151E	Online	New	PJ27333
TTCP0152E	Online	New	PJ27333
TTCP0153E	Online	New	PJ27333
TTCP0154E	Online	New	PJ27333
TTCP0155E	Online	New	PJ27333
TTCP0156E	Online	New	PJ27333
TTCP0157E	Online	New	PJ27333
TTCP0158E	Online	New	PJ27333
TTCP0162E	Online	New	PJ27333
TTCP0163E	Online	New	PJ27333
TTCP0185I	Online	New	PJ27333
TTCP0186I	Online	New	PJ27333
TTCP0187I	Online	New	PJ27333
TTCP0188I	Online	New	PJ27333
TTCP0301E	Online	New	PJ27333
TTCP0302E	Online	New	PJ27333
TTCP0303E	Online	New	PJ27333
TTCP0304E	Online	New	PJ27333
TTCP0305E	Online	New	PJ27333
TTCP0306E	Online	New	PJ27333
TTCP0307E	Online	New	PJ27333
TTCP0308E	Online	New	PJ27333
TTCP0309E	Online	New	PJ27333
TTCP0310E	Online	New	PJ27333
TTCP0312E	Online	New	PJ27333
TTCP0313E	Online	New	PJ27333
TTCP0314E	Online	New	PJ27333
TTCP0315E	Online	New	PJ27333
TTCP0316E	Online	New	PJ27333
VIPA0001I	Online	New	PJ27333
VIPA0002I	Online	New	PJ27333

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
VIPA0003I	Online	New	PJ27333
VIPA0004I	Online	New	PJ27333
VIPA0005I	Online	New	PJ27333
VIPA0006I	Online	New	PJ27333
VIPA0050E	Online	New	PJ27333
VIPA0051E	Online	New	PJ27333
VIPA0052E	Online	New	PJ27333
VIPA0053E	Online	New	PJ27333
VIPA0054E	Online	New	PJ27333
VIPA0055E	Online	New	PJ27333
VIPA0057E	Online	New	PJ27333
VIPA0058E	Online	New	PJ27333
VIPA0059E	Online	New	PJ27333
VIPA0061E	Online	New	PJ27333
VIPA0062E	Online	New	PJ27333
VIPA0063E	Online	New	PJ27333
VIPA0064E	Online	New	PJ27333
VIPA0065E	Online	New	PJ27333
VIPA0066E	Online	New	PJ27333
VIPA0067E	Online	New	PJ27333
PUT 12			
0000DB	System Error	New	PJ26580
0007E7	System Error	New	PJ27079
0007E8	System Error	New	PJ27079
007830	System Error	New	PJ26890
007831	System Error	New	PJ26890
007832	System Error	New	PJ26890
007833	System Error	New	PJ26890
009307	System Error	New	PJ27023
009308	System Error	New	PJ27023
009309	System Error	New	PJ27023
009310	System Error	New	PJ27023
009311	System Error	New	PJ27023
009312	System Error	New	PJ27023
009313	System Error	New	PJ27023
009314	System Error	New	PJ27023
009315	System Error	New	PJ27023
009316	System Error	New	PJ27023
009317	System Error	New	PJ27023
009318	System Error	New	PJ27023
009319	System Error	New	PJ27023
009320	System Error	New	PJ27050
094202	System Error	New	PJ26967
094203	System Error	New	PJ26967

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
094204	System Error	New	PJ26967
BROW0423I	Online	No Longer Supported	PJ26887
BROW0424I	Online	No Longer Supported	PJ26887
BROW0471E	Online	No Longer Supported	PJ26887
BROW0472E	Online	No Longer Supported	PJ26887
BROW1001I	Online	New	PJ26887
BROW1011I	Online	New	PJ26887
BROW1012I	Online	New	PJ26887
BROW1013I	Online	New	PJ26887
BROW1014I	Online	New	PJ26887
BROW1015I	Online	New	PJ26887
BROW1016I	Online	New	PJ26887
BROW1017I	Online	New	PJ26887
BROW1018I	Online	New	PJ26887
BROW1051E	Online	New	PJ26887
BROW1053E	Online	New	PJ26887
BROW1054E	Online	New	PJ26887
BROW1055E	Online	New	PJ26887
BROW1056E	Online	New	PJ26887
BROW1057E	Online	New	PJ26887
BROW1058W	Online	New	PJ26887
BROW1059E	Online	New	PJ26887
BROW1061E	Online	New	PJ26887
BROW1062E	Online	New	PJ26887
BROW1063E	Online	New	PJ26887
BROW1064E	Online	New	PJ26887
BROW1065E	Online	New	PJ26887
BROW1066E	Online	New	PJ26887
BROW1067E	Online	New	PJ26887
BROW1070E	Online	New	PJ26887
BROW1072E	Online	New	PJ26887
BROW1073E	Online	New	PJ26887
BROW1074E	Online	New	PJ26887
BROW1075E	Online	New	PJ26887
CCEB0001E	Online	New	PJ26914
CDCO0002I	Online	New	PJ27095
CDCO0003I	Online	New	PJ27095
CDCO0004W	Online	New	PJ27095
CDCO0005W	Online	New	PJ27095
CDCO0006I	Online	New	PJ27095
CDCO0007I	Online	New	PJ27095
CDCO0008E	Online	New	PJ27095
CDCO0009E	Online	New	PJ27095
CDCO0010E	Online	New	PJ27095

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CDCO0011W	Online	New	PJ27095
CDCO0012I	Online	New	PJ27095
CDCO0013W	Online	New	PJ27095
CDCO0014E	Online	New	PJ27095
CDCO0015E	Online	New	PJ27095
CDCO0016I	Online	New	PJ27095
CDCO0017E	Online	New	PJ27095
CDCO0018E	Online	New	PJ27095
CDCO0019I	Online	New	PJ27095
CDCO0020I	Online	New	PJ27095
CDCO0021E	Online	New	PJ27095
CDCO0022W	Online	New	PJ27095
CDCO0023W	Online	New	PJ27095
CDCO0024E	Online	New	PJ27095
CDCO0025E	Online	New	PJ27095
CDCO0026E	Online	New	PJ27095
CDCO0028W	Online	New	PJ27095
CDCO0029E	Online	New	PJ27095
CDCO0030I	Online	New	PJ27095
CDCO0031E	Online	New	PJ27095
CPA00001I	Online	New	PJ26729
CPA00002E	Online	New	PJ26729
CPA00003E	Online	New	PJ26729
CPA00004I	Online	New	PJ26729
CRD90021I	Online	Changed	PJ27079
CRZ10008E	Online	New	PJ26941
CRZ10009E	Online	New	PJ26941
CTSX0001I	Online	New	PJ26890
CTSX0002I	Online	New	PJ26890
CTSX0003W	Online	New	PJ26890
CTSX0004E	Online	New	PJ26890
CTSX0007I	Online	New	PJ26890
CTSX0008W	Online	New	PJ26890
CTSX0009E	Online	New	PJ26890
DECB0011I	Online	New	PJ26810
DTCP0057E	Online	New	PJ26904
DTCP0060E	Online	New	PJ26904
DTCP0061E	Online	New	PJ26904
FKPA0013I	Online	New	PJ26780
FTPD0001I	Online	New	PJ27028
INET0028E	Online	New	PJ26848
INET0029I	Online	New	PJ26848
INET0030I	Online	New	PJ26848
INET0120E	Online	New	PJ26434

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MCFT0003I	Online	No Longer Supported	PJ26919
MCFT0041T	Online	New	PJ26841
MCFT0042T	Online	New	PJ26841
MCFT0043I	Online	New	PJ26841
MCFT0046I	Online	New	PJ26919
MQSC0008I	Online	No Longer Supported	PJ27023
MQSC0015I	Online	No Longer Supported	PJ27023
MQSC0016I	Online	No Longer Supported	PJ27023
MQSC0017I	Online	No Longer Supported	PJ27023
MQSC0023W	Online	No Longer Supported	PJ27023
MQSC0024W	Online	No Longer Supported	PJ27023
MQSC0025E	Online	No Longer Supported	PJ27023
MQSC0034E	Online	No Longer Supported	PJ27023
MQSC0040E	Online	No Longer Supported	PJ27023
MQSC0041E	Online	No Longer Supported	PJ27023
MQSC0044I	Online	No Longer Supported	PJ27023
MQSC0050E	Online	New	PJ27023
MQSC0051E	Online	No Longer Supported	PJ27023
MQSC0052I	Online	No Longer Supported	PJ27023
MQSC0053E	Online	No Longer Supported	PJ27023
MQSC0054E	Online	No Longer Supported	PJ27023
MQSC0055I	Online	No Longer Supported	PJ27023
MQSC0056I	Online	No Longer Supported	PJ27023
MQSC0057I	Online	New	PJ27023
MQSC0058E	Online	New	PJ27023
MQSC0059W	Online	No Longer Supported	PJ27023
MQSC0060E	Online	New	PJ27023
MQSC0062E	Online	No Longer Supported	PJ27023
MQSC0063E	Online	No Longer Supported	PJ27023
MQSC0064E	Online	New	PJ27023
MQSC0065W	Online	New	PJ27023
MQSC0067E	Online	New	PJ27023
MQSC0069I	Online	New	PJ27023
MQSC0070E	Online	New	PJ27023
MQSC0071E	Online	No Longer Supported	PJ27023
MQSC0072E	Online	No Longer Supported	PJ27023
MQSC0074E	Online	No Longer Supported	PJ27023
MQSC0077E	Online	No Longer Supported	PJ27023
MQSC0078E	Online	Changed	PJ27023
MQSC0079E	Online	Changed	PJ27023
MQSC0082E	Online	No Longer Supported	PJ27023
MQSC0084E	Online	No Longer Supported	PJ27023
MQSC0086E	Online	New	PJ27023
MQSC0088I	Online	New	PJ27023

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MQSC0089E	Online	No Longer Supported	PJ27023
MQSC0091E	Online	No Longer Supported	PJ27023
MQSC0092E	Online	New	PJ27023
MQSC0093E	Online	New	PJ27023
MQSC0094E	Online	New	PJ27023
MQSC0095E	Online	New	PJ27023
MQSC0096E	Online	New	PJ27023
MQSC0097E	Online	New	PJ27023
MQSC0098E	Online	New	PJ27023
MQSC0099E	Online	New	PJ27023
MQSC0100E	Online	New	PJ27023
MQSC0119E	Online	New	PJ27023
MQSC0135E	Online	New	PJ27023
MQSC0137E	Online	New	PJ27023
MQSC0141E	Online	New	PJ27023
MQSC0142E	Online	New	PJ27023
MQSC0143I	Online	New	PJ27023
MQSC0145I	Online	New	PJ27023
MQSC0146I	Online	New	PJ27023
MQSC0147E	Online	New	PJ27023
MQSC0148I	Online	New	PJ27023
MQSC0149I	Online	New	PJ27023
MQSC0154E	Online	No Longer Supported	PJ27023
MQSC0155E	Online	No Longer Supported	PJ27023
MQSC0157E	Online	Changed	PJ27023
MQSC0165E	Online	No Longer Supported	PJ27023
MQSC0167E	Online	New	PJ27023
MQSC0168E	Online	New	PJ27023
MQSC0169E	Online	New	PJ27023
MQSC0170E	Online	New	PJ27023
MQSC0171E	Online	New	PJ27023
MQSC0172E	Online	New	PJ27023
MQSC0173I	Online	New	PJ27023
MQSC0174E	Online	New	PJ27023
MQSC0175E	Online	New	PJ27023
MQSC0176E	Online	New	PJ27023
MQSC0178E	Online	New	PJ27023
MQSC0179E	Online	No Longer Supported	PJ27023
MQSC0210E	Online	New	PJ27023
MQSC0211E	Online	New	PJ27023
MQSC0212E	Online	New	PJ27023
MQSC0213E	Online	New	PJ27023
MQSC0302E	Online	No Longer Supported	PJ27023
MQSC0303E	Online	No Longer Supported	PJ27023

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MQSC0341E	Online	New	PJ27023
MQSC0342E	Online	New	PJ27023
MQSC0343E	Online	New	PJ27023
MQSC0344E	Online	New	PJ27023
MQSC0345W	Online	New	PJ27023
MQSC0346E	Online	New	PJ27023
MQSC0347E	Online	New	PJ27023
MQSC0348E	Online	New	PJ27023
MQSC0501E	Online	No Longer Supported	PJ27023
MQSC0502E	Online	No Longer Supported	PJ27023
MQSC0504E	Online	No Longer Supported	PJ27023
MQSC0507E	Online	No Longer Supported	PJ27023
MQSC0511W	Online	No Longer Supported	PJ27023
MQSC0512W	Online	New	PJ27023
MQSC0600E	Online	New	PJ27023
MQSC0601E	Online	New	PJ27023
MQSC0602E	Online	New	PJ27023
MQSC0603E	Online	New	PJ27023
MQSC0604E	Online	New	PJ27023
MQSC0605E	Online	New	PJ27023
MQSC0606E	Online	New	PJ27023
MQSC0607I	Online	New	PJ27023
MQSC0608I	Online	New	PJ27023
MQSC0609I	Online	New	PJ27023
MQSC0610I	Online	New	PJ27023
MQSC0611I	Online	New	PJ27023
MQSC0612I	Online	New	PJ27023
MQSC0613E	Online	New	PJ27023
MQSC0614E	Online	New	PJ27023
MQSC0615E	Online	New	PJ27023
MQSC0616E	Online	New	PJ27023
MQSC0617E	Online	New	PJ27023
MQSC0618E	Online	New	PJ27023
MQSC0619E	Online	New	PJ27023
MQSC0701I	Online	New	PJ27023
MQSC0702W	Online	New	PJ27023
MQSC0703W	Online	New	PJ27023
MQSC0706I	Online	New	PJ27023
MQSC0707E	Online	New	PJ27023
MQSC0801I	Online	New	PJ27023
MQSC0802I	Online	New	PJ27023
NKEY0021E	Online	No Longer Supported	PJ27079
NKEY0022E	Online	No Longer Supported	PJ27079
NKEY0121E	Online	New	PJ27079

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
NKEY0122E	Online	New	PJ27079
SOCK0010I	Online	New	PJ26904
SOCK0011I	Online	New	PJ26904
SOCK0012E	Online	New	PJ26904
SOCK0013E	Online	New	PJ26904
SOCK0014E	Online	New	PJ26904
SOCK0015E	Online	New	PJ26904
SOCK0016I	Online	New	PJ26904
SOCK0017E	Online	New	PJ26904
SOCK0018I	Online	New	PJ26904
SOCK0019I	Online	New	PJ26904
SOCK0020E	Online	New	PJ26904
SOCK0021I	Online	New	PJ26904
SOCK0022I	Online	New	PJ26904
SOCK0023E	Online	New	PJ26904
SQLD0017I	Online	No Longer Supported	PJ27079
SQLD0018I	Online	No Longer Supported	PJ27079
SQLD0051W	Online	No Longer Supported	PJ27079
SQLD0052W	Online	No Longer Supported	PJ27079
SQLD0117I	Online	New	PJ27079
SQLD0118I	Online	New	PJ27079
SQLD0151W	Online	New	PJ27079
SQLD0152W	Online	New	PJ27079
TRTE0001I	Online	New	PJ26890
TRTE0002I	Online	New	PJ26890
TRTE0003I	Online	New	PJ26890
TRTE0004I	Online	New	PJ26890
TRTE0005I	Online	New	PJ26890
TRTE0050E	Online	New	PJ26890
TRTE0051E	Online	New	PJ26890
TRTE0053E	Online	New	PJ26890
TRTE0054E	Online	New	PJ26890
TRTE0055E	Online	New	PJ26890
TRTE0056E	Online	New	PJ26890
TRTE0057E	Online	New	PJ26890
TRTE0058E	Online	New	PJ26890
TRTE0059E	Online	New	PJ26890
TRTE0060E	Online	New	PJ26890
TRTE0061E	Online	New	PJ26890
TRTE0062E	Online	New	PJ26890
TRTE0063E	Online	New	PJ26890
TRTE0064E	Online	New	PJ26890
TRTE0065E	Online	New	PJ26890
TRTE0066E	Online	New	PJ26890

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
TRTE0067E	Online	New	PJ26890
TRTE0068E	Online	New	PJ26890
TRTE0069E	Online	New	PJ26890
TRTE0070E	Online	New	PJ26890
TRTE0150E	Online	New	PJ26890
STRC0005I	Online	No Longer Supported	PJ26880
STRC0007I	Online	New	PJ26880
STRC0008I	Online	New	PJ26880
PUT 11			
000038	System Error	Changed	PJ26707
0000DA	System Error	New	PJ26707
0000F4	System Error	Changed	PJ26686
0000F7	System Error	New	PJ26686
0001F4	System Error	New	PJ26686
0001F5	System Error	New	PJ26686
0006AE	System Error	No Longer Supported	PJ26707
004600	System Error	New	PJ26707
004601	System Error	New	PJ26707
004602	System Error	New	PJ26707
004603	System Error	New	PJ26707
004604	System Error	New	PJ26707
004605	System Error	New	PJ26707
004606	System Error	New	PJ26707
004607	System Error	New	PJ26707
004608	System Error	New	PJ26707
004609	System Error	New	PJ26707
00460A	System Error	New	PJ26707
00460B	System Error	New	PJ26707
00460C	System Error	New	PJ26707
004610	System Error	New	PJ26707
004611	System Error	New	PJ26707
004612	System Error	New	PJ26707
004613	System Error	New	PJ26707
004614	System Error	New	PJ26707
004615	System Error	New	PJ26707
004616	System Error	New	PJ26707
004617	System Error	New	PJ26707
00461E	System Error	New	PJ26707
00461F	System Error	New	PJ26707
004620	System Error	New	PJ26707
004621	System Error	New	PJ26707
004622	System Error	New	PJ26707
004623	System Error	New	PJ26707
004624	System Error	New	PJ26707

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
004626	System Error	New	PJ26707
004627	System Error	New	PJ26707
004628	System Error	New	PJ26707
004629	System Error	New	PJ26707
00462A	System Error	New	PJ26707
00462B	System Error	New	PJ26707
00462C	System Error	New	PJ26707
00462D	System Error	New	PJ26707
00462E	System Error	New	PJ26707
00462F	System Error	New	PJ26707
004630	System Error	New	PJ26707
004632	System Error	New	PJ26707
004633	System Error	New	PJ26707
004634	System Error	New	PJ26707
004635	System Error	New	PJ26707
004637	System Error	New	PJ26707
004638	System Error	New	PJ26707
004640	System Error	New	PJ26707
004641	System Error	New	PJ26707
004642	System Error	New	PJ26707
004643	System Error	New	PJ26707
004644	System Error	New	PJ26707
004645	System Error	New	PJ26707
004646	System Error	New	PJ26707
004647	System Error	New	PJ26707
004648	System Error	New	PJ26707
004649	System Error	New	PJ26707
00464A	System Error	New	PJ26707
00464B	System Error	New	PJ26707
00464C	System Error	New	PJ26707
00464D	System Error	New	PJ26707
00464E	System Error	New	PJ26707
00464F	System Error	New	PJ26707
004650	System Error	New	PJ26707
00500A	System Error	Changed	PJ26707
007545	System Error	New	PJ26713
007546	System Error	New	PJ26713
007547	System Error	New	PJ26713
007548	System Error	New	PJ26713
007549	System Error	New	PJ26713
007801	System Error	New	PJ26683
007802	System Error	New	PJ26683
007804	System Error	New	PJ26683
007805	System Error	New	PJ26683

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
007806	System Error	New	PJ26683
007807	System Error	New	PJ26683
008508	System Error	New	PJ26575
008509	System Error	New	PJ26575
00850B	System Error	New	PJ26575
00850C	System Error	New	PJ26575
00850D	System Error	New	PJ26575
00850E	System Error	New	PJ26575
00850F	System Error	New	PJ26575
008510	System Error	New	PJ26575
008531	System Error	New	PJ26575
008532	System Error	New	PJ26575
008533	System Error	New	PJ26575
008541	System Error	New	PJ26149
AMOD0018I	Online	No Longer Supported	PJ26686
AMOD0028I	Online	No Longer Supported	PJ26686
AMOD0032I	Online	No Longer Supported	PJ26686
AMOD0033I	Online	No Longer Supported	PJ26686
AMOD0044T	Online	No Longer Supported	PJ26686
AMOD0045I	Online	No Longer Supported	PJ26686
AMOD0046I	Online	No Longer Supported	PJ26686
AMOD0047I	Online	No Longer Supported	PJ26686
AMOD0051T	Online	No Longer Supported	PJ26686
AMOD0054T	Online	No Longer Supported	PJ26686
AMOD0055T	Online	No Longer Supported	PJ26686
AMOD0056T	Online	No Longer Supported	PJ26686
AMOD0059T	Online	No Longer Supported	PJ26686
AMOD0060T	Online	No Longer Supported	PJ26686
AMOD0061T	Online	No Longer Supported	PJ26686
AMOD0062T	Online	No Longer Supported	PJ26686
AMOD0064T	Online	No Longer Supported	PJ26686
AMOD0065T	Online	No Longer Supported	PJ26686
AMOD0066T	Online	No Longer Supported	PJ26686
AMOD0067T	Online	No Longer Supported	PJ26686
AMOD0069T	Online	No Longer Supported	PJ26686
AMOD0072T	Online	No Longer Supported	PJ26686
AMOD0073T	Online	No Longer Supported	PJ26686
AMOD0074T	Online	No Longer Supported	PJ26686
AMOD0076T	Online	No Longer Supported	PJ26686
AMOD0079T	Online	No Longer Supported	PJ26686
AMOD0080T	Online	No Longer Supported	PJ26686
AMOD0081T	Online	No Longer Supported	PJ26686
AMOD0082T	Online	No Longer Supported	PJ26686
AMOD0084T	Online	No Longer Supported	PJ26686

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
AMOD0085T	Online	No Longer Supported	PJ26686
AMOD0086T	Online	No Longer Supported	PJ26686
AMOD0088T	Online	No Longer Supported	PJ26686
AMOD0089T	Online	No Longer Supported	PJ26686
AMOD0090T	Online	No Longer Supported	PJ26686
AMOD0091T	Online	No Longer Supported	PJ26686
AMOD0092T	Online	No Longer Supported	PJ26686
AMOD0093I	Online	No Longer Supported	PJ26686
AMOD0094T	Online	No Longer Supported	PJ26686
AMOD0095T	Online	No Longer Supported	PJ26686
AMOD0097T	Online	No Longer Supported	PJ26686
AMOD0098T	Online	No Longer Supported	PJ26686
AMOD0099T	Online	No Longer Supported	PJ26686
AMOD0194T	Online	No Longer Supported	PJ26686
CDBG0001W	Online	New	PJ26352
CDBG0002E	Online	New	PJ26352
CDBS0008E	Online	New	PJ26666
CDBS0011I	Online	New	PJ26666
CDBS0012I	Online	New	PJ26666
CDBS0013I	Online	New	PJ26666
CDBS0014I	Online	New	PJ26666
CDBS0015I	Online	New	PJ26666
CDBS0016I	Online	New	PJ26666
CDBS0017I	Online	New	PJ26666
CDBS0018W	Online	New	PJ26666
CDBS0019I	Online	New	PJ26666
CFCC0020E	Online	Changed	PJ26707
CFCC0021E	Online	Changed	PJ26707
CFCC0022E	Online	Changed	PJ26707
CFCE0006E	Online	New	PJ26707
CFCE0007E	Online	New	PJ26707
CFIN0009E	Online	New	PJ26713
CFIN0010E	Online	New	PJ26713
CFLK0001I	Online	New	PJ26707
CFLK0002I	Online	New	PJ26707
CFLK0003I	Online	New	PJ26707
CFLK0004I	Online	New	PJ26707
CFLK0005E	Online	New	PJ26707
CFLK0006E	Online	New	PJ26707
CFLK0007I	Online	New	PJ26707
CFLK0009I	Online	New	PJ26707
CFLK0011I	Online	New	PJ26707
CFLK0012E	Online	New	PJ26707
CFLK0013E	Online	New	PJ26707

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CFLK0014I	Online	New	PJ26707
CFLK0015I	Online	New	PJ26707
CFLK0016I	Online	New	PJ26707
CFLK0018E	Online	New	PJ26707
CFLK0019E	Online	New	PJ26707
CFLK0020E	Online	New	PJ26707
CFLK0021E	Online	New	PJ26707
CFLK0022E	Online	New	PJ26707
CFLK0023E	Online	New	PJ26707
CFLK0024E	Online	New	PJ26707
CFLK0025E	Online	New	PJ26707
CFLK0026E	Online	New	PJ26707
CFLK0027E	Online	New	PJ26707
CFLK0028I	Online	New	PJ26707
CFLK0029T	Online	New	PJ26707
CFLK0030E	Online	New	PJ26707
CFLK0031E	Online	New	PJ26707
CFLK0032E	Online	New	PJ26707
CFLK0033E	Online	New	PJ26707
CFLK0034E	Online	New	PJ26707
CFLK0035E	Online	New	PJ26707
CFLK0036E	Online	New	PJ26707
CFLK0037E	Online	New	PJ26707
CFLK0038E	Online	New	PJ26707
CFLK0039E	Online	New	PJ26707
CFLK0040E	Online	New	PJ26707
CFLK0041T	Online	New	PJ26707
CFLK0042T	Online	New	PJ26707
CFLK0043E	Online	New	PJ26707
CFLK0045E	Online	New	PJ26707
CFLK0200I	Online	New	PJ26707
CFLK0201E	Online	New	PJ26707
CFLK0202E	Online	New	PJ26707
CFLK0204I	Online	New	PJ26707
CFLK0205E	Online	New	PJ26707
CFLK0206E	Online	New	PJ26707
CFLK0207E	Online	New	PJ26707
CFLK0208E	Online	New	PJ26707
CFLK0209W	Online	New	PJ26707
CFLK0211E	Online	New	PJ26707
CFLK0212E	Online	New	PJ26707
CFL00001W	Online	New	PJ26707
CFL00002W	Online	New	PJ26707
CFL00003W	Online	New	PJ26707

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CFL20001W	Online	New	PJ26707
CLM00001E	Online	No Longer Supported	PJ26707
CLM00002E	Online	New	PJ26707
CLM60001W	Online	New	PJ26707
CLM60002W	Online	New	PJ26707
CLM60003W	Online	New	PJ26707
CLM60004W	Online	New	PJ26707
CLM80001E	Online	New	PJ26707
CLM80002E	Online	New	PJ26707
CLM80004E	Online	New	PJ26707
CLM80005E	Online	New	PJ26707
CLM80006E	Online	New	PJ26707
CLM80007E	Online	New	PJ26707
CLM80008E	Online	New	PJ26707
CLM80009I	Online	New	PJ26707
CL210003E	Online	New	PJ26687
CL210004W	Online	New	PJ26439
CORO0007E	Online	New	PJ26687
COT20383A	Online	New	PJ26577
COT20384I	Online	New	PJ26577
COT20385I	Online	New	PJ26577
COT50007I	Online	New	PJ26577
COT50008I	Online	New	PJ26577
COT90093W	Online	New	PJ26577
COT90386I	Online	New	PJ26577
COT90387I	Online	New	PJ26577
COT90388W	Online	New	PJ26577
COT90389I	Online	New	PJ26577
COT90390I	Online	New	PJ26577
CPAA0013E	Online	New	PJ26707
CPSF0028W	Online	New	PJ26707
CTKA0017I	Online	New	PJ26575
CTKA0018I	Online	New	PJ26575
CTKA0065E	Online	New	PJ26575
CTKA0066E	Online	New	PJ26575
CTKA0067E	Online	New	PJ26575
CTKA0068E	Online	New	PJ26575
CTSR0001I	Online	New	PJ26683
CTSR0002I	Online	New	PJ26683
CT400008I	Online	New	PJ26575
CT400010I	Online	New	PJ26575
CUDZ0001E	Online	New	PJ26666
CUDZ0002E	Online	New	PJ26666
CUDZ0003E	Online	New	PJ26666

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CUDZ0099E	Online	New	PJ26666
DECB0002I	Online	New	PJ26534
DECB0003I	Online	New	PJ26534
DECB0004I	Online	New	PJ26534
DECB0005I	Online	New	PJ26534
DECB0006E	Online	New	PJ26534
DECB0007E	Online	New	PJ26534
DECB0008E	Online	New	PJ26534
DECB0009E	Online	New	PJ26534
DECB0010E	Online	New	PJ26534
DTCP0040E	Online	Changed	This is a book only change; there is no code change.
DTCP0041E	Online	No Longer Supported	PJ26683
DTCP0042E	Online	Changed	This is a book only change; there is no code change.
DTCP0043E	Online	New	PJ26683
DTCP0045E	Online	New	PJ26683
FCTB0120E	Offline	New	PJ26577
FCTB0121E	Offline	New	PJ26577
FINT0003I	Online	New	PJ26713
FINT0004I	Online	No Longer Supported	PJ26713
FINT0014E	Online	New	PJ26713
FINT0015I	Online	New	PJ26713
FINT0016I	Online	New	PJ26713
FINT0017I	Online	New	PJ26713
FINT0018I	Online	New	PJ26713
FINT0019E	Online	New	PJ26713
FINT0020I	Online	New	PJ26713
FKPA0012A	Online	New	PJ26575
INET0075E	Online	New	PJ26683
INET0114E	Online	New	PJ26515
INET0115E	Online	New	PJ26515
INET0116E	Online	New	PJ26515
INET0117E	Online	New	PJ26515
INET0118E	Online	New	PJ26515
IPTR0001I	Online	New	PJ26683
IPTR0002I	Online	New	PJ26683
IPTR0005I	Online	New	PJ26683
IPTR0007E	Online	New	PJ26683
IPTR0008E	Online	New	PJ26683
IPTR0009I	Online	New	PJ26683
IPTR0010E	Online	New	PJ26683
IPTS0000I	Offline	New	PJ26683

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
IPTS0001E	Offline	New	PJ26683
IPTS0002E	Offline	New	PJ26683
IPTS0003E	Offline	New	PJ26683
IPTS0004E	Offline	New	PJ26683
IPTS0005E	Offline	New	PJ26683
IPTS0006E	Offline	New	PJ26683
IPTS0007E	Offline	New	PJ26683
IPTS0008E	Offline	New	PJ26683
IPTS0009E	Offline	New	PJ26683
IPTS0010E	Offline	New	PJ26683
IPTS0011E	Offline	New	PJ26683
MATP0017I	Online	New	PJ26693
MATP0018I	Online	New	PJ26693
MATP0019W	Online	New	PJ26693
MATP0020I	Online	New	PJ26693
MATP0021I	Online	New	PJ26693
MATP0022E	Online	New	PJ26693
MATP0023E	Online	New	PJ26693
MATP0024E	Online	New	PJ26693
MATP0025E	Online	New	PJ26693
MATP0026I	Online	New	PJ26693
MATP0027I	Online	New	PJ26693
MATP0028E	Online	New	PJ26693
MATP0029E	Online	New	PJ26693
MATP0030E	Online	New	PJ26693
MATP0031E	Online	New	PJ26693
MATP0032E	Online	New	PJ26693
MATP0055E	Online	Changed	PJ26693
MCFT0005T	Online	Changed	PJ26707
MCFT0027E	Online	Changed	PJ26707
MCFT0035I	Online	New	PJ26707
MCFT0036E	Online	New	PJ26707
MCFT0038E	Online	New	PJ26707
MCFT0039E	Online	New	PJ26707
MCFT0040E	Online	New	PJ26707
MCPY0018I	Online	No Longer Supported	PJ26686
MCPY0028I	Online	No Longer Supported	PJ26686
MCPY0033I	Online	No Longer Supported	PJ26686
MCPY0038I	Online	No Longer Supported	PJ26686
MCPY0045I	Online	No Longer Supported	PJ26686
MCPY0047I	Online	No Longer Supported	PJ26686
MCPY0048I	Online	No Longer Supported	PJ26686
MCPY0050T	Online	No Longer Supported	PJ26686
MCPY0051T	Online	No Longer Supported	PJ26686

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MCPY0052T	Online	No Longer Supported	PJ26686
MCPY0053T	Online	No Longer Supported	PJ26686
MCPY0054T	Online	No Longer Supported	PJ26686
MCPY0055T	Online	No Longer Supported	PJ26686
MCPY0056T	Online	No Longer Supported	PJ26686
MCPY0058T	Online	No Longer Supported	PJ26686
MCPY0060T	Online	No Longer Supported	PJ26686
MCPY0062T	Online	No Longer Supported	PJ26686
MCPY0063T	Online	No Longer Supported	PJ26686
MCPY0064T	Online	No Longer Supported	PJ26686
MCPY0065T	Online	No Longer Supported	PJ26686
MCPY0066T	Online	No Longer Supported	PJ26686
MCPY0067T	Online	No Longer Supported	PJ26686
MCPY0069T	Online	No Longer Supported	PJ26686
MCPY0070T	Online	No Longer Supported	PJ26686
MCPY0071W	Online	No Longer Supported	PJ26686
MCPY0072E	Online	No Longer Supported	PJ26686
MCPY0072T	Online	No Longer Supported	PJ26686
MCPY0073T	Online	No Longer Supported	PJ26686
MCPY0076T	Online	No Longer Supported	PJ26686
MCPY0077T	Online	No Longer Supported	PJ26686
MCPY0079E	Online	No Longer Supported	PJ26686
MCPY0080E	Online	No Longer Supported	PJ26686
MCPY0081E	Online	No Longer Supported	PJ26686
MCPY0082E	Online	No Longer Supported	PJ26686
MCPY0085W	Online	No Longer Supported	PJ26686
MCPY0086T	Online	No Longer Supported	PJ26686
MCPY0087T	Online	No Longer Supported	PJ26686
MCPY0088T	Online	No Longer Supported	PJ26686
MCPY0089T	Online	No Longer Supported	PJ26686
MCPY0091T	Online	No Longer Supported	PJ26686
MCPY0092T	Online	No Longer Supported	PJ26686
MCPY0093W	Online	No Longer Supported	PJ26686
MCPY0094T	Online	No Longer Supported	PJ26686
MCPY0096I	Online	No Longer Supported	PJ26686
MCPY0097T	Online	No Longer Supported	PJ26686
MCPY0098T	Online	No Longer Supported	PJ26686
MCPY0099T	Online	No Longer Supported	PJ26686
MCPY0101T	Online	No Longer Supported	PJ26686
MCPY0010W	Online	New	PJ26686
MCPY0200T	Online	New	PJ26686
MCPY0201T	Online	New	PJ26686
MCPY0202T	Online	New	PJ26686
MCPY0203T	Online	New	PJ26686

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MCPY0204T	Online	New	PJ26686
MCPY0205T	Online	New	PJ26686
MCPY0206T	Online	New	PJ26686
MCPY0207T	Online	New	PJ26686
MCPY0208T	Online	New	PJ26686
MCPY0209I	Online	New	PJ26686
MCPY0210T	Online	New	PJ26686
MCPY0211T	Online	New	PJ26686
MCPY0212T	Online	New	PJ26686
MCPY0213T	Online	New	PJ26686
MCPY0214T	Online	New	PJ26686
MCPY0215T	Online	New	PJ26686
MCPY0216T	Online	New	PJ26686
MCPY0217T	Online	New	PJ26686
MCPY0218I	Online	New	PJ26686
MCPY0219T	Online	New	PJ26686
MCPY0220T	Online	New	PJ26686
MCPY0221T	Online	New	PJ26686
MCPY0222T	Online	New	PJ26686
MCPY0223T	Online	New	PJ26686
MCPY0224T	Online	New	PJ26686
MCPY0225E	Online	New	PJ26707
MCPY0226T	Online	New	PJ26686
MCPY0227T	Online	New	PJ26686
MCPY0228T	Online	New	PJ26686
MCPY0229E	Online	New	PJ26686
MCPY0230E	Online	New	PJ26686
MCPY0231E	Online	New	PJ26686
MCPY0232E	Online	New	PJ26686
MCPY0233I	Online	New	PJ26686
MCPY0234T	Online	New	PJ26686
MCPY0235W	Online	New	PJ26686
MCPY0236T	Online	New	PJ26686
MCPY0237T	Online	New	PJ26686
MCPY0238I	Online	New	PJ26686
MCPY0239T	Online	New	PJ26686
MCPY0241T	Online	New	PJ26686
MCPY0242T	Online	New	PJ26686
MCPY0243I	Online	New	PJ26686
MCPY0244T	Online	New	PJ26686
MCPY0245I	Online	New	PJ26686
MCPY0246I	Online	New	PJ26686
MCPY0247I	Online	New	PJ26686
MCPY0248I	Online	New	PJ26686

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MCPY0249T	Online	New	PJ26686
MCPY0250T	Online	New	PJ26686
MCPY0251T	Online	New	PJ26686
MCPY0252T	Online	New	PJ26686
MCPY0258T	Online	New	PJ26686
MCPY0259T	Online	New	PJ26686
MCPY0261I	Online	New	PJ26686
MCPY0262T	Online	New	PJ26686
MCPY0264T	Online	New	PJ26686
MCPY0265T	Online	New	PJ26686
MCPY0266T	Online	New	PJ26686
MCPY0267T	Online	New	PJ26686
MCPY0268I	Online	New	PJ26686
MCPY0270T	Online	New	PJ26686
MCPY0271I	Online	New	PJ26686
MCPY0272E	Online	New	PJ26686
MCPY0273E	Online	New	PJ26686
MCPY0274T	Online	New	PJ26686
MCPY0275T	Online	New	PJ26686
MCPY0276I	Online	New	PJ26686
MCPY0277T	Online	New	PJ26686
MCPY0278T	Online	New	PJ26686
MCPY0290I	Online	New	PJ26686
MCPY0291W	Online	New	PJ26686
MCPY0292W	Online	New	PJ26686
MCPY0293E	Online	New	PJ26686
MCPY0294T	Online	New	PJ26686
MCPY0295T	Online	New	PJ26686
MCPY0296T	Online	New	PJ26686
MCPY0297T	Online	New	PJ26686
MCPY0298T	Online	New	PJ26686
MCPY0299I	Online	New	PJ26686
MQSC0205I	Online	New	PJ26498
MQSC0206I	Online	New	PJ26498
MQSC0207E	Online	New	PJ26498
MQSC0208I	Online	New	PJ26498
NDLU0011I	Online	No Longer Supported	PJ26566
NDLU0012I	Online	No Longer Supported	PJ26566
NDLU0031I	Online	New	PJ26566
NDLU0032I	Online	New	PJ26566
NETW0066E	Online	New	PJ26204
NETW0067I	Online	New	PJ26204
PLMT0004I	Online	New	PJ26437
RECP0261E	Online	New	PJ26738

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
RHLD0025E	Online	New	PJ26707
RPCR0001A	Online	New	PJ26575
RPCR0002E	Online	New	PJ26575
RPCR0003I	Online	New	PJ26575
RPCR0004I	Online	New	PJ26575
RPCR0005E	Online	New	PJ26575
STAT0012I	Online	New	PJ26575
TTCP0001I	Online	New	PJ26683
TTCP0002I	Online	New	PJ26683
TTCP0003I	Online	New	PJ26683
TTCP0004I	Online	New	PJ26683
TTCP0005I	Online	New	PJ26683
TTCP0006I	Online	New	PJ26683
TTCP0007I	Online	New	PJ26683
TTCP0010I	Online	New	PJ26683
TTCP0011I	Online	New	PJ26683
TTCP0012I	Online	New	PJ26683
TTCP0013I	Online	New	PJ26683
TTCP0014I	Online	New	PJ26683
TTCP0015I	Online	New	PJ26683
TTCP0016I	Online	New	PJ26683
TTCP0017I	Online	New	PJ26683
TTCP0018I	Online	New	PJ26683
TTCP0019I	Online	New	PJ26683
TTCP0020I	Online	New	PJ26683
TTCP0021I	Online	New	PJ26683
TTCP0022I	Online	New	PJ26683
TTCP0030I	Online	New	PJ26683
TTCP0031I	Online	New	PJ26683
TTCP0032I	Online	New	PJ26683
TTCP0033I	Online	New	PJ26683
TTCP0040I	Online	New	PJ26683
TTCP0041I	Online	New	PJ26683
TTCP0042I	Online	New	PJ26683
TTCP0043I	Online	New	PJ26683
TTCP0045I	Online	New	PJ26683
TTCP0047I	Online	New	PJ26683
TTCP0090W	Online	New	PJ26683
TTCP0091W	Online	New	PJ26683
TTCP0100E	Online	New	PJ26683
TTCP0101E	Online	New	PJ26683
TTCP0102E	Online	New	PJ26683
TTCP0103E	Online	New	PJ26683
TTCP0104E	Online	New	PJ26683

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
TTCP0105E	Online	New	PJ26683
TTCP0106E	Online	New	PJ26683
TTCP0110E	Online	New	PJ26683
TTCP0111E	Online	New	PJ26683
TTCP0112E	Online	New	PJ26683
TTCP0113E	Online	New	PJ26683
TTCP0114E	Online	New	PJ26683
TTCP0115E	Online	New	PJ26683
TTCP0116E	Online	New	PJ26683
TTCP0117E	Online	New	PJ26683
TTCP0118E	Online	New	PJ26683
TTCP0120E	Online	New	PJ26683
TTCP0121E	Online	New	PJ26683
TTCP0122E	Online	New	PJ26683
TTCP0125E	Online	New	PJ26683
TTCP0126E	Online	New	PJ26683
TTCP0127E	Online	New	PJ26683
TTCP0128E	Online	New	PJ26683
TTCP0129E	Online	New	PJ26683
TTCP0130E	Online	New	PJ26683
TTCP0131E	Online	New	PJ26683
TTCP0201E	Online	New	PJ26683
TTCP0202E	Online	New	PJ26683
TTCP0203I	Online	New	PJ26683
TTCP0204E	Online	New	PJ26683
TTCP0205E	Online	New	PJ26683
TTCP0206E	Online	New	PJ26683
TTCP0207E	Online	New	PJ26683
TTCP0208W	Online	New	PJ26683
TTCP0209E	Online	New	PJ26683
TTCP0210E	Online	New	PJ26683
TTCP0211I	Online	New	PJ26683
TTCP0212E	Online	New	PJ26683
TTCP0213E	Online	New	PJ26683
TTCP0214E	Online	New	PJ26683
TTCP0215E	Online	New	PJ26683
TTCP0216E	Online	New	PJ26683
TTCP0217E	Online	New	PJ26683
TTCP0218E	Online	New	PJ26683
TTCP0219E	Online	New	PJ26683
TTCP0220E	Online	New	PJ26683
TTCP0221E	Online	New	PJ26683
TTCP0222E	Online	New	PJ26683
PUT 10			

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
000000000	Online	No Longer Supported	PJ26146
007778	System Error	New	PJ26174
007779	System Error	New	PJ26174
007780	System Error	New	PJ26174
007781	System Error	New	PJ26174
007783	System Error	New	PJ26174
007785	System Error	New	PJ26174
00C200	System Error	New	PJ25880
00C201	System Error	New	PJ25880
00C202	System Error	New	PJ25880
00C203	System Error	New	PJ25880
00C204	System Error	New	PJ25880
00C205	System Error	New	PJ25880
00C206	System Error	New	PJ25880
00C207	System Error	New	PJ25880
02040B	System Error	New	PJ26143
097450	System Error	New	PJ25983
097451	System Error	New	PJ25983
097452	System Error	New	PJ25983
0ADB00	System Error	New	PJ25981
0ADB02	System Error	New	PJ25981
0ADB03	System Error	New	PJ25981
0ADB04	System Error	New	PJ25981
0ADB05	System Error	New	PJ25981
0ADB0A	System Error	New	PJ25981
0ADB0B	System Error	New	PJ25981
0ADB0C	System Error	New	PJ25981
0ADB0F	System Error	New	PJ25981
0ADB10	System Error	New	PJ25981
0ADB11	System Error	New	PJ25981
BROW0098E	Online	New	PJ26143
BROW0475E	Online	New	PJ26143
BROW0703I	Online	New	PJ26143
BROW0710I	Online	New	PJ26143
BROW0753E	Online	New	PJ26143
BROW0754E	Online	New	PJ26143
BROW0801I	Online	New	PJ26143
BROW0802I	Online	New	PJ26143
BROW0803I	Online	New	PJ26143
BROW0804I	Online	New	PJ26143
BROW0810I	Online	New	PJ26143
BROW0850E	Online	New	PJ26143
BROW0851E	Online	New	PJ26143
BROW0852E	Online	New	PJ26143

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
BROW0853E	Online	New	PJxxxxx
BROW0901I	Online	New	PJ26143
BROW0902I	Online	New	PJ26143
BROW0903I	Online	New	PJ26143
BROW0904I	Online	New	PJ26143
BROW0910I	Online	New	PJ26143
BROW0951E	Online	New	PJ26143
BROW0952E	Online	New	PJ26143
C62115	System Error	New	PJ25855
CFIN0008E	Online	New	PJ26174
CJ040005I	Online	New	PJ26143
CLKS0058E	Online	Changed	PJ26146
CLKS0059E	Online	Changed	PJ26146
CLKS0068E	Online	Changed	PJ26146
COSK0199E	Online	New	PJ25829
CPSE0015I	Online	Changed	PJ26146
CPSE0050E	Online	Changed	PJ26146
CPSE0051T	Online	Changed	PJ26146
CPSE0052E	Online	Changed	PJ26146
CPSE0053T	Online	Changed	PJ26146
CPSE0055T	Online	Changed	PJ26146
CRDW0004I	Online	Changed	PJ26146
CSAV0001E	Online	New	PJ25741
CSAV0001I	Online	No Longer Supported	PJ25741
CSMP0097I	Online	Changed	PJ26146
DBRI0087I	Online	Changed	PJ26146
DBR00096E	Online	Changed	PJ26146
DDCA0008I	Online	Changed	PJ26146
ECBL0023I	Online	No Longer Supported	PJ25585
ECBL0024I	Online	New	PJ25585
FCTB0117E	Offline	New	PJ26160
FCTB0118E	Offline	New	PJ26160
FCTB0119E	Offline	New	PJ26160
FECB0006I	Online	Changed	PJ26146
FECB0007I	Online	Changed	PJ26146
FILE0050W	Online	New	PJ26174
GOGO0005E	Online	Changed	PJ26146
IPLB00D2I	Online	Changed	PJ26146
MATP0001I	Online	New	PJ26161
MATP0002I	Online	New	PJ26161
MATP0003E	Online	New	PJ26161
MATP0004E	Online	New	PJ26161
MATP0005E	Online	New	PJ26161
MATP0006I	Online	New	PJ26161

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MATP0007I	Online	New	PJ26161
MATP0008I	Online	New	PJ26161
MATP0009E	Online	New	PJ26161
MATP0010I	Online	New	PJ26161
MATP0011E	Online	New	PJ26161
MATP0012I	Online	New	PJ26161
MATP0013E	Online	New	PJ26161
MATP0014E	Online	New	PJ26161
MATP0015E	Online	New	PJ26161
MATP0016E	Online	New	PJ26161
MATP0055E	Online	New	PJ26161
MATP0064E	Online	New	PJ26161
MQSC0008I	Online	New	PJ26156
MQSC0011I	Online	No Longer Supported	PJ26156
MQSC0012E	Online	New	PJ26156
MQSC0013E	Online	New	PJ26156
MQSC0014I	Online	New	PJ26156
MQSC0021E	Online	No Longer Supported	PJ26156
MQSC0022E	Online	No Longer Supported	PJ26156
MQSC0028I	Online	New	PJ26156
MQSC0029I	Online	New	PJ26156
MQSC0030I	Online	New	PJ26156
MQSC0031I	Online	New	PJ26156
MQSC0032I	Online	New	PJ26156
MQSC0033I	Online	New	PJ26156
MQSC0034E	Online	New	PJ26156
MQSC0035E	Online	New	PJ26156
MQSC0036W	Online	New	PJ26156
MQSC0046W	Online	New	PJ26156
MQSC0047I	Online	New	PJ26156
MQSC0048I	Online	New	PJ26156
MQSC0049I	Online	New	PJ26156
MQSC0051E	Online	New	PJ26156
MQSC0052I	Online	Changed	PJ26156
MQSC0053E	Online	New	PJ26156
MQSC0056I	Online	New	PJ26156
MQSC0073E	Online	New	PJ26156
MQSC0075E	Online	No Longer Supported	PJ26156
MQSC0076E	Online	No Longer Supported	PJ26156
MQSC0078E	Online	Changed	PJ26156
MQSC0079E	Online	Changed	PJ26156
MQSC0085I	Online	New	PJ26156
MQSC0114E	Online	No Longer Supported	PJ26156
MQSC0119E	Online	No Longer Supported	PJ26156

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MQSC0122E	Online	No Longer Supported	PJ26156
MQSC0133E	Online	New	PJ26156
MQSC0134E	Online	New	PJ26156
MQSC0150I	Online	New	PJ26156
MQSC0158I	Online	No Longer Supported	PJ26156
MQSC0160I	Online	No Longer Supported	PJ26156
MQSC0161I	Online	No Longer Supported	PJ26156
MQSC0162E	Online	Changed	PJ26156
MQSC0165E	Online	New	PJ26156
MQSC0166E	Online	New	PJ26156
MQSC0177I	Online	New	PJ26156
MQSC0204I	Online	New	PJ26156
MQSC0333E	Online	New	PJ26156
MQSC0334E	Online	New	PJ26156
MQSC0335I	Online	New	PJ26156
MQSC0336E	Online	New	PJ26156
MQSC0337I	Online	New	PJ26156
MQSC0338E	Online	New	PJ26156
MQSC0339E	Online	New	PJ26156
MQSC0340E	Online	New	PJ26156
MQSC0501E	Online	New	PJ26156
OLDR0508E	Online	New	PJ25877
OLDR1071E	Online	New	PJ25877
OLDR1072E	Online	New	PJ25877
OLDR2054T	Online	New	PJ25877
OLDR2055T	Online	New	PJ25877
OLDR5823E	Online	New	PJ25877
OLDR5824E	Online	New	PJ25877
RECP0000I	Online	Changed	PJ26146
RPGM0015E	Online	Changed	PJ26146
RPGM0017I	Online	Changed	PJ26146
RPGM0033I	Online	Changed	PJ26146
SNAP0001I	Online	Changed	PJ26146
STAT0011I	Online	Changed	PJ26146
PUT 9			
000078	System Error	New	PJ25726
0004A8	System Error	Changed	PJ25760
0004A9	System Error	Changed	PJ25760
0004AA	System Error	Changed	PJ25760
0009D2	System Error	New	PJ25323
005001	System Error	New	PJ25781
005002	System Error	New	PJ25781
005003	System Error	New	PJ25781
005004	System Error	New	PJ25781

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
005005	System Error	New	PJ25781
005006	System Error	New	PJ25781
005007	System Error	New	PJ25781
005008	System Error	New	PJ25781
005009	System Error	New	PJ25781
00500A	System Error	New	PJ25781
007510	System Error	No Longer Supported	PJ25589
007540	System Error	New	PJ25589
007544	System Error	New	PJ25589
007700	System Error	New	PJ25589
007701	System Error	New	PJ25589
007702	System Error	New	PJ25589
007703	System Error	New	PJ25589
007704	System Error	New	PJ25589
007705	System Error	New	PJ25589
007706	System Error	New	PJ25589
007707	System Error	New	PJ25589
007750	System Error	New	PJ25589
007751	System Error	New	PJ25589
007752	System Error	New	PJ25589
007753	System Error	New	PJ25589
007754	System Error	New	PJ25589
007777	System Error	New	PJ25589
009300	System Error	New	PJ25780
009301	System Error	New	PJ25780
009304	System Error	New	PJ25780
009305	System Error	New	PJ25780
020410	System Error	New	PJ25332
041006	System Error	New	PJ25332
097400	System Error	New	PJ25632
097401	System Error	New	PJ25632
C62200	System Error	New	PJ25760
C62201	System Error	New	PJ25760
C62202	System Error	New	PJ25760
C62203	System Error	New	PJ25760
C62204	System Error	New	PJ25760
C62205	System Error	New	PJ25760
C62206	System Error	New	PJ25760
C62207	System Error	New	PJ25760
C62209	System Error	New	PJ25760
C6220A	System Error	New	PJ25760
C6220B	System Error	New	PJ25760
C6220C	System Error	New	PJ25760
BROW0252E	Online	Changed	PJ25405

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
BROW0701I	Online	New	PJ25332
BROW0702I	Online	New	PJ25332
BROW0751E	Online	New	PJ25332
BROW0752E	Online	New	PJ25332
CDBP0001E	Online	New	PJ25632
CDBP0002E	Online	New	PJ25632
CDBP0003E	Online	New	PJ25632
CDBS0001I	Online	New	PJ25632
CDBS0002I	Online	New	PJ25632
CDBS0003I	Online	New	PJ25632
CDBS0004I	Online	New	PJ25632
CDBS0005E	Online	New	PJ25632
CDBS0006E	Online	New	PJ25632
CDBS0009I	Online	New	PJ25632
CFCC0020E	Online	New	PJ25781
CFCC0021E	Online	New	PJ25781
CFCC0024W	Online	New	PJ25781
CFCC0025I	Online	New	PJ25781
CFCC0028E	Online	New	PJ25781
CFCC0029E	Online	New	PJ25781
CFCC0031E	Online	New	PJ25781
CFCC0034E	Online	New	PJ25781
CFCE0001E	Online	New	PJ25781
CFCE0002E	Online	New	PJ25781
CFCE0003E	Online	New	PJ25781
CFCE0004E	Online	New	PJ25781
CFCE0005E	Online	New	PJ25781
CFCR0001I	Online	New	PJ25781
CJ040003I	Online	New	PJ25332
CJ040004I	Online	New	PJ25332
CJ040052E	Online	New	PJ25332
COSK0003E	Online	Changed	PJ25726
COSK0196E	Online	New	PJ25368
CSGH0001I	Online	New	PJ25760
CSGH0002I	Online	New	PJ25760
CSGH0003I	Online	New	PJ25760
CSGJ0001I	Online	New	PJ25760
CSGJ0002I	Online	New	PJ25760
CSGJ0003I	Online	New	PJ25760
CYEN0099E	Online	Changed	PJ25445
DCFT0001I	Online	New	PJ25781
DCFT0002I	Online	New	PJ25781
DCFT0003E	Online	New	PJ25781
ECBL0023I	Online	Changed	PJ25484

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
FCTB0115E	Offline	New	PJ25760
FCTB0116E	Offline	New	PJ25760
FILE0001I	Online	New	PJ25589
FILE0002I	Online	New	PJ25589
FILE0003I	Online	New	PJ25589
FILE0096E	Online	New	PJ25589
FILE0097E	Online	New	PJ25589
FILE0098E	Online	New	PJ25589
FILE0099E	Online	New	PJ25589
HPR00001I	Online	New	PJ25760
HPR00002I	Online	New	PJ25760
HPR00003I	Online	New	PJ25760
HPR00004I	Online	New	PJ25760
HPR00009E	Online	New	PJ25760
HPR00010W	Online	New	PJ25760
HPR00011E	Online	New	PJ25760
INET0011I	Online	New	PJ25589
INET0012I	Online	New	PJ25589
INET0013I	Online	New	PJ25589
INET0014I	Online	New	PJ25589
INET0015I	Online	New	PJ25589
INET0016I	Online	New	PJ25589
INET0017I	Online	New	PJ25589
INET0018I	Online	New	PJ25589
INET0019I	Online	New	PJ25589
INET0024I	Online	New	PJ25589
INET0025I	Online	New	PJ25589
INET0026I	Online	New	PJ25589
INET0027I	Online	New	PJ25589
INET0050I	Online	New	PJ25589
INET0051I	Online	New	PJ25589
INET0076E	Online	New	PJ25589
INET0077E	Online	New	PJ25589
INET0078E	Online	New	PJ25589
INET0080E	Online	New	PJ25589
INET0081E	Online	New	PJ25589
INET0082E	Online	New	PJ25589
INET0083E	Online	New	PJ25589
INET0084E	Online	New	PJ25589
INET0085E	Online	New	PJ25589
INET0086E	Online	New	PJ25589
INET0087E	Online	New	PJ25589
INET0088E	Online	New	PJ25589
INET0090E	Online	New	PJ25589

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
INET0091E	Online	New	PJ25589
INET0092E	Online	New	PJ25589
INET0093E	Online	New	PJ25589
INET0094E	Online	New	PJ25589
INET0095E	Online	New	PJ25589
INET0096E	Online	New	PJ25589
INET0097E	Online	New	PJ25589
INET0098E	Online	New	PJ25589
INET0099E	Online	New	PJ25589
INET0100E	Online	New	PJ25589
INET0101E	Online	New	PJ25589
INET0102E	Online	New	PJ25589
INET0103E	Online	New	PJ25589
INET0104E	Online	New	PJ25589
INET0105E	Online	New	PJ25589
INET0106E	Online	New	PJ25589
INET0107E	Online	New	PJ25589
INET0108E	Online	New	PJ25589
INET0109W	Online	New	PJ25589
INET0110E	Online	New	PJ25589
INET0111E	Online	New	PJ25589
INET0112E	Online	New	PJ25780
IPLB0160W	Online	New	PJ23486
MCFT0001I	Online	No Longer Supported	PJ25781
MCFT0002I	Online	New	PJ25781
MCFT0003I	Online	New	PJ25781
MCFT0004I	Online	New	PJ25781
MCFT0005T	Online	New	PJ25781
MCFT0006T	Online	New	PJ25781
MCFT0007E	Online	New	PJ25781
MCFT0008I	Online	New	PJ25781
MCFT0009T	Online	New	PJ25781
MCFT0010T	Online	New	PJ25781
MCFT0011T	Online	New	PJ25781
MCFT0019E	Online	New	PJ25781
MCFT0020T	Online	New	PJ25781
MCFT0022T	Online	New	PJ25781
MCFT0024I	Online	New	PJ25781
MCFT0025E	Online	New	PJ25781
MCFT0026E	Online	New	PJ25781
MCFT0027E	Online	New	PJ25781
MCFT0028T	Online	New	PJ25781
MCFT0029I	Online	New	PJ25781
MCFT0030T	Online	New	PJ25781

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MCFT0031I	Online	New	PJ25781
MCFT0032T	Online	New	PJ25781
MCFT0033T	Online	New	PJ25781
MCFT0034T	Online	New	PJ25781
MQSC0001I	Online	New	PJ25780
MQSC0002I	Online	New	PJ25780
MQSC0003E	Online	New	PJ25780
MQSC0004I	Online	New	PJ25780
MQSC0005E	Online	New	PJ25780
MQSC0006I	Online	New	PJ25780
MQSC0007E	Online	New	PJ25780
MQSC0009E	Online	New	PJ25780
MQSC0010I	Online	New	PJ25780
MQSC0011I	Online	New	PJ25780
MQSC0015I	Online	New	PJ25780
MQSC0016I	Online	New	PJ25780
MQSC0017I	Online	New	PJ25780
MQSC0018I	Online	New	PJ25780
MQSC0019I	Online	New	PJ25780
MQSC0020I	Online	New	PJ25780
MQSC0021E	Online	New	PJ25780
MQSC0022E	Online	New	PJ25780
MQSC0023W	Online	New	PJ25780
MQSC0024W	Online	New	PJ25780
MQSC0025E	Online	New	PJ25780
MQSC0026W	Online	New	PJ25780
MQSC0027E	Online	New	PJ25780
MQSC0040E	Online	New	PJ25780
MQSC0041E	Online	New	PJ25780
MQSC0042E	Online	New	PJ25780
MQSC0043E	Online	New	PJ25780
MQSC0044I	Online	New	PJ25780
MQSC0045E	Online	New	PJ25780
MQSC0052I	Online	New	PJ25780
MQSC0054E	Online	New	PJ25780
MQSC0055I	Online	New	PJ25780
MQSC0059W	Online	New	PJ25780
MQSC0061E	Online	New	PJ25780
MQSC0062E	Online	New	PJ25780
MQSC0063E	Online	New	PJ25780
MQSC0066E	Online	New	PJ25780
MQSC0071E	Online	New	PJ25780
MQSC0072E	Online	New	PJ25780
MQSC0074E	Online	New	PJ25780

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MQSC0075E	Online	New	PJ25780
MQSC0076E	Online	New	PJ25780
MQSC0077E	Online	New	PJ25780
MQSC0078E	Online	New	PJ25780
MQSC0079E	Online	New	PJ25780
MQSC0080I	Online	New	PJ25780
MQSC0081E	Online	New	PJ25780
MQSC0082E	Online	New	PJ25780
MQSC0083E	Online	New	PJ25780
MQSC0084E	Online	New	PJ25780
MQSC0089E	Online	New	PJ25780
MQSC0090E	Online	New	PJ25780
MQSC0091E	Online	New	PJ25780
MQSC0102E	Online	New	PJ25780
MQSC0103E	Online	New	PJ25780
MQSC0104E	Online	New	PJ25780
MQSC0105E	Online	New	PJ25780
MQSC0106E	Online	New	PJ25780
MQSC0107E	Online	New	PJ25780
MQSC0108E	Online	New	PJ25780
MQSC0109E	Online	New	PJ25780
MQSC0110E	Online	New	PJ25780
MQSC0111E	Online	New	PJ25780
MQSC0112E	Online	New	PJ25780
MQSC0113E	Online	New	PJ25780
MQSC0114E	Online	New	PJ25780
MQSC0115E	Online	New	PJ25780
MQSC0116E	Online	New	PJ25780
MQSC0117E	Online	New	PJ25780
MQSC0118E	Online	New	PJ25780
MQSC0119E	Online	New	PJ25780
MQSC0122E	Online	New	PJ25780
MQSC0123E	Online	New	PJ25780
MQSC0125E	Online	New	PJ25780
MQSC0126E	Online	New	PJ25780
MQSC0127E	Online	New	PJ25780
MQSC0128E	Online	New	PJ25780
MQSC0129E	Online	New	PJ25780
MQSC0130E	Online	New	PJ25780
MQSC0131E	Online	New	PJ25780
MQSC0132E	Online	New	PJ25780
MQSC0136E	Online	New	PJ25780
MQSC0138E	Online	New	PJ25780
MQSC0139E	Online	New	PJ25780

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MQSC0140I	Online	New	PJ25780
MQSC0144E	Online	New	PJ25780
MQSC0151I	Online	New	PJ25780
MQSC0152I	Online	New	PJ25780
MQSC0153E	Online	New	PJ25780
MQSC0154E	Online	New	PJ25780
MQSC0155E	Online	New	PJ25780
MQSC0157E	Online	New	PJ25780
MQSC0158I	Online	New	PJ25780
MQSC0159I	Online	New	PJ25780
MQSC0160I	Online	New	PJ25780
MQSC0161I	Online	New	PJ25780
MQSC0162E	Online	New	PJ25780
MQSC0163E	Online	New	PJ25780
MQSC0164E	Online	New	PJ25780
MQSC0200I	Online	New	PJ25780
MQSC0201I	Online	New	PJ25780
MQSC0202I	Online	New	PJ25780
MQSC0203I	Online	New	PJ25780
MQSC0301E	Online	New	PJ25780
MQSC0302E	Online	New	PJ25780
MQSC0303E	Online	New	PJ25780
MQSC0304E	Online	New	PJ25780
MQSC0305E	Online	New	PJ25780
MQSC0306E	Online	New	PJ25780
MQSC0307E	Online	New	PJ25780
MQSC0308E	Online	New	PJ25780
MQSC0309E	Online	New	PJ25780
MQSC0310E	Online	New	PJ25780
MQSC0311I	Online	New	PJ25780
MQSC0312E	Online	New	PJ25780
MQSC0313I	Online	New	PJ25780
MQSC0314E	Online	New	PJ25780
MQSC0315I	Online	New	PJ25780
MQSC0316I	Online	New	PJ25780
MQSC0317E	Online	New	PJ25780
MQSC0318E	Online	New	PJ25780
MQSC0319E	Online	New	PJ25780
MQSC0320I	Online	New	PJ25780
MQSC0321E	Online	New	PJ25780
MQSC0322E	Online	New	PJ25780
MQSC0323E	Online	New	PJ25780
MQSC0324E	Online	New	PJ25780
MQSC0325E	Online	New	PJ25780

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MQSC0326E	Online	New	PJ25780
MQSC0327E	Online	New	PJ25780
MQSC0328E	Online	New	PJ25780
MQSC0329E	Online	New	PJ25780
MQSC0330E	Online	New	PJ25780
MQSC0332E	Online	New	PJ25780
MQSC0401E	Online	New	PJ25780
MQSC0402E	Online	New	PJ25780
MQSC0403E	Online	New	PJ25780
MQSC0404E	Online	New	PJ25780
MQSC0405E	Online	New	PJ25780
MQSC0406E	Online	New	PJ25780
MQSC0407I	Online	New	PJ25780
MQSC0408E	Online	New	PJ25780
MQSC0409E	Online	New	PJ25780
MQSC0410E	Online	New	PJ25780
MQSC0411E	Online	New	PJ25780
MQSC0412E	Online	New	PJ25780
MQSC0413E	Online	New	PJ25780
MQSC0414E	Online	New	PJ25780
MQSC0415E	Online	New	PJ25780
MQSC0416E	Online	New	PJ25780
MQSC0417E	Online	New	PJ25780
MQSC0418E	Online	New	PJ25780
MQSC0419E	Online	New	PJ25780
MQSC0420E	Online	New	PJ25780
MQSC0421E	Online	New	PJ25780
MQSC0422E	Online	New	PJ25780
MQSC0502E	Online	New	PJ25780
MQSC0504E	Online	New	PJ25780
MQSC0507E	Online	New	PJ25780
MQSC0511W	Online	New	PJ25780
MQSC9998E	Online	New	PJ25780
MQSC9999E	Online	New	PJ25780
NAPN0011I	Online	New	PJ25760
NAPN0012I	Online	No Longer Supported	PJ25760
NCVT0007I	Online	New	PJ25760
NDLU0029E	Online	New	PJ25760
NMON0001I	Online	No Longer Supported	PJ25760
NMON0002I	Online	New	PJ25760
NPIU0001I	Online	No Longer Supported	PJ25760
NPIU0002I	Online	No Longer Supported	PJ25760
NPIU0003I	Online	No Longer Supported	PJ25760
NPIU0004I	Online	New	PJ25760

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
NPIU0005I	Online	New	PJ25760
NRTP0001I	Online	New	PJ25760
NRTP0002I	Online	New	PJ25760
NRTP0003I	Online	New	PJ25760
NRTP0004I	Online	New	PJ25760
NRTP0005I	Online	New	PJ25760
NRTP0006I	Online	New	PJ25760
NRTP0007I	Online	New	PJ25760
NRTP0008I	Online	New	PJ25760
NRTP0011I	Online	New	PJ25760
NRTP0012I	Online	New	PJ25760
NRTP0015I	Online	New	PJ25760
NRTP0016I	Online	New	PJ25760
NRTP0018I	Online	New	PJ25760
NRTP0019I	Online	New	PJ25760
NRTP0020I	Online	New	PJ25760
NRTP0021I	Online	New	PJ25760
NRTP0040E	Online	New	PJ25760
NRTP0041E	Online	New	PJ25760
NRTP0042E	Online	New	PJ25760
NRTP0043E	Online	New	PJ25760
NRTP0044E	Online	New	PJ25760
NRTP0045E	Online	New	PJ25760
NRTP0046E	Online	New	PJ25760
NRTP0047E	Online	New	PJ25760
NRTP0048E	Online	New	PJ25760
NRTP0050E	Online	New	PJ25760
NRTP0051E	Online	New	PJ25760
NRTP0052E	Online	New	PJ25760
NRTP0053E	Online	New	PJ25760
NRTP0054E	Online	New	PJ25760
NRTP0055E	Online	New	PJ25760
NRTP0056E	Online	New	PJ25760
NRTP0057I	Online	New	PJ25760
NTRP0007I	Online	No Longer Supported	PJ25760
NTRP0011I	Online	New	PJ25760
NTRP0012I	Online	New	PJ25760
NTRP0013I	Online	New	PJ25760
NTRP0014I	Online	New	PJ25760
NTRP0015I	Online	New	PJ25760
NTRP0016I	Online	New	PJ25760
NTRP0017I	Online	New	PJ25760
NTRP0018I	Online	New	PJ25760
NTRP0019I	Online	New	PJ25760

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
NTRP0038I	Online	New	PJ25760
NTRP0039I	Online	New	PJ25760
NTRP0040I	Online	No Longer Supported	PJ25760
NTRP0044I	Online	No Longer Supported	PJ25760
NTRP0045I	Online	New	PJ25760
NTRP0046I	Online	New	PJ25760
NTRP0047I	Online	New	PJ25760
NTRP0048I	Online	New	PJ25760
NTRP0052E	Online	No Longer Supported	PJ25760
NTRP0062E	Online	New	PJ25760
NTRP0063E	Online	New	PJ25760
NTRP0064E	Online	New	PJ25760
NTRP0065E	Online	New	PJ25760
NTRP0066E	Online	New	PJ25760
OLDR2084T	Online	No Longer Supported	PJ25684
OLDR2085T	Online	New	PJ25684
OODB0014I	Online	New	PJ25332
OODB0030I	Online	New	PJ25332
OODB0123E	Online	New	PJ25332
OODB0130E	Online	New	PJ25332
RECP0215I	Online	New	PJ25332
RECP0281E	Online	No Longer Supported	PJ25332
RECP0285E	Online	New	PJ25332
RECP0286E	Online	New	PJ25332
RECP0287E	Online	New	PJ25332
RECP0288E	Online	New	PJ25332
RECP0289E	Online	New	PJ25332
RECP0290E	Online	New	PJ25332
SONS0007I	Online	New	PJ25445
TFTP0001E	Online	New	PJ25589
TFTP0002E	Online	New	PJ25589
PUT 8			
004005	System Error	New	PJ24744
020407	System Error	New	PJ25207
020408	System Error	New	PJ25207
020409	System Error	New	PJ25207
BROW0425I	Online	New	PJ25207
BROW0473E	Online	New	PJ25207
BROW0474E	Online	New	PJ25207
CBOT0006I	Online	New	PJ25266
CBOT0007E	Online	New	PJ25266
CBOT0008E	Online	New	PJ25266
CBOT0009I	Online	New	PJ25266
CFIN0004I	Online	Changed	PJ25266

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CFIN0006E	Online	New	PJ25266
CFIN0007E	Online	New	PJ25266
CLCA0001E	Online	New	PJ25375
CLTR0001I	Online	New	PJ25375
CLTR0002E	Online	New	PJ25375
CLTR0003E	Online	New	PJ25375
CLTR0004E	Online	New	PJ25375
CLTR0005E	Online	New	PJ25375
COSK0006E	Online	No Longer Supported	PJ24602
COSK0381E	Online	New	PJ24602
COTI0006E	Online	No Longer Supported	PJ24602
COTI0381E	Online	New	PJ24602
COTM0006E	Online	No Longer Supported	PJ24602
COTM0381E	Online	New	PJ24602
COTS0086I	Online	No Longer Supported	PJ24602
COTS0382I	Online	New	PJ24602
COTT0086I	Online	No Longer Supported	PJ24602
COTT0382I	Online	New	PJ24602
CTKA0001I	Online	No Longer Supported	PJ24945
CTKA0002I	Online	No Longer Supported	PJ24945
CTKA0005I	Online	No Longer Supported	PJ24945
CTKA0006I	Online	No Longer Supported	PJ24945
CTKA0007I	Online	New	PJ24945
CTKA0008I	Online	New	PJ24945
CTKA0060I	Online	New	PJ24945
DPLT0001I	Online	New	PJ25075
DPLT0002I	Online	New	PJ25075
DPLT0003I	Online	New	PJ25075
DPLT0004I	Online	New	PJ25075
DPLT0005I	Online	New	PJ25075
DPLT0006I	Online	New	PJ25075
DPLT0007I	Online	New	PJ25075
DPLT0008I	Online	New	PJ25075
DPLT0009E	Online	New	PJ25075
DTCP0001I	Online	New	PJ25375
DTCP0003I	Online	New	PJ25375
DTCP0004I	Online	New	PJ25375
DTCP0005I	Online	New	PJ25375
DTCP0006I	Online	New	PJ25375
DTCP0009I	Online	New	PJ25375
DTCP0010E	Online	New	PJ25375
DTCP0011E	Online	New	PJ25375
DTCP0013I	Online	New	PJ25375
DTCP0020E	Online	New	PJ25375

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
DTCP0022E	Online	New	PJ25375
DTCP0023E	Online	New	PJ25375
DTCP0024E	Online	New	PJ25375
DTCP0025E	Online	New	PJ25375
DTCP0026E	Online	New	PJ25375
DTCP0027I	Online	New	PJ25375
DTCP0028E	Online	New	PJ25375
DTCP0030E	Online	New	PJ25375
DTCP0031E	Online	New	PJ25375
DTCP0040E	Online	New	PJ25375
DTCP0041E	Online	New	PJ25375
DTCP0042I	Online	New	PJ25375
DTCP0051E	Online	New	PJ25375
DTCP0052E	Online	New	PJ25375
DTCP0053E	Online	New	PJ25375
DTCP0054E	Online	New	PJ25375
FECB0001E	Online	New	PJ23981
FECB0002E	Online	New	PJ23981
FECB0003E	Online	New	PJ23981
FECB0004I	Online	New	PJ23981
FECB0005I	Online	New	PJ23981
FECB0006I	Online	New	PJ23981
FECB0007I	Online	New	PJ23981
FINT0008I	Online	New	PJ25266
FINT0009I	Online	New	PJ25266
FINT0010I	Online	New	PJ25266
FINT0011I	Online	New	PJ25266
FINT0012I	Online	New	PJ25266
IMAG0057E	Online	New	PJ24744
PSMS0028E	Online	New	PJ25088
RECP004EI	Online	New	PJ25207
RECP0261E	Online	No Longer Supported	PJ25207
RECP0272E	Online	Changed	PJ25182, PJ25207
RECP0274E	Online	Changed	PJ25207
RECP0276E	Online	Changed	PJ25182, PJ25207
RECP0277E	Online	Changed	PJ25182, PJ25207
RECP0278E	Online	Changed	PJ25207
RECP0279E	Online	Changed	PJ25207
RECP0281E	Online	Changed	PJ25207
RECP0283E	Online	New	PJ25207
RECP0284E	Online	New	PJ25207
RECP0291E	Online	New	PJ25207
RECP0292E	Online	New	PJ25207
RECP0293E	Online	No Longer Supported	PJ25207

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
RECP0295E	Online	Changed	PJ25182
RECP0296E	Online	Changed	PJ25182
PUT 7			
000038	System Error	Changed	PJ25094
006000	System Error	New	PJ25094
006001	System Error	New	PJ25094
006002	System Error	New	PJ25094
006003	System Error	New	PJ25094
006005	System Error	New	PJ25094
006006	System Error	New	PJ25094
006007	System Error	New	PJ25094
006008	System Error	New	PJ25094
006009	System Error	New	PJ25094
00600A	System Error	New	PJ25094
00600B	System Error	New	PJ25094
00600C	System Error	New	PJ25094
00600D	System Error	New	PJ25094
00600E	System Error	New	PJ25094
00600F	System Error	New	PJ25094
006010	System Error	New	PJ25094
006012	System Error	New	PJ25094
006013	System Error	New	PJ25094
007510	System Error	New	PJ25089
007511	System Error	New	PJ25089
007512	System Error	New	PJ25089
007513	System Error	New	PJ25089
007514	System Error	New	PJ25089
007515	System Error	New	PJ25089
007516	System Error	New	PJ25089
007517	System Error	New	PJ25089
00C100	System Error	New	PJ25094
00C101	System Error	New	PJ25094
00C102	System Error	New	PJ25094
00C103	System Error	New	PJ25094
00C104	System Error	New	PJ25094
00C105	System Error	New	PJ25094
00C106	System Error	New	PJ25094
00C107	System Error	New	PJ25094
00C108	System Error	New	PJ25094
00C109	System Error	New	PJ25094
00C10A	System Error	New	PJ25094
00C10B	System Error	New	PJ25094
00C10C	System Error	New	PJ25094
00C10D	System Error	New	PJ25094

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
00C10E	System Error	New	PJ25094
00C10F	System Error	New	PJ25094
00C110	System Error	New	PJ25094
00C111	System Error	New	PJ25094
00C112	System Error	New	PJ25094
00C113	System Error	New	PJ25094
00C114	System Error	New	PJ25094
00C115	System Error	New	PJ25094
00C116	System Error	New	PJ25094
00C117	System Error	New	PJ25094
00C118	System Error	New	PJ25094
00C119	System Error	New	PJ25094
00C11A	System Error	New	PJ25094
00C11B	System Error	New	PJ25094
00C11C	System Error	New	PJ25094
00C11D	System Error	New	PJ25094
00C11E	System Error	New	PJ25094
00C11F	System Error	New	PJ25094
00C120	System Error	New	PJ25094
00C121	System Error	New	PJ25094
00C130	System Error	New	PJ25094
00C131	System Error	New	PJ25094
00C132	System Error	New	PJ25094
00C133	System Error	New	PJ25094
00C134	System Error	New	PJ25094
00C135	System Error	New	PJ25094
00C136	System Error	New	PJ25094
00C137	System Error	New	PJ25094
00C139	System Error	New	PJ25094
00C139	System Error	New	PJ25094
00C13A	System Error	New	PJ25094
00C13C	System Error	New	PJ25094
020000	System Error	New	PJ25098
0200C8	System Error	New	PJ25098
0200D2	System Error	New	PJ25098
0200DC	System Error	New	PJ25098
0200E6	System Error	New	PJ25098
0200F0	System Error	New	PJ25098
0200FA	System Error	New	PJ25098
020402	System Error	New	PJ25098
020403	System Error	New	PJ25098
020404	System Error	New	PJ25098
020405	System Error	New	PJ25098
020406	System Error	New	PJ25098

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
041113	System Error	New	PJ25098
094015	System Error	New	PJ25084
094016	System Error	New	PJ25084
094017	System Error	New	PJ25084
094018	System Error	New	PJ25084
094101	System Error	New	PJ25084
094201	System Error	New	PJ25084
ALDR0910W	Offline	New	PJ24845
ATTENTION - CONTAINS NO LINK MAP DATA	Offline	New	PJ24845
BROW0051E	Online	New	PJ25098
BROW0099E	Online	New	PJ25098
BROW0201I	Online	New	PJ25098
BROW0202I	Online	New	PJ25098
BROW0203I	Online	New	PJ25098
BROW0204I	Online	New	PJ25098
BROW0205I	Online	New	PJ25098
BROW0206I	Online	New	PJ25098
BROW0210I	Online	New	PJ25098
BROW0251E	Online	New	PJ25098
BROW0252E	Online	New	PJ25098
BROW0253E	Online	New	PJ25098
BROW0254E	Online	New	PJ25098
BROW0255E	Online	New	PJ25098
BROW0256E	Online	New	PJ25098
BROW0257E	Online	New	PJ25098
BROW0258E	Online	New	PJ25098
BROW0259E	Online	New	PJ25098
BROW0301I	Online	New	PJ25098
BROW0303I	Online	New	PJ25098
BROW0304I	Online	New	PJ25098
BROW0310I	Online	New	PJ25098
BROW0351E	Online	New	PJ25098
BROW0352E	Online	New	PJ25098
BROW0353E	Online	New	PJ25098
BROW0354E	Online	New	PJ25098
BROW0355E	Online	New	PJ25098
BROW0356E	Online	New	PJ25098
BROW0357E	Online	New	PJ25098
BROW0358E	Online	New	PJ25098
BROW0359E	Online	New	PJ25098
BROW0360E	Online	New	PJ25098
BROW0399E	Online	New	PJ25098
BROW0402I	Online	New	PJ25098

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
BROW0403I	Online	New	PJ25098
BROW0404I	Online	New	PJ25098
BROW0405I	Online	New	PJ25098
BROW0406I	Online	New	PJ25098
BROW0407I	Online	New	PJ25098
BROW0408I	Online	New	PJ25098
BROW0410I	Online	New	PJ25098
BROW0411I	Online	New	PJ25098
BROW0412I	Online	New	PJ25098
BROW0413I	Online	New	PJ25098
BROW0415I	Online	New	PJ25098
BROW0416I	Online	New	PJ25098
BROW0417I	Online	New	PJ25098
BROW0418I	Online	New	PJ25098
BROW0419I	Online	New	PJ25098
BROW0420I	Online	New	PJ25098
BROW0421I	Online	New	PJ25098
BROW0422I	Online	New	PJ25098
BROW0423I	Online	New	PJ25098
BROW0424I	Online	New	PJ25098
BROW0451E	Online	New	PJ25098
BROW0452E	Online	New	PJ25098
BROW0453E	Online	New	PJ25098
BROW0454E	Online	New	PJ25098
BROW0455E	Online	New	PJ25098
BROW0456E	Online	New	PJ25098
BROW0457E	Online	New	PJ25098
BROW0458E	Online	New	PJ25098
BROW0459E	Online	New	PJ25098
BROW0460E	Online	New	PJ25098
BROW0461E	Online	New	PJ25098
BROW0462E	Online	New	PJ25098
BROW0463E	Online	New	PJ25098
BROW0464E	Online	New	PJ25098
BROW0465E	Online	New	PJ25098
BROW0466E	Online	New	PJ25098
BROW0467E	Online	New	PJ25098
BROW0468E	Online	New	PJ25098
BROW0469E	Online	New	PJ25098
BROW0470E	Online	New	PJ25098
BROW0471E	Online	New	PJ25098
BROW0472E	Online	New	PJ25098
BROW0501I	Online	New	PJ25098
BROW0502I	Online	New	PJ25098

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
BROW0503I	Online	New	PJ25098
BROW0510I	Online	New	PJ25098
BROW0551E	Online	New	PJ25098
BROW0552E	Online	New	PJ25098
BROW0553E	Online	New	PJ25098
BROW0554E	Online	New	PJ25098
BROW0555E	Online	New	PJ25098
BROW0556E	Online	New	PJ25098
BROW0557E	Online	New	PJ25098
BROW0558E	Online	New	PJ25098
BROW0559E	Online	New	PJ25098
BROW0599E	Online	New	PJ25098
BROW0601I	Online	New	PJ25098
BROW0602I	Online	New	PJ25098
BROW0650W	Online	New	PJ25098
BROW0651E	Online	New	PJ25098
BROW0652E	Online	New	PJ25098
BROW0653E	Online	New	PJ25098
CBLD0411W	Offline	New	PJ24845
CBLD0412W	Offline	New	PJ24845
CBLD0802E	Offline	No Longer Supported	PJ24845
CBLD0803E	Offline	New	PJ24845
CBLD0804E			
CBLD0805E	Offline	New	PJ25084
CBLD1201T	Offline	No Longer Supported	PJ24845
CBLD1202T	Offline	New	PJ24845
CBOT0001E	Online	New	PJ25089
CBOT0002E	Online	New	PJ25089
CBOT0004I	Online	New	PJ25089
CBOT0005E	Online	New	PJ25089
CDSI0001I	Online	New	PJ23984
CDSI0002I	Online	New	PJ23984
CDSI0003I	Online	New	PJ23984
CFIN0001W	Online	New	PJ25089
CFIN0002E	Online	New	PJ25089
CFIN0003I	Online	New	PJ25089
CFIN0004I	Online	New	PJ25089
CFIN0005W	Online	New	PJ25089
CJ040001I	Online	New	PJ25098
CJ040002I	Online	New	PJ25098
CJ040051E	Online	New	PJ25098
CJ040099E	Online	New	PJ25098
CJ160001E	Online	New	PJ25098
CLM00001E	Online	New	PJ25094

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CL110001I	Online	New	PJ25094
CL110002I	Online	New	PJ25094
CL110003I	Online	New	PJ25094
CL110004E	Online	New	PJ25094
CL140011I	Online	New	PJ25094
CL210001I	Online	New	PJ25094
CL210002E	Online	New	PJ25094
CORO0001I	Online	New	PJ25094
CORO0002E	Online	New	PJ25094
CORO0003I	Online	New	PJ25094
CORO0004E	Online	New	PJ25094
CORO0005I	Online	New	PJ25094
CORO0006I	Online	New	PJ25094
COTM0009E	Online	New	PJ24465
CPAA0012E	Online	New	PJ25094
CTIN0019I	Online	New	PJ25094
CTIN0090E	Online	New	PJ25094
CYED0010I	Online	New	PJ24709
C6204E	System Error	No Longer Supported	PJ23835
DADF0126E	Online	No Longer Supported	PJ21730
DADF0127E	Online	New	PJ21730
DADF0128E	Online	New	PJ21730
DLOK0001E	Online	New	PJ25094
DLOK0002I	Online	New	PJ25094
DMAP0001I	Online	New	PJ24845
DMAP0002I	Online	New	PJ24845
DMAP1000E	Online	New	PJ24845
DMAP1001E	Online	New	PJ24845
DMAP2000E	Online	New	PJ24845
DMAP2001E	Online	New	PJ24845
DMAP2002E	Online	New	PJ24845
DMAP2003E	Online	New	PJ24845
DMAP2004E	Online	New	PJ24845
DMAP2005E	Online	New	PJ24845
DMAP2006E	Online	New	PJ24845
DMAP2007E	Online	New	PJ24845
DMAP2008E	Online	New	PJ24845
DMAP2009E	Online	New	PJ24845
DMAP2010E	Online	New	PJ24845
DMAP2011E	Online	New	PJ24845
DMAP2012E	Online	New	PJ24845
DMAP2013E	Online	New	PJ24845
DMAP2014E	Online	New	PJ24845
DMAP2015E	Online	New	PJ24845

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
DMAP3000E	Online	New	PJ24845
DMAP3001E	Online	New	PJ24845
DMAP3002E	Online	New	PJ24845
DMAP3003E	Online	New	PJ24845
DMAP3004E	Online	New	PJ24845
DMAP3005E	Online	New	PJ24845
DMFS0004I	Online	No Longer Supported	PJ24680
DMFS0005I	Online	New	PJ24680
FCTB0108E	Offline	New	PJ25089
FILE0005W	Online	New	PJ25089
FINT0001I	Online	New	PJ25089
FINT0002I	Online	New	PJ25089
FINT0005E	Online	New	PJ25089
FINT0006I	Online	New	PJ25089
FINT0007I	Online	New	PJ25089
NSID0022E	Online	No Longer Supported	PJ24585
NSID0023E	Online	No Longer Supported	PJ24585
NSID0039E	Online	New	PJ24585
NSID0040E	Online	New	PJ24585
OLDR0090W	Offline	New	PJ24845
OLDR2026T	Online	Changed	PJ25084
OLDR2053T	Online	New	PJ25084
OLDR3226W	Online	New	PJ24881
OODB0001I	Online	New	PJ25098
OODB0002I	Online	New	PJ25098
OODB0006I	Online	New	PJ25098
OODB0007I	Online	New	PJ25098
OODB0011I	Online	New	PJ25098
OODB0012I	Online	New	PJ25098
OODB0021I	Online	New	PJ25098
OODB0022I	Online	New	PJ25098
OODB0025I	Online	New	PJ25098
OODB0026I	Online	New	PJ25098
OODB0027I	Online	New	PJ25098
OODB0031I	Online	New	PJ25098
OODB0032I	Online	New	PJ25098
OODB0039E	Online	New	PJ25098
OODB0041I	Online	New	PJ25098
OODB0042I	Online	New	PJ25098
OODB0051I	Online	New	PJ25098
OODB0099E	Online	New	PJ25098
OODB0101E	Online	New	PJ25098
OODB0105E	Online	New	PJ25098
OODB0106E	Online	New	PJ25098

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
OODB0121E	Online	New	PJ25098
OODB0122E	Online	New	PJ25098
OODB0131E	Online	New	PJ25098
OODB0132E	Online	New	PJ25098
OODB0133E	Online	New	PJ25098
OODB0134E	Online	New	PJ25098
OODB0135E	Online	New	PJ25098
OODB0136E	Online	New	PJ25098
OODB0141E	Online	New	PJ25098
OODB0142E	Online	New	PJ25098
OODB0143E	Online	New	PJ25098
OODB0144E	Online	New	PJ25098
OODB0145E	Online	New	PJ25098
OODB0151E	Online	New	PJ25098
OODB0152E	Online	New	PJ25098
OODB0153E	Online	New	PJ25098
OODB0154E	Online	New	PJ25098
OODB0155E	Online	New	PJ25098
OODB0156E	Online	New	PJ25098
OODB0164E	Online	New	PJ25098
OODB0171E	Online	New	PJ25098
OODB0191E	Online	New	PJ25098
OODB0192E	Online	New	PJ25098
OODB0201E	Online	New	PJ25098
OODB0202E	Online	New	PJ25098
OODB0203E	Online	New	PJ25098
OODB0204E	Online	New	PJ25098
OODB0205E	Online	New	PJ25098
RCSC0001W	Online	New	PJ25094
RECP0201I	Online	New	PJ25098
RECP0202I	Online	New	PJ25098
RECP0203I	Online	New	PJ25098
RECP0204I	Online	New	PJ25098
RECP0205I	Online	New	PJ25098
RECP0206I	Online	New	PJ25098
RECP0207I	Online	New	PJ25098
RECP0208I	Online	New	PJ25098
RECP0209I	Online	New	PJ25098
RECP0210I	Online	New	PJ25098
RECP0211I	Online	New	PJ25098
RECP0213I	Online	New	PJ25098
RECP0214I	Online	New	PJ25098
RECP0250W	Online	New	PJ25098
RECP0251E	Online	New	PJ25098

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
RECP0252E	Online	New	PJ25098
RECP0253E	Online	New	PJ25098
RECP0254E	Online	New	PJ25098
RECP0255E	Online	New	PJ25098
RECP0256E	Online	New	PJ25098
RECP0257E	Online	New	PJ25098
RECP0258E	Online	New	PJ25098
RECP0259E	Online	New	PJ25098
RECP0260E	Online	New	PJ25098
RECP0261E	Online	New	PJ25098
RECP0262E	Online	New	PJ25098
RECP0263E	Online	New	PJ25098
RECP0264I	Online	New	PJ25098
RECP0271E	Online	New	PJ25098
RECP0272E	Online	New	PJ25098
RECP0273E	Online	New	PJ25098
RECP0274E	Online	New	PJ25098
RECP0275E	Online	New	PJ25098
RECP0276E	Online	New	PJ25098
RECP0277E	Online	New	PJ25098
RECP0278E	Online	New	PJ25098
RECP0279E	Online	New	PJ25098
RECP0281E	Online	New	PJ25098
RECP0282E	Online	New	PJ25098
RECP0293E	Online	New	PJ25098
RECP0294E	Online	New	PJ25098
RECP0295E	Online	New	PJ25098
RECP0296E	Online	New	PJ25098
RECP0297E	Online	New	PJ25098
RECP0298E	Online	New	PJ25098
RECP0299E	Online	New	PJ25098
RHLD0002I	Online	New	PJ25094
RHLD0020E	Online	No Longer Supported	PJ25094
RHLD0027E	Online	No Longer Supported	PJ25094
RHLD0030E	Online	New	PJ25094
RHLD0037E	Online	New	PJ25094
RHLD0098I	Online	No Longer Supported	PJ25094
RHLD0110I	Online	New	PJ25094
RTDM0001I	Online	No Longer Supported	PJ25094
RTDM0005I	Online	New	PJ25094
RTDM0006I	Online	New	PJ25094
RTDM0007I	Online	New	PJ25094
RTDM0010I	Online	New	PJ25094
RTDM0032E	Online	New	PJ25094

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
RTDM0033E	Online	New	PJ25094
RTDM0071E	Online	New	PJ25094
RTDM0072E	Online	New	PJ25094
RTDM0082E	Online	New	PJ25094
RTDM0083E	Online	New	PJ25094
RTDM0084E	Online	New	PJ25094
RTDM0089E	Online	New	PJ25094
TPFL0005W	Offline	New	PJ24845
TPFL0010E	Offline	New	PJ24845
TPXD0001A	Online	New	PJ25098
TPXD0002I	Online	New	PJ25098
VFAC0007I	Online	No Longer Supported	PJ25094
VFAC0014I	Online	No Longer Supported	PJ25094
VFAC0024I	Online	New	PJ25094
VFAC0086I	Online	New	PJ25094
VFAC0110W	Online	New	PJ25094
PUT 6			
0003E0	System Error	New	PJ24084
007101	System Error	New	PJ24472
007102	System Error	New	PJ24472
007106	System Error	New	PJ24472
007200	System Error	New	PJ24472
007501	System Error	New	PJ23923
007502	System Error	New	PJ23923
007503	System Error	New	PJ23923
007507	System Error	New	PJ23923
007508	System Error	New	PJ23923
007509	System Error	New	PJ23923
ABORT	Offline	Changed	PJ23353
ACPD0011I	Online	New	PJ23736
CDFT0001E	Online	New	PJ23297
CDFT0003E	Online	New	PJ23297
CDFT0004E	Online	New	PJ23297
CDFT0005E	Online	New	PJ23297
CDFT0006E	Online	New	PJ23297
CDFT0007E	Online	New	PJ23297
CDFT0009E	Online	New	PJ23297
CDFT0012I	Online	New	PJ23297
CEFR0179E	Online	New	PJ24563
CEFR0180E	Online	New	PJ24563
CEFR0187E	Online	New	PJ24563
CEFR0204E	Online	New	PJ24563
CEFR0233E	Online	New	PJ24563
CEFR0239E	Online	New	PJ24563

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CEFR0245E	Online	New	PJ24563
CEFR0252E	Online	New	PJ24563
CEFR0266W	Online	New	PJ24563
CEFR0276E	Online	New	PJ24563
CEFR0278E	Online	New	PJ24563
CEFR0279E	Online	New	PJ24563
CEFR0315E	Online	New	PJ24563
CEFR0316E	Online	New	PJ24563
CEFR0317E	Online	New	PJ24563
CEFR0318E	Online	New	PJ24563
CEFR0319E	Online	New	PJ24563
CEFR0320E	Online	New	PJ24563
CEFR0321E	Online	New	PJ24563
CEFR0323E	Online	New	PJ24563
CEFR0325E	Online	New	PJ24563
CEFR0326E	Online	New	PJ24563
CEFR0327E	Online	New	PJ24563
CEFR0328E	Online	New	PJ24563
CEFR0329E	Online	New	PJ24563
CEFR0330E	Online	New	PJ24563
CEFR0331E	Online	New	PJ24563
CEFR0332E	Online	New	PJ24563
CEFR0333E	Online	New	PJ24563
CEFR0334E	Online	New	PJ24563
CEFR0335E	Online	New	PJ24563
CEFR0336E	Online	New	PJ24563
CEFR0337E	Online	New	PJ24563
CEFR0338E	Online	New	PJ24563
CEFR0339E	Online	New	PJ24563
CEFR0340E	Online	New	PJ24563
CEFR0341I	Online	New	PJ24563
CEFR0342E	Online	New	PJ24563
CEFR0343E	Online	New	PJ24563
CEFR0344E	Online	New	PJ24563
CEFR0345E	Online	New	PJ24563
CEFR0346I	Online	New	PJ24563
CEFR0347W	Online	New	PJ24563
CEFR0348W	Online	New	PJ24563
CEFR0349E	Online	New	PJ24563
CEFR0350I	Online	New	PJ24563
CEFR0351W	Online	New	PJ24563
CEFR0352W	Online	New	PJ24563
CEFR0353E	Online	New	PJ24563
CEFR0354I	Online	New	PJ24563

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CEFR0355W	Online	New	PJ24563
CEFR0356W	Online	New	PJ24563
CEFR0357E	Online	New	PJ24563
CEFR0358I	Online	New	PJ24563
CEFR0359W	Online	New	PJ24563
CEFR0360W	Online	New	PJ24563
CEFR0361E	Online	New	PJ24563
CEFR0362I	Online	New	PJ24563
CEFR0363I	Online	New	PJ24563
CEFR0365I	Online	New	PJ24563
CEFR0366I	Online	New	PJ24563
CEFR0367I	Online	New	PJ24563
CEFR0368E	Online	New	PJ24563
CEFR0369E	Online	New	PJ24563
CEFR0370I	Online	New	PJ24563
CEFR0371I	Online	New	PJ24563
CEFR0378E	Online	New	PJ24563
CEFR0379W	Online	New	PJ24563
CFD20003I	Online	No Longer Supported	PJ23209
CFD20004I	Online	New	PJ23209
CGTB0001E	Online	New	PJ23338
CGTB0002I			
CGTB0003E			
CLAW0038E	Online	Changed	PJ24525
CLKS0094E	Online	New	PJ24203
COSA0139W	Online	No Longer Supported	PJ24563
COSA0297W	Online	New	PJ24563
COSB0148W	Online	No Longer Supported	PJ24563
COSB0196E	Online	No Longer Supported	PJ24563
COSB0296E	Online	New	PJ24563
COSB0298W	Online	New	PJ24563
COSE0119I	Online	No Longer Supported	PJ24563
COSE0299I	Online	New	PJ24563
COSE0312E	Online	New	PJ24563
COSI0305I	Online	New	PJ24563
COTC0080A	Online	No Longer Supported	PJ24563
COTC0128I	Online	No Longer Supported	PJ24563
COTC0129I	Online	No Longer Supported	PJ24563
COTC0300A	Online	New	PJ24563
COTC0301I	Online	New	PJ24563
COTC0302I	Online	New	PJ24563
COTE0001I	Online	No Longer Supported	PJ24563
COTE0002I	Online	New	PJ24563

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
COTG0080A	Online	No Longer Supported	PJ24563
COTG0300A	Online	New	PJ24563
COTI0004E	Online	Changed	PJ24563
COTI0009I	Online	Changed	PJ24563
COTI0016E	Online	Changed	PJ24563
COTI0295I	Online	New	PJ24563
COTI0303E	Online	New	PJ24563
COTI0304I	Online	New	PJ24563
COTJ0044I	Online	No Longer Supported	PJ24563
COTJ0313I	Online	New	PJ24563
COTJ0314I	Online	New	PJ24563
COTK0060E	Online	No Longer Supported	PJ24563
COTK0061E	Online	No Longer Supported	PJ24563
COTK0305E	Online	New	PJ24563
COTK0373E	Online	New	PJ24563
COTL0001I	Online	No Longer Supported	PJ24563
COTL0002I	Online	New	PJ24563
COTM0004E	Online	No Longer Supported	PJ24563
COTM0023W	Online	No Longer Supported	PJ24563
COTM0032E	Online	No Longer Supported	PJ24563
COTM0033W	Online	No Longer Supported	PJ24563
COTM0036E	Online	No Longer Supported	PJ24563
COTM0046I	Online	No Longer Supported	PJ24563
COTM0161E	Online	No Longer Supported	PJ24563
COTM0199E	Online	No Longer Supported	PJ24563
COTM0295I	Online	New	PJ24563
COTM0303E	Online	New	PJ24563
COTM0306W	Online	New	PJ24563
COTM0307E	Online	New	PJ24563
COTM0308W	Online	New	PJ24563
COTM0309E	Online	New	PJ24563
COTM0310I	Online	New	PJ24563
COTM0311E	Online	New	PJ24563
COTM0312E	Online	New	PJ24563
COTS0300A	Online	New	PJ24563
CPSF0016E	Online	No Longer Supported	PJ23269
CRZ10001I	Online	New	PJ23430
CRZ10002I	Online	New	PJ23430
CRZ10003I	Online	New	PJ23430
CRZ10005E	Online	New	PJ23430
CRZ10006E	Online	New	PJ23430
CRZ10007E	Online	New	PJ23430
CSAV0000I	Online	New	PJ22843
CSAV0001I	Online	New	PJ22843

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CSAV0002I	Online	New	PJ22843
CSAV0003E	Online	New	PJ22843
CSAV0004E	Online	New	PJ22843
CSAV0005E	Online	New	PJ22843
CSAV0006E	Online	New	PJ22843
CSAV0007E	Online	New	PJ22843
CSAV0009E	Online	New	PJ22843
CSAW0000I	Online	New	PJ22843
CSS10049W	Online	New	PJ24290
CT400009I	Online	New	PJ24530
CVRI0004E	Online	New	PJ23526
CVRI0004E	Online	New	PJ23526
CYED0007W	Online	New	PJ23699
CYED0008T	Online	New	PJ23699
CYED0009I	Online	New	PJ23699
CYYE0050E	Online	New	PJ24129
CYYE0051E	Online	New	PJ24129
DB2P0001E	Offline	Changed	PJ23931
DB2P0002E	Offline	Changed	PJ23931
DB2P0003E	Offline	Changed	PJ23931
DB2P0003W	Offline	No Longer Supported	PJ23931
DB2P0004W	Offline	Changed	PJ23931
DB2P0005W	Offline	Changed	PJ23931
DB2P0006E	Offline	Changed	PJ23931
DB2P0006W	Offline	No Longer Supported	PJ23931
DB2P0007E	Offline	Changed	PJ23931
DB2P0007W	Offline	No Longer Supported	PJ23931
DB2P0008E	Offline	Changed	PJ23931
DB2P0008W	Offline	No Longer Supported	PJ23931
DB2P0009E	Offline	New	PJ23931
DB2P0010E	Offline	New	PJ23931
DB2P0053W	Offline	New	PJ23931
DSMG0003I	Online	No Longer Supported	PJ23755
DSMG0004I	Online	No Longer Supported	PJ23755
DSMG0008I	Online	No Longer Supported	PJ23755
DSMG0009I	Online	No Longer Supported	PJ23755
DTOD0001I	Online	New	PJ23434
DTOD0002I	Online	New	PJ23434
DTOD0003E	Online	New	PJ23434
DYO01001W	Offline	New	PJ23114
DYO02003E	Offline	New	PJ23114
DYO02004E	Offline	New	PJ23114
ECBL0013I	Online	No Longer Supported	PJ23871
ECBL0015I	Online	No Longer Supported	PJ23871

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
ECBL0016I	Online	No Longer Supported	PJ23871
ECBL0021I	Online	New	PJ23871
ECBL0022I	Online	New	PJ23871
ECBL0023I	Online	New	PJ23871
FKPA0011A	Online	New	PJ24530
IFIL0002I	Online	No Longer Supported	PJ24134
IFIL0003I	Online	No Longer Supported	PJ24134
IFIL0004I	Online	New	PJ24134
IFIL0005I	Online	New	PJ24134
LIBI1215T	Offline	New	PJ23068
LIBI1216T	Offline	New	PJ23068
NCNS0027E	Online	New	PJ23620
NCNS0028E	Online	New	PJ23620
NCNS0029E	Online	New	PJ23620
NCNS0030E	Online	New	PJ23620
NKEY0019E	Online	No Longer Supported	PJ23844
NKEY0020E	Online	No Longer Supported	PJ23844
NKEY0026E	Online	New	PJ23844
NKEY0027E	Online	New	PJ23844
STUB1202T	Offline	New	PJ23068
SQLD0081I	Online	New	PJ23931
SQLD0082E	Online	New	PJ23931
SQLD0083E	Online	New	PJ23931
SQLD0084E	Online	New	PJ23931
SQLD0085E	Online	New	PJ23931
SQLD0086I	Online	New	PJ23931
SQLD0087I	Online	New	PJ23931
SQLD0088I	Online	New	PJ23931
SQLD0089E	Online	New	PJ23931
SQLD0098E	Online	New	PJ23931
STRC0003I	Online	No Longer Supported	PJ23493
STRC0004I	Online	No Longer Supported	PJ23493
STRC0005I	Online	New	PJ23493
STRC0006I	Online	New	PJ23493
XID30072E	Online	Changed	PJ23764
XID30073E	Online	Changed	PJ23764
XID30074E	Online	Changed	PJ23764
PUT 5			
000010	System Error	Changed	PJ23178
00005C	System Error	New	PJ22371
0000D3	System Error	No Longer Supported	PJ23103
0000D9	System Error	New	PJ23103
000698	System Error	No Longer Supported	PJ21715
002010	System Error	New	PJ23178

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
002011	System Error	New	PJ23178
002012	System Error	New	PJ23178
002013	System Error	New	PJ23178
002014	System Error	New	PJ23178
004000	System Error	New	PJ17689
007600	System Error	New	PJ22434
007601	System Error	New	PJ22434
041108	System Error	New	PJ21224
094010	System Error	Changed	PJ21907
ALL RCP ITEMS DO NOT HAVE SAME TIME STAMP	Offline	New	PJ21224
APAT0003I	Online	No Longer Supported	PJ22523
APAT0004I	Online	No Longer Supported	PJ22523
APAT0101I	Online	New	PJ22523
APAT0102I	Online	New	PJ22523
CFD20001E	Online	New	PJ22665
CFD20002E	Online	New	PJ22665
CFD20003I	Online	New	PJ22665
CLAW0002E	Online	Changed	PJ22389
CLAW0020E	Online	New	PJ22389
CLAW0022I	Online	Changed	PJ22389
CLAW0023I	Online	Changed	PJ22389
CLAW0024E	Online	Changed	PJ22389
CLAW0033E	Online	Changed	PJ22389
CLAW0035I	Online	Changed	PJ22389
CLAW0045E	Online	Changed	PJ22389
CLAW0049E	Online	New	PJ22389
CLAW0066W	Online	New	PJ22389
CLAW0067E	Online	New	PJ22389
CLAW0071E	Online	Changed	PJ22389
CLAW0072E	Online	Changed	PJ22389
CLAW0082I	Online	Changed	PJ22389
CLCL0066W	Online	No Longer Supported	PJ22389
CLCL0067E	Online	No Longer Supported	PJ22389
CLKS0095I	Online	New	PJ22369
CLKS0096W	Online	New	PJ22369
COT20205E	Online	New	PJ17689
CPSF0011W	Online	No Longer Supported	PJ21564
CPSF0026W	Online	New	PJ21564
CTMS0001I	Online	New	PJ23178
CTMS0002W	Online	New	PJ23178
CTMS0003E	Online	New	PJ23178
CTMS0004E	Online	New	PJ23178
DMOD0001E	Online	No Longer Supported	PJ22665

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
DMOD0002E	Online	No Longer Supported	PJ22665
DPAT0003I	Online	No Longer Supported	PJ22523
DPAT0004I	Online	No Longer Supported	PJ22523
DPAT0101I	Online	New	PJ22523
DPAT0102I	Online	New	PJ22523
DYO02001E	Offline	New	PJ21224
DYO02002E	Offline	New	PJ21224
ECBL0008E	Online	No Longer Supported	PJ23178
ECBL0009E	Online	No Longer Supported	PJ23103
ECBL0011I	Online	No Longer Supported	PJ23103
ECBL0012I	Online	New	PJ23178
ECBL0014I	Online	New	PJ23178
ECBL0015I	Online	New	PJ23178
ECBL0016I	Online	New	PJ23178
ECBL0017E	Online	New	PJ23178
ECBL0018E	Online	New	PJ23178
ECBL0019I	Online	New	PJ23103
ECBL0020I	Online	New	PJ23103
IMAG0178W	Online	New	PJ20911
LDLS0011	Online	No Longer Supported	PJ21802
LDLS0020I	Online	New	PJ21802
LDLS0022I	Online	New	PJ21802
MQID0011I	Online	New	PJ22434
MQID0012I	Online	New	PJ22434
MQID0013I	Online	New	PJ22434
MQID0014I	Online	New	PJ22434
MQID0015I	Online	New	PJ22434
MQID0016I	Online	New	PJ22434
MQID0091E	Online	New	PJ22434
MQID0092E	Online	New	PJ22434
MQID0093E	Online	New	PJ22434
MQID0094E	Online	New	PJ22434
MQID0095E	Online	New	PJ22434
MQID0097E	Online	New	PJ22434
MQID0098E	Online	New	PJ22434
MQID0099E	Online	New	PJ22434
MQID0100E	Online	New	PJ22434
MQID0101E	Online	New	PJ22434
MQID0102E	Online	New	PJ22434
MQID0103E	Online	New	PJ22434
MQID0104E	Online	New	PJ22434
MQID0105E	Online	New	PJ22434
MQIT0001W	Online	New	PJ22434
MQIT0002W	Online	New	PJ22434

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MQIT0003I	Online	New	PJ22434
MQIT0004I	Online	New	PJ22434
NKEY0001I	Online	No Longer Supported	PJ22705
NKEY0002I	Online	No Longer Supported	PJ22705
NKEY0003I	Online	No Longer Supported	PJ22705
NKEY0023I	Online	New	PJ22705
NKEY0024I	Online	New	PJ22705
NKEY0025I	Online	New	PJ22705
RCP ITEMS OUT OF SEQUENCE	Offline	New	PJ21224
RCP SEQUENCE NUMBER: nnnnnnnn IS IN ERROR – RUN ABORTED	Offline	New	PJ21224
RECOUP LOGGING RECORD OUT OF SEQUENCE	Offline	New	PJ21224
RECP0022T	Online	Changed	PJ21224
RECP004CT	Online	New	PJ21224
RUN ABORTED, RCP HAD INCORRECT TIME STAMP	Offline	New	PJ21224
STAT0009I	Online	No Longer Supported	PJ23178
STAT0011I	Online	New	PJ23178
STRC0001I	Online	No Longer Supported	PJ22571
STRC0002I	Online	No Longer Supported	PJ22571
STRC0004I	Online	No Longer Supported	PJ22571
SYSL0001I	Online	New	PJ23178
SYSL0002I	Online	New	PJ23178
SYSL0003I	Online	New	PJ23178
SYSL0004E	Online	New	PJ23178
SYSL0005E	Online	New	PJ23178
SYSL0006E	Online	New	PJ23178
SYSL0007E	Online	New	PJ23178
SYSL0008E	Online	New	PJ23178
SYSL0009E	Online	New	PJ23178
TMSL0001I	Online	New	PJ23178
TMSL0002I	Online	New	PJ23178
TMSL0003I	Online	New	PJ23178
TMSL0004I	Online	New	PJ23178
TMSL0005I	Online	New	PJ23178
TMSL0006E	Online	New	PJ23178
TMSL0007E	Online	New	PJ23178
TMSL0008E	Online	New	PJ23178
TMSL0009E	Online	New	PJ23178
TMSL0010I	Online	New	PJ23178
TMSL0011E	Online	New	PJ23178

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
TMSL0013E	Online	New	PJ23178
TMSL0014E	Online	New	PJ23178
TMSL0015E	Online	New	PJ23178
PUT 4			
000576	System Error	No Longer Supported	PJ21313
0007E5	System Error	New	PJ21713
0007E6	System Error	New	PJ21713
0009D0	System Error	New	PJ21044
0009D1	System Error	New	PJ21044
0009E0	System Error	New	PJ21044
0009E1	System Error	New	PJ21044
0009E2	System Error	New	PJ21044
0009E3	System Error	New	PJ21044
0009E4	System Error	New	PJ21044
0009E5	System Error	New	PJ21044
0009E6	System Error	New	PJ21044
0009E7	System Error	New	PJ21044
0009EA	System Error	New	PJ21044
0009EB	System Error	New	PJ21044
0009F0	System Error	New	PJ21044
0009F1	System Error	New	PJ21044
0009F2	System Error	New	PJ21044
0009F3	System Error	New	PJ21044
0009F4	System Error	New	PJ21044
0009F5	System Error	New	PJ21044
0009F6	System Error	New	PJ21044
0009F7	System Error	New	PJ21044
0009F8	System Error	New	PJ21044
009100	System Error	New	PJ21791
009101	System Error	New	PJ21791
009102	System Error	New	PJ21791
009103	System Error	New	PJ21791
009104	System Error	New	PJ21791
009105	System Error	New	PJ21791
009106	System Error	New	PJ21791
009107	System Error	New	PJ21791
00910A	System Error	New	PJ21791
009110	System Error	New	PJ21791
009111	System Error	New	PJ21791
009112	System Error	New	PJ21791
009113	System Error	New	PJ21791
009114	System Error	New	PJ21791
009115	System Error	New	PJ21791
009116	System Error	New	PJ21791

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
094003	System Error	New	PJ21167
09400A	System Error	Changed	PJ21167
09400E	System Error	New	PJ21167
094011	System Error	New	PJ21167
BRCP0005E	Online	New	PJ21044
CLAW0001I	Online	New	PJ21791
CLAW0002E	Online	New	PJ21791
CLAW0003I	Online	New	PJ21791
CLAW0004E	Online	New	PJ21791
CLAW0005E	Online	New	PJ21791
CLAW0006E	Online	New	PJ21791
CLAW0007E	Online	New	PJ21791
CLAW0008I	Online	New	PJ21791
CLAW0009E	Online	New	PJ21791
CLAW0010I	Online	New	PJ21791
CLAW0011I	Online	New	PJ21791
CLAW0013I	Online	New	PJ21791
CLAW0014E	Online	New	PJ21791
CLAW0015E	Online	New	PJ21791
CLAW0018E	Online	New	PJ21791
CLAW0019E	Online	New	PJ21791
CLAW0021E	Online	New	PJ21791
CLAW0022E	Online	New	PJ21791
CLAW0023E	Online	New	PJ21791
CLAW0024E	Online	New	PJ21791
CLAW0026I	Online	New	PJ21791
CLAW0027E	Online	New	PJ21791
CLAW0028E	Online	New	PJ21791
CLAW0029E	Online	New	PJ21791
CLAW0030E	Online	New	PJ21791
CLAW0033E	Online	New	PJ21791
CLAW0035E	Online	New	PJ21791
CLAW0036E	Online	New	PJ21791
CLAW0037I	Online	New	PJ21791
CLAW0038E	Online	New	PJ21791
CLAW0039E	Online	New	PJ21791
CLAW0040E	Online	New	PJ21791
CLAW0041E	Online	New	PJ21791
CLAW0042E	Online	New	PJ21791
CLAW0043E	Online	New	PJ21791
CLAW0044I	Online	New	PJ21791
CLAW0045E	Online	New	PJ21791
CLAW0046I	Online	New	PJ21791
CLAW0047I	Online	New	PJ21791

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CLAW0048E	Online	New	PJ21791
CLAW0071I	Online	New	PJ21791
CLAW0072I	Online	New	PJ21791
CLAW0073I	Online	New	PJ21791
CLAW0074I	Online	New	PJ21791
CLAW0082I	Online	New	PJ21791
CLAW0083E	Online	New	PJ21791
CLAW0084I	Online	New	PJ21791
CLAW0085E	Online	New	PJ21791
CLAW0086I	Online	New	PJ21791
CLAW0088E	Online	New	PJ21791
CLAW0089I	Online	New	PJ21791
CLAW0090E	Online	New	PJ21791
CLAW0091E	Online	New	PJ21791
CLAW0092I	Online	New	PJ21791
CLAW0093E	Online	New	PJ21791
CLAW0094I	Online	New	PJ21791
CLAW0095E	Online	New	PJ21791
CLAW0096E	Online	New	PJ21791
CLAW0097I	Online	New	PJ21791
CLAW0098I	Online	New	PJ21791
CLAW0099E	Online	New	PJ21791
CLCL0066W	Online	New	PJ21791
CLCL0067E	Online	New	PJ21791
CLC00001I	Online	New	PJ21791
CLID0001E	Online	No Longer Supported	PJ20555
CLID0002E	Online	No Longer Supported	PJ20555
CLID0003E	Online	No Longer Supported	PJ20555
CLID0004E	Online	No Longer Supported	PJ20555
CLID0005E	Online	No Longer Supported	PJ20555
CLID0006E	Online	No Longer Supported	PJ20555
CPSF0026A	Online	New	PJ15208
CSG40053E	Online	New	PJ21044
CSG40054W	Online	New	PJ21044
CSG40055E	Online	New	PJ21044
CSNB0001E	Online	New	PJ21044
CSNB0002I	Online	New	PJ21044
CSNB0003E	Online	New	PJ21044
CSNB0004I	Online	New	PJ21044
CSNB0005I	Online	New	PJ21044
CTKA0003I	Online	No Longer Supported	PJ21167
CTKA0004I	Online	No Longer Supported	PJ21167
CTKA0005I	Online	New	PJ21167
CTKA0006I	Online	New	PJ21167

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CTKA0059E	Online	Changed	PJ21167
CVX30052E	Online	No Longer Supported	PJ20149
CVX30053E	Online	No Longer Supported	PJ20149
DCOR0063E	Online	New	PJ21167
DMOD0001E	Online	New	PJ21548
DMOD0002E	Online	New	PJ21548
IFIL0030E	Online	New	PJ21415
MPIF0036E	Online	New	PJ21596
MPIF0037E	Online	New	PJ21596
MPIF0038E	Online	New	PJ21596
MPIF0040E	Online	New	PJ21596
MPIF0041E	Online	New	PJ21596
MPIF0042I	Online	New	PJ21596
MPIF0043E	Online	New	PJ21596
MPIF0044E	Online	New	PJ21596
MPIF0045E	Online	New	PJ21596
MPIF0046E	Online	New	PJ21596
MPIF0047E	Online	New	PJ21596
NDYN0000E	Online	New	PJ21044
NDYN0004E	Online	New	PJ21044
NDYN0005I	Online	New	PJ21044
NDYN0006I	Online	New	PJ21044
NDYN0020I	Online	New	PJ21044
NDYN0030I	Online	New	PJ21044
NDYN0040I	Online	New	PJ21044
NDYN0050I	Online	New	PJ21044
NDYN0061E	Online	New	PJ21044
NDYN0062E	Online	New	PJ21044
NDYN0063E	Online	New	PJ21044
NDYN0064I	Online	New	PJ21044
NDYN0065E	Online	New	PJ21044
NDYN0066E	Online	New	PJ21044
NDYN0070E	Online	New	PJ21044
NDYN0072E	Online	New	PJ21044
NDYN0073E	Online	New	PJ21044
NDYN0074I	Online	New	PJ21044
NDYN0075I	Online	New	PJ21044
NDYN0077E	Online	New	PJ21044
NDYN0078E	Online	New	PJ21044
NDYN0079E	Online	New	PJ21044
NDYN0080I	Online	New	PJ21044
NDYN0081E	Online	New	PJ21044
NDYN0082E	Online	New	PJ21044
NDYN0083E	Online	New	PJ21044

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
NDYN0084E	Online	New	PJ21044
NDYN0085E	Online	New	PJ21044
NDYN0086E	Online	New	PJ21044
NDYN0087E	Online	New	PJ21044
NDYN0088E	Online	New	PJ21044
NDYN0089E	Online	New	PJ21044
NDYN0090E	Online	New	PJ21044
NDYN0091E	Online	New	PJ21044
NDYN0092E	Online	New	PJ21044
NNCB0003E	Online	No Longer Supported	PJ21044
NNCB0018E	Online	New	PJ21044
NNCB0019E	Online	New	PJ21044
NNCB0020E	Online	New	PJ21044
NNCB0021E	Online	New	PJ21044
NNCB0022E	Online	New	PJ21044
NNCB0023E	Online	New	PJ21044
NNCB0024E	Online	New	PJ21044
NNCB0026E	Online	New	PJ21044
NNCB0027E	Online	New	PJ21044
NNCB0028E	Online	New	PJ21044
NNCB0029I	Online	New	PJ21044
NNCB0030E	Online	New	PJ21044
NNCB0031E	Online	New	PJ21044
NNCB0032E	Online	New	PJ21044
NNCB0033E	Online	New	PJ21044
NNCB0034E	Online	New	PJ21044
NNCB0035E	Online	New	PJ21044
NNCB0051E	Online	No Longer Supported	PJ21044
NNCB0070I	Online	New	PJ21044
NNCB0071I	Online	New	PJ21044
NNCB0072E	Online	New	PJ21044
NNCB0073W	Online	New	PJ21044
NNCB0074I	Online	New	PJ21044
NNCB0075I	Online	New	PJ21044
NNCB0076I	Online	New	PJ21044
NNCB0077I	Online	New	PJ21044
NNCB0078I	Online	New	PJ21044
NNCB0079E	Online	New	PJ21044
NNCB0080E	Online	New	PJ21044
NNCB0083W	Online	New	PJ21044
NNCB0084I	Online	New	PJ21044
NNCB0085I	Online	New	PJ21044
NNCB0086I	Online	New	PJ21044
NNCB0087E	Online	New	PJ21044

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
NNCB0088E	Online	New	PJ21044
NNCB0089E	Online	New	PJ21044
NNCB0090E	Online	New	PJ21044
NNCB0091E	Online	New	PJ21044
NNCB0092E	Online	New	PJ21044
NNCB0093I	Online	New	PJ21044
NNCB0094W	Online	New	PJ21044
NNCB0096E	Online	New	PJ21044
NNCB0097I	Online	New	PJ21044
NNCB0098I	Online	New	PJ21044
NNCB0099I	Online	New	PJ21044
NNCB0100E	Online	New	PJ21044
NNCB0110I	Online	New	PJ21044
NNCB0130I	Online	New	PJ21044
NOPL0003I	Online	New	PJ21044
NOPL0033E	Online	Changed	PJ21044
NOPL0034E	Online	Changed	PJ21044
NOPL0040E	Online	No Longer Supported	PJ21044
NOPL0040A	Online	New	PJ21044
NOPL0041E	Online	No Longer Supported	PJ21044
NOPL0042E	Online	No Longer Supported	PJ21044
NOPL0042A	Online	New	PJ21044
NOPL0050E	Online	No Longer Supported	PJ21044
NOPL0052A	Online	New	PJ21044
NOPL0062A	Online	Changed	PJ21044
NOPL0063A	Online	Changed	PJ21044
NOPL0064I	Online	New	PJ21044
NOPL0065I	Online	New	PJ21044
NOPL0066E	Online	New	PJ21044
NOPL0067E	Online	New	PJ21044
NOPL0068E	Online	New	PJ21044
NOPL0069A	Online	New	PJ21044
NOPL0072E	Online	New	PJ21044
NOPL0073E	Online	New	PJ21044
NOPL0074E	Online	New	PJ21044
NOPL0075E	Online	New	PJ21044
NOPL0076E	Online	New	PJ21044
NOPL0077E	Online	New	PJ21044
NOPL0078E	Online	New	PJ21044
OLDR2050T	Online	New	PJ20404
OLDR2051T	Online	New	PJ20404
OLDR2052T	Online	New	PJ20404
ONL010	Offline	New	PJ21266
PRSE0012E	Online	No Longer Supported	PJ22161

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
RIPL0011E	Online	New	PJ21939
SOCK0001E	Online	New	PJ21791
SOCK0002E	Online	New	PJ21791
SOCK0003E	Online	New	PJ21791
SOCK0004E	Online	New	PJ21791
STAT0008I	Online	No Longer Supported	PJ21167
STAT0010I	Online	New	PJ21167
PUT 3			
000012	System Error	Changed	PJ19844
00006D	System Error	New	PJ19403
000079	System Error	Changed	PJ19966
ALDR0905E	Offline	Changed	PJ19966
C62100	System Error	New	PJ19949
C62101	System Error	New	PJ19949
C62102	System Error	New	PJ19949
C62103	System Error	New	PJ19949
C62104	System Error	New	PJ19949
C62105	System Error	New	PJ19949
C62106	System Error	New	PJ19949
C62107	System Error	New	PJ19949
C62108	System Error	New	PJ19949
C62109	System Error	New	PJ19949
C6210A	System Error	New	PJ19949
C6210B	System Error	New	PJ19949
C6210C	System Error	New	PJ19949
C6210D	System Error	New	PJ19949
C6210E	System Error	New	PJ19949
C6210F	System Error	New	PJ19949
C62110	System Error	New	PJ19949
C62111	System Error	New	PJ19949
C62112	System Error	New	PJ19949
C62113	System Error	New	PJ19949
C62114	System Error	New	PJ19949
APPN0001I	Online	New	PJ19949
APPN0002I	Online	New	PJ19949
APPN0003I	Online	New	PJ19949
APPN0040W	Online	New	PJ19949
APPN0050E	Online	New	PJ19949
APPN0051E	Online	New	PJ19949
APPN0052A	Online	New	PJ19949
APPN0053A	Online	New	PJ19949
CCIM0092W	Online	New	PJ19949
CCIM0093W	Online	New	PJ19949
CIL60111E	Online	New	PJ19966

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CILE0103W	Online	Changed	PJ19966
CILF0107E	Online	Changed	PJ19966
CILF0108E	Online	Changed	PJ19966
CILF0110E	Online	Changed	PJ19966
CILF0112E	Online	New	PJ19966
CILH0111E	Online	New	PJ19966
CILH0112E	Online	New	PJ19966
CVAD0013E	Online	New	PJ18916
EM116	Offline	New	PJ19949
FMSG0013E	Online	No Longer Supported	PJ18916
MEAS0029I	Online	New	PJ18660
NAPN0001I	Online	New	PJ19949
NAPN0002I	Online	New	PJ19949
NAPN0003I	Online	New	PJ19949
NAPN0004I	Online	New	PJ19949
NAPN0005W	Online	New	PJ19949
NAPN0006E	Online	New	PJ19949
NAPN0007E	Online	New	PJ19949
NAPN0008E	Online	New	PJ19949
NAPN0009E	Online	New	PJ19949
NAPN0010E	Online	New	PJ19949
NAPN0012I	Online	New	PJ19949
NAPN0013E	Online	New	PJ19949
NAPN0014E	Online	New	PJ19949
NAPN0015I	Online	New	PJ19949
NETW0062I	Online	New	PJ19949
NETW0064I	Online	New	PJ19949
NETW0063I	Online	New	PJ19949
NETW0065I	Online	New	PJ19949
NETW0100I	Online	New	PJ19949
NETW0101I	Online	New	PJ19949
NETW0103E	Online	New	PJ19949
NETW0104E	Online	New	PJ19949
NETW0105E	Online	New	PJ19949
NETW0106E	Online	New	PJ19949
NETW0107E	Online	New	PJ19949
NETW0108E	Online	New	PJ19949
NETW0109E	Online	New	PJ19949
NETW0110E	Online	New	PJ19949
NETW0111E	Online	New	PJ19949
NETW0112E			
NETW0113E	Online	New	PJ19949
NETW0114E	Online	New	PJ19949
NETW0115E	Online	New	PJ19949

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
NETW0116E	Online	New	PJ19949
NETW0117E	Online	New	PJ19949
NETW0118E	Online	New	PJ19949
NETW0119E	Online	New	PJ19949
NETW0120E	Online	New	PJ19949
OLDR0013T	Offline	No Longer Supported	PJ19966
OLDR0077I	Offline	New	PJ19966
OLDR0078E	Offline	New	PJ19966
OLDR0079E	Offline	New	PJ19966
OLDR0080E	Offline	New	PJ19966
OLDR0081T	Offline	New	PJ19966
OLDR0082E	Offline	New	PJ19966
OLDR0083E	Offline	New	PJ19966
OLDR0084E	Offline	New	PJ19966
OLDR0085E	Offline	New	PJ19966
OLDR0086E	Offline	New	PJ19966
OLDR0087W	Offline	New	PJ19966
OLDR0088E	Offline	New	PJ19966
OLDR0089E	Offline	New	PJ19966
OLDR0211E	Online	Changed	PJ19966
OLDR0212E	Online	No Longer Supported	PJ19966
OLDR0214E	Online	New	PJ19966
OLDR2026T	Online	New	PJ19966
OLDR2028T	Online	New	PJ19966
OLDR2029T	Online	New	PJ19966
OLDR2030T	Online	New	PJ19966
OLDR2031T	Online	New	PJ19966
OLDR2032W	Online	New	PJ19966
OLDR3015T	Online	New	PJ19966
OLDR3016T	Online	New	PJ19966
OLDR3200T	Online	Changed	PJ19966
OLDR3212E	Online	Changed	PJ19966
OLDR3225E	Online	New	PJ19966
OLDR4140W	Online	New	PJ18093
OLDR5822T	Online	New	PJ19966
STRC0001I	Online	No Longer Supported	PJ19422
STRC0002I	Online	No Longer Supported	PJ19422
STRC0003I	Online	New	PJ19422
STRC0004I	Online	New	PJ19422
TPFL0002W	Offline	Changed	PJ19966
TPFL0003W	Offline	Changed	PJ19966
TPFL0004W	Offline	New	PJ19966
XID30000I	Online	No Longer Supported	PJ19949
XID30001I	Online	No Longer Supported	PJ19949

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
XID30002I	Online	No Longer Supported	PJ19949
XID30003I	Online	No Longer Supported	PJ19949
XID30050E	Online	No Longer Supported	PJ19949
XID30051E	Online	No Longer Supported	PJ19949
XID30052E	Online	No Longer Supported	PJ19949
XID30053E	Online	No Longer Supported	PJ19949
XID30054E	Online	No Longer Supported	PJ19949
XID30055E	Online	No Longer Supported	PJ19949
XID30056E	Online	No Longer Supported	PJ19949
XID30060I	Online	New	PJ19949
XID30061I	Online	New	PJ19949
XID30062I	Online	New	PJ19949
XID30070E	Online	New	PJ19949
XID30071E	Online	New	PJ19949
XID30072E	Online	New	PJ19949
XID30073E	Online	New	PJ19949
XID30074E	Online	New	PJ19949
XID30075E	Online	New	PJ19949
XID30076E	Online	New	PJ19949
PUT 2			
00000F	System Error	Changed	PJ15508
00004D	System Error	New	PJ17852
00004F	System Error	No Longer Supported	PJ17852
000061	System Error	New	PJ17852
000062	System Error	New	PJ17852
000063	System Error	New	PJ17852
000064	System Error	New	PJ17852
000077	System Error	New	PJ17852
000079	System Error	New	PJ17852
000079	System Error	New	PJ17852
0002A5	System Error	Changed	PJ15542
0004DE	System Error	New	PJ15581
041504	System Error	New	PJ15959
094000	System Error	New	PJ17852
094001	System Error	New	PJ17852
094002	System Error	New	PJ17852
094004	System Error	New	PJ17852
094005	System Error	New	PJ17852
094006	System Error	New	PJ17852
094007	System Error	New	PJ17852
094008	System Error	New	PJ17852
094009	System Error	New	PJ17852
09400A	System Error	New	PJ17852
09400B	System Error	New	PJ17852

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
09400C	System Error	New	PJ17852
09400F	System Error	New	PJ17852
ACPL0048E	Online	No Longer Supported	PJ17852
ACPL0049E	Online	No Longer Supported	PJ17852
ACPL0076E	Online	No Longer Supported	PJ17852
ACPL0077E	Online	No Longer Supported	PJ17852
ACPL0097W	Online	New	PJ17852
ACPL0098E	Online	New	PJ17852
ACPL0099E	Online	New	PJ17852
ACPL0100E	Online	New	PJ17852
ACPL0101E	Online	New	PJ17852
ACPL0102E	Online	New	PJ17852
ACPL0103E	Online	New	PJ17852
ALDR0901E	Offline	New	PJ17852
ALDR0902E	Offline	New	PJ17852
ALDR0903E	Offline	New	PJ17852
ALDR0904E	Offline	New	PJ17852
ALDR0905E	Offline	New	PJ17852
APAT0015E	Online	New	PJ17852
CBLD0000I	Offline	New	PJ17852
CBLD0400W	Offline	New	PJ17852
CBLD0401W	Offline	New	PJ17852
CBLD0402W	Offline	New	PJ17852
CBLD0410W	Offline	New	PJ17852
CBLD0801E	Offline	New	PJ17852
CBLD0802E	Offline	New	PJ17852
CBLD1208T	Offline	New	PJ17852
CBLD1211T	Offline	New	PJ17852
CBLD1212T	Offline	New	PJ17852
CILC0101E	Online	New	PJ17852
CILD0104E	Online	New	PJ17852
CILD0105E	Online	New	PJ17852
CILD0106W	Online	New	PJ17852
CILE0102E	Online	New	PJ17852
CILE0103W	Online	New	PJ17852
CILF0107E	Online	New	PJ17852
CILF0108E	Online	New	PJ17852
CILF0109W	Online	New	PJ17852
CILF0110E	Online	New	PJ17852
CILF0111E	Online	New	PJ17852
CLGX0012E	Online	Changed	PJ15221
CLGX0019E	Online	Changed	PJ15221
CPSF0003E	Online	No Longer Supported	PJ17852
CSMP0097I	Online	Changed	PJ15668

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
CSMP0099I	Online	Changed	PJ17859
CTKA0003I	Online	New	PJ17852
CTKA0004I	Online	New	PJ17852
CTKA0059E	Online	New	PJ17852
CVX00055E	Online	New	PJ15598
CVX30051E	Online	No Longer Supported	PJ15598
CYC00001W	Online	Changed	PJ17912
CYC00003I	Online	Changed	PJ17912
CYEN0099E	Online	New	PJ15766, PJ15916
DADF0102E	Online	No Longer Supported	PJ17852
DADF0126E	Online	New	PJ17852
DPAT0001I	Online	No Longer Supported	PJ17852
DPAT0002I	Online	No Longer Supported	PJ17852
DPAT0003I	Online	New	PJ17852
DPAT0004I	Online	New	PJ17852
DSMG0043E	Online	New	PJ16767
DYDU0008I	Online	Changed	PJ17912
DYO01000W	Offline	New	PJ17912
DYO02000E	Offline	New	PJ17912
FCTB0107E	Offline	New	PJ17852
FRST0030E	Online	New	PJ15752
IMAG0079E	Online	New	PJ17852
IMAG0081E	Online	New	PJ17852
IMAG0082E	Online	New	PJ17852
IMAG0083E	Online	New	PJ17852
LIBI0801E	Offline	New	PJ17852
LIBI0802E	Offline	New	PJ17852
LIBI0810E	Offline	New	PJ17852
LIBI0815E	Offline	New	PJ17852
LIBI0820E	Offline	New	PJ17852
LIBI0821E	Offline	New	PJ17852
LIBI0822E	Offline	New	PJ17852
LIBI0823E	Offline	New	PJ17852
LIBI0824E	Offline	New	PJ17852
LIBI1201T	Offline	New	PJ17852
LIBI1202T	Offline	New	PJ17852
LIBI1212T	Offline	New	PJ17852
LIBI1213T	Offline	New	PJ17852
LIBI1250T	Offline	New	PJ17852
LIBI1251T	Offline	New	PJ17852
LIBI1252T	Offline	New	PJ17852
LIBI1253T	Offline	New	PJ17852
LIBI1254T	Offline	New	PJ17852
LIBI1260T	Offline	New	PJ17852

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
MPIF0074W	Online	Changed	PJ15668
NETW0050I	Online	Changed	PJ17315
NOT LOADED — PGM CAN ONLY BE LOADED IN THE BSS	Offline	New	PJ17852
NOT LOADED — PGM NOT FOUND IN LIBRARY	Offline	New	PJ17852
NOT LOADED — PGM NOT REAL TIME	Offline	New	PJ17852
OLDR5208I	Online	New	PJ14947
OLDR5209W	Online	New	PJ14947
PARS LIST vv NOT AVAILABLE - LOAD ENDS	Offline	New	PJ17852
PMIG0001I	Online	New	PJ17912
PMIG0002I	Online	New	PJ17912
PMIG0003T	Online	New	PJ17912
PMIG0004I	Online	New	PJ17912
PMIG0005I	Online	New	PJ17912
PMIG0006W	Online	New	PJ17912
PMIG0007T	Online	New	PJ17912
PMIG0008T	Online	New	PJ17912
PMIG0009T	Online	New	PJ17912
PSMS0027W	Online	New	PJ14737
SQLD0081I	Online	New	PJ23931
SQLD0082E	Online	New	PJ23931
SQLD0083E	Online	New	PJ23931
SQLD0084E	Online	New	PJ23931
SQLD0085E	Online	New	PJ23931
SQLD0086I	Online	New	PJ23931
SQLD0087I	Online	New	PJ23931
SQLD0088I	Online	New	PJ23931
SQLD0089E	Online	New	PJ23931
SQLD0098E	Online	New	PJ23931
SSCP0028I	Online	Changed	PJ17092
STUB0001I	Offline	New	PJ17852
STUB0010W	Offline	New	PJ17852
STUB0100E	Offline	New	PJ17852
STUB0101E	Offline	New	PJ17852
STUB1200T	Offline	New	PJ17852
TLDR0200T	Offline	New	PJ17852
TLDR0201T	Offline	New	PJ17852
TLDR0202T	Offline	New	PJ17852
TLDR0210T	Offline	New	PJ17852
TLDR0211T	Offline	New	PJ17852

Table 1292. Message and System Error Changes by PUT and APAR (continued)

Message ID or System Error Number	Message Type	New, Changed, or No Longer Supported?	APAR Number
TPFL0002W	Offline	New	PJ17852
TPFL0003W	Offline	New	PJ17852
WARNING — PROG-MOD-BASE CLEAR CARD INPUT, PROGRAM MODULE BASE WILL BE CLEARED	Offline	New	PJ17852
WARNING — REP CARD NOT SUPPORTED FOR PROGRAM MODULE	Offline	New	PJ17852
ZNETW message series	Online	No Longer Supported	Not Applicable

Segments

Table 1293 summarizes segment changes. This information is presented in alphabetic order by the name of the segment.

Table 1293. Segment Changes by PUT and APAR

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
PUT 15					
ACPD	Real-Time Assembler	Not Applicable	Changed	Updated to bypass CYCPC macro calls on a loader general file IPL.	PJ27920
ACPJ	Real-Time Assembler	Not Applicable	Changed	Updated to bypass CYCPC macro calls on a loader general file IPL.	PJ27920
ACPL	Real-Time Assembler	Not Applicable	Changed	Updated message ACPL0006I to handle more than 32 767 file resident programs.	PJ27665
ALDR	Offline Assembler	TPFLDR	Changed	Updated to continue processing when load module processing fails.	PJ27941
BCAI	Real-Time Assembler	Not Applicable	Changed	Updated to change the setting for BL0ECB.	PJ28119
BCC2	Real-Time Assembler	Not Applicable	Changed	Updated to prevent an OPR-I041122 dump from occurring.	PJ28092
BCP5	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ27848.	PJ27848
BKDU	Real-Time Assembler	Not Applicable	Changed	Updated to prevent message RECP0098E from occurring.	PJ28119
BKP5	Real-Time Assembler	Not Applicable	Changed	Created new messages BKP60004E, BKP60005E, and BKP60006E.	PJ27848
BOF1	Real-Time Assembler	Not Applicable	Changed	Created new message BOF10029I.	PJ27848
BRB4	Real-Time Assembler	Not Applicable	Changed	Deleted message BRB40002I.	PJ27848
BREP	Real-Time Assembler	Not Applicable	New	Created new messages BREP0001A, BREP0002T, BREP0003I, BREP0004E, BREP0005E, BREP0006E.	PJ27848

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
BRFM	Real-Time Assembler	Not Applicable	Changed	Updated to reset CE1CC0 if it is a global record.	PJ28092
B RTP	Real-Time Assembler	Not Applicable	Changed	Updated to display an out-of-range message if a message segment is not loaded.	PJ27951
B RTS	Real-Time Assembler	Not Applicable	Changed	Updated so that it is not marked as an HPO segment.	PJ27951
B RTT	Real-Time Assembler	Not Applicable	Changed	Updated so that it is not marked as an HPO segment.	PJ27951
B WRT	Real-Time Assembler	Not Applicable	Changed	Updated to get the correct count of TPF collection support records.	PJ28092
B XBK	Real-Time Assembler	Not Applicable	Changed	Updated to correct error handling for message FRST0098A.	PJ27737
CAPD	Real-Time Assembler	Not Applicable	Changed	Updated the ZECBL command to no longer pause the TPF 4.1 system when determining the program name for a given ECB.	PJ27873
CBY1	Real-Time Assembler	Not Applicable	Changed	Updated to serialized MPIF startup.	PJ27391
CCNUCL	CSECT	Not Applicable	Not Applicable	Reassemble this CSECT to support changes made to the CTME copy member for APAR PJ28117.	PJ28117
CCOSAE	Object Code Only	CPS0	Changed	Updated to allow you to apply OSA-Express support to back-level TPF 4.1 systems.	PJ27799
CCVAGE	CSECT	Not Applicable	Not Applicable	Updated for APAR PJ27871.	PJ27871
CIPY	Real-Time Assembler	Not Applicable	Changed	Updated to ensure that validation data specified with the ZAPGM command does not extend beyond the end of the record (PJ27727). Updated to ensure that ZDPGM command output is not displayed in disassembled format if the INSTR parameter is not entered (PJ27808).	PJ27727, PJ27808
CLCNM	Real-Time Assembler	CISO	No Longer Supported	Replaced by the new DLM CLNM.	PJ27786
CLMODN	C Language	CISO	No Longer Supported	Replaced by the new DLM CMLM.	PJ27786
CLNM	Real-Time Assembler	CLNM	New	Removed user-modifiable code from CISO; replaces CLCNM.	PJ27786
CL11	Real-Time Assembler	Not Applicable	Changed	Updated to make corrections to APAR PJ27466, and updated for APAR PJ28059.	PJ28030, PJ28059
CL22	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ28059	PJ28059
CL23	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ28059.	PJ28059
CL31	Real-Time Assembler	Not Applicable	Changed	Updated to call CL13 to determine if a DASD transaction event was committed.	PJ27925
CL99	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ28059	PJ28059

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CMLM	C Language	CMLM	New	Removed user-modifiable code from CISO; replaces CLMODN.	PJ27786
CMTL	Real-Time Assembler	Not Applicable	Changed	Updated to set the protect key back to protected storage after returning from segment CMX0.	PJ27789
CMVW	Real-Time Assembler	Not Applicable	Changed	Updated to change the base register used for LOCKIT and UNLOCKIT subroutines.	PJ27911
CMWF	Real-Time Assembler	Not Applicable	Changed	Updated to correct a timing problem with LU 0 SLU-Thread Sessions.	PJ27693
COEF	Real-Time Assembler	Not Applicable	Changed	Updated to use the correct address when disabling and enabling I/O interrupts.	PJ27895
COER	Real-Time Assembler	Not Applicable	Changed	Updated to correct a TCP/IP restart problem.	PJ27967
COS9	Real-Time Assembler	Not Applicable	Changed	Updated to resolve a register corruption problem.	PJ27611
COSL	Real-Time Assembler	Not Applicable	Changed	Updated to replace the DLAYC macro with EVNTC and EVNWC macro calls.	PJ27571
CPSZ	Real-Time Assembler	Not Applicable	Changed	Updated to copy the LWS and NAB into the stack frame.	PJ27997
CQAM	Real-Time Assembler	Not Applicable	Changed	Updated so that TOD clock confirmation is no longer requested (and, in some situations, STR interrupts are enabled) if STR interrupts are disabled when a non-loosely coupled processor IPLs.	PJ27818
CRZ1	Real-Time Assembler	Not Applicable	Changed	Updated to display message CRZ10010E when the displacement exceeds the block size for a chain address.	PJ27685
CSBI	Real-Time Assembler	Not Applicable	Changed	Updated to correct an error while building the CDTERM-INACT-ORDERLY locate response (PJ27969). Updated to correct APAR PJ27969 that caused the PCID table to become full (PJ28058).	PJ27969, PJ28058
CSBP	Real-Time Assembler	Not Applicable	Changed	Updated to correct an error while building the CDTERM-INACT-ORDERLY locate response (PJ27969). Updated to correct a possible CTL-3 error when a search-only LOCATE is received (PJ28038).	PJ27969, PJ28038
CSNAM	Real-Time Assembler	CISO	No Longer Supported	Replaced by the new CSNM DLM.	PJ27786
CSNM	Real-Time Assembler	CSNMM	New	Removed user-modifiable code from CISO; replaces CSNAM.	PJ27786
CSO1	Real-Time Assembler	Not Applicable	Changed	Updated to correct a display problem.	PJ27793

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CSS0	Real-Time Assembler	Not Applicable	Changed	Updated to ensure that the maximum number of subsystem IDs (SSIDs) that can reside in the subsystem status table (SSST) overflow area is X'19E6'to stay in the file allocation in the IBMM4 fixed file record.	PJ27831
CTFA	Real-Time Assembler	Not Applicable	Changed	Updated to correct the WTOPC for message SOCK0011I.	PJ27893
CTSR	Real-Time Assembler	Not Applicable	Changed	Updated to correct a TCP/IP restart problem.	PJ27967
CTS0	Real-Time Assembler	Not Applicable	Changed	Updated to verify that socket descriptor is not in use.	PJ27968
CVBC	Real-Time Assembler	Not Applicable	Changed	Updated to ensure that validation data specified with the ZAREC and ZAFIL commands does not extend beyond the end of the record.	PJ27727
CYGR	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a CTL-3 error from occurring when IPLing from a loader general file (LGF).	PJ28069
CYH4	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a CTL-3 error from occurring on an internal call error path.	PJ28121
CYPB	Real-Time Assembler	Not Applicable	Changed	Updated to change CRET time to run in 1052 state.	PJ27760
CYPJ	Real-Time Assembler	Not Applicable	Changed	Updated to make corrections to APAR PJ26686.	PJ27950
CYB6	Real-Time Assembler	Not Applicable	Changed	Added new error message DADF0064E.	PJ27727
CYPP	Real-Time Assembler	Not Applicable	Changed	Updated to change CRET time to run in 1052 state and clear the CRET indicator bit at copy completion.	PJ27760
CYPT	Real-Time Assembler	Not Applicable	New	Updated to change CRET time to run in 1052 state.	PJ27760
C249	Real-Time Assembler	Not Applicable	Changed	Corrected the mask value that is used to determine the function return code.	PJ28105
DRVA	Offline Assembler	DRIVERA and MASM	Changed	Updated to force a default of ARCH(0) with the compiler.	PJ28128
FTVA03	Offline C Language	FCTB	Changed	Updated for APAR PJ27951.	PJ27951
NLDT	Offline C Language	TPFLDR	Changed	Updated to correct an error that occurred when loading load modules after applying APAR PJ27845.	PJ27866
UDRR	Real-Time Assembler	Not Applicable	Changed	Added for user data recovery restore support.	PJ27728
UDRS	Real-Time Assembler	Not Applicable	Changed	Added for user data recovery copy support.	PJ27728
UIO2	Real-Time Assembler	Not Applicable	Changed	Updated to correctly set up AAA/RCB base register after issuing system error 01F01F.	PJ27813

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
UMET	Real-Time Assembler	Not Applicable	Changed	Updated for user data recovery support.	PJ27728
USUD	C Language	USUD	New	Removed user-modifiable code from CISO.	PJ27786
XLFF	Real-Time Assembler	Not Applicable	Changed	Updated a WTOPC macro to use the default substitution area (CE1MAC) rather than ECB fields.	PJ27881
PUT 14					
ALDR	Offline Assembler	TPFLDR	Changed	Updated to fix the control program link map when the control program includes unnamed CSECTs.	PJ27376
ASF1	Real-Time Assembler	Not Applicable	Changed	Updated loop processing to correctly search the IP message block.	PJ27492
BXAB	Real-Time Assembler	Not Applicable	Changed	Updated to correct the errors when a single module is captured following the completion of the ZFCAP commands with the ALL parameter specified.	PJ27414
BXAG	Real-Time Assembler	Not Applicable	Changed	Updated the ZFCAP STATUS command to exclude information for inactive processors.	PJ27319
BXBM	Real-Time Assembler	Not Applicable	Changed	Updated to correct the errors when a single module is captured following the completion of the ZFCAP command with the ALL parameter specified.	PJ27414
B0SH	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
B1AA	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
B1BK	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BAM0	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606, PJ27647
BAM1	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BAM5	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BCC1	Real-Time Assembler	Not Applicable	Changed	Updated to use register 6 (R6) to contain the address of the persistent identifier across MALOC calls.	PJ27874
BCC2	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ27874
BCP5	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BEWP	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BKA0	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
BKDY	Real-Time Assembler	Not Applicable	Changed	Updated to correct the descriptor for #SONSP.	PJ27857
BKD7	Real-Time Assembler	Not Applicable	Changed	Updated to remove an unnecessary check for a zero persistent identifier.	PJ27874
BKPA	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BLOG	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a CTL-22 dump during cycle to NORM state.	PJ27762
BOF7	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BOFC	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
BOFD	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
BOFE	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
BOFG	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BPM0	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BRFM	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BRPT	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BRT0	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
B RTP	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BRTV	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BRUB	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BRYD	Real-Time Assembler	Not Applicable	Changed	Removed code related to the obsolete DGF.	PJ27636
BRYE	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
BRYL	Real-Time Assembler	Not Applicable	Changed	Removed code related to the obsolete DGF.	PJ27636
BRYM	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
BRYN	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
BRYU	Real-Time Assembler	Not Applicable	Changed	Updated so that the in-core directories are captured correctly.	PJ27857
BS0C	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BSSC	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606
BWRA	Real-Time Assembler	Not Applicable	Changed	Updated for pool maintenance rewrite.	PJ27606

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CAC9	Real-Time Assembler	Not Applicable	Changed	Updated to define missing lengths.	PJ27548
CBQ7	Real-Time Assembler	Not Applicable	Changed	Updated to define missing lengths.	PJ27548
CPSA	Real-Time Assembler	Not Applicable	Changed	Updated to branch around the IFL0DF macro if TPFDF is not installed.	PJ27872
CCUEXT	Real-Time Assembler	CPS0	Changed	Updated to remove extraneous bits (PJ27525). Updated to preserve all data levels across TPFDF macro and function calls (PJ27530).	PJ27525, PJ27530
CHDF	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a 000E08 system error dump during ACTIVATE_ON_RECEIPT (AOR) processing.	PJ27602
CHNR	Real-Time Assembler	Not Applicable	Changed	Updated processing to allow a new parameter (NONE) for the ZNCNS INIT command and the CNOSC macro.	PJ27468
CHNS	Real-Time Assembler	Not Applicable	Changed	Updated processing to allow a new parameter (NONE) for the ZNCNS INIT command and the CNOSC macro.	PJ27468
CHNV	Real-Time Assembler	Not Applicable	Changed	Updated processing to allow a new parameter (NONE) for the ZNCNS INIT command and the CNOSC macro.	PJ27468
CHRY	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CLH0	Real-Time Assembler	Not Applicable	Changed	Updated to include the new keyword RLVAL.	PJ27446
CLH2	Real-Time Assembler	Not Applicable	Changed	Updated to include the new keyword RLVAL.	PJ27446
CLH3	Real-Time Assembler	Not Applicable	Changed	Updated to include the new keyword RLVAL.	PJ27446
CLM7	Real-Time Assembler	Not Applicable	Changed	Updated the 004645 system error to print with a prefix of I rather than E.	PJ27452
CL11	Real-Time Assembler	Not Applicable	Changed	Updated to make adjustments for VPARS.	PJ27446
CL21	Real-Time Assembler	Not Applicable	Changed	Updated to make adjustments for VPARS.	PJ27446
CL24	Real-Time Assembler	Not Applicable	Changed	Updated to make adjustments for VPARS.	PJ27446
CMQAPI	C++ Language	CMQS	New	Added support for MQPMO_NEW_MSG_ID.	PJ27407
CMQMGR	C++ Language	CMQS	Changed	MQSeries recoup change.	PJ27274
CMQQUE	C++ Language	CMQS	New (PJ27407), Changed (PJ27555)	Added support for the MsgID field in MQMD (PJ27407). Updated to check messages on the transmission queue for MQXQH (PJ27555).	PJ27407, PJ27555

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CMTF	Real-Time Assembler	Not Applicable	Changed	Updated to check for level on D0 when processing a ZNRPT command.	PJ27534
CMVH	Real-Time Assembler	Not Applicable	Changed	Added code to prevent SRT slots from becoming unusable.	PJ27279
COA4	Real-Time Assembler	Not Applicable	Changed	Updated to preserve all data levels across TPFDF macro and function calls.	PJ27530
COBD	Real-Time Assembler	Not Applicable	Changed	Updated to perform a GFS state check before issuing a RELFC.	PJ27316
CORE	Real-Time Assembler	Not Applicable	Changed (PJ27283)	Updated to seize the entry for the IBM 3494 or 3495 data server device after the device has been located in the online portion of the tape status table (TSTB). After seizing the entry, CORE will verify that the entry still contains the device (PJ27283). Updated to correct a blank volume serial number (VSN) if the ZTPLF UNLOAD command is entered for a volume before the load for that volume has completed (PJ27455)	PJ27283, PJ27455
CORK	Real-Time Assembler	Not Applicable	Changed	Added the CEFR0391E message (PJ27400). Added the CEFR0392W, CEFR0393W, CEFR0394E, and CEFR0395E messages (PJ27410). Added the COSK0396A message (PJ27689)	PJ27400, PJ27410, PJ27689
CORO	Real-Time Assembler	Not Applicable	Changed	Updated to wait for 1 second instead of issuing the DLAYC macro when the mount request indicates that the device is busy. In addition, the number of retries for both the mount and dismount requests was increased from 5 to 10 (APAR PJ27283). Updated support for the virtual tape server (VTS) Selective Attention Suppression function. The VTS must be at or above microcode level 2.22.18.3 (APAR PJ27543).	PJ27283, PJ27543
COSB	Real-Time Assembler	Not Applicable	Changed	Updated support for the virtual tape server (VTS) Selective Attention Suppression function.	PJ27543
COSI	Real-Time Assembler	Not Applicable	Changed	Updated to handle error scenarios for the ZTMNT command with the OVERLAY parameter specified.	PJ27538
COSK	Real-Time Assembler	Not Applicable	Not Applicable	Although this segment was not changed by APAR PJ27689, you must reassemble it because of other changes made by this APAR.	PJ27689

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
COSM	Real-Time Assembler	Not Applicable	Not Applicable	Although this segment was not changed by APAR PJ27689, you must reassemble it because of other changes made by this APAR.	PJ27689
COSR	Real-Time Assembler	Not Applicable	Changed	Removed the COSK0200I message.	PJ27689
COSZ	Real-Time Assembler	Not Applicable	Changed	Removed the CEFRO347W, CEFRO348W, and CEFRO349E messages.	PJ27410
COTM	Real-Time Assembler	Not Applicable	Changed	Updated to handle error scenarios for the ZTMNT command with the OVERLAY parameter specified.	PJ27538
CPSA	Real-Time Assembler	Not Applicable	Changed	Updated to preserve all data levels across TPFDF macro and function calls.	PJ27530
CPSA	Real-Time Assembler	Not Applicable	Changed	Updated to bypass the TPFDF product for non-TPFDF systems.	PJ27872
CPSZ	Real-Time Assembler	Not Applicable	Changed	Updated to properly detect secondary LIBVEC processing.	PJ27434
CSAH	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CSBA	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CSBB	Real-Time Assembler	Not Applicable	Changed	Updated to have CVOE use the CP name of the complex.	PJ27389
CSBL	Real-Time Assembler	Not Applicable	Changed	Updated the Clear Path Switch Locate flag on the interface to CSBS.	PJ27412
CSBM	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CSBO	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CSBP	Real-Time Assembler	Not Applicable	Changed	Updated the Clear Path Switch Locate flag on the interface to CSBS.	PJ27412
CSBX	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CSCZ	Real-Time Assembler	Not Applicable	Changed	Updated processing to select an LU 6.2 session.	PJ27385
CSEA	Real-Time Assembler	Not Applicable	Changed	Updated processing to allow a new parameter (NONE) for the ZNETW ACTIVATE command and the CNOSC macro.	PJ27468
CSED	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CSGA	Real-Time Assembler	Not Applicable	Changed	Updated to process a new parameter for the SNAKEY macro.	PJ26334
CSHL	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582
CSH3	Real-Time Assembler	Not Applicable	Changed	Updated to use the CPU ID from the PID table instead of the ECB.	PJ27582

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CSK0	Real-Time Assembler	Not Applicable	Changed	Updated to add a new parameter for the SNAKEY macro.	PJ26334
CSTDLL	Real-Time Assembler	Not Applicable	Changed	Updated to provide a field in C startup code for customer use.	PJ27692
CSTRTD	Real-Time Assembler	Not Applicable	Changed	Updated to provide a field in C startup code for customer use.	PJ27692
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Updated to provide a field in C startup code for customer use.	PJ27692
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated to prevent the 000022 system error dump during cycle to NORM state (PJ27762). Updated to set up register 0 (R0) correctly (PJ27746).	PJ27762, PJ27746
CTKS	Real-Time Assembler	Not Applicable	Changed	Updated to preserve all data levels across TPFDF macro and function calls.	PJ27530
CTKTI	Real-Time Assembler	Not Applicable	Changed	Updated for PJ27628.	PJ27628
CTSA	Real-Time Assembler	Not Applicable	Changed	Updated so that the TCP/IP native stack AOR processor correctly saves the caller PBI and SSU information.	PJ27758
CTSB	Real-Time Assembler	Not Applicable	Changed	Updated so that the TCP/IP native stack AOR processor correctly saves the caller PBI and SSU information.	PJ27758
CTSC	Real-Time Assembler	Not Applicable	Changed	Updated so that the TCP/IP native stack AOR processor correctly saves the caller PBI and SSU information.	PJ27758
CTSG	Real-Time Assembler	Not Applicable	Changed	Updated so that the TCP/IP native stack AOR processor correctly saves the caller PBI and SSU information.	PJ27758
CTSI	Assembler	Not Applicable	Changed	Corrects the SIOCGIFFLAGS command of the <code>ioctl()</code> API.	PJ27761
CTS7	Real-Time Assembler	Not Applicable	Changed	Updated the TOLEN field for TCP <code>recvfrom</code> .	PJ27428
CUSCPF	C++ Language	CMQS	Changed	MQSeries recoup change.	PJ27274
CUSCQM	C++ Language	CMQS	Changed	MQSeries recoup change.	PJ27274
CVAA	Real-Time Assembler	Not Applicable	Changed	Added a check for the message length.	PJ27239
CVAI	Real-Time Assembler	CVAI	Changed	Restored header line text.	PJ27470
CVLD	Real-Time Assembler	Not Applicable	Changed	Updated to add the new 0003CC system error.	PJ27595
CVLG	Real-Time Assembler	Not Applicable	Changed	Updated to issue the 0003CC system error if the ZLSTP command times out.	PJ27595
CWGX	Real-Time Assembler	Not Applicable	Changed	Updated to set up data levels for CWGX to interface with the error routine in XLZ1.	PJ27423

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CYAA	Real-Time Assembler	Not Applicable	Changed	Removed code related to the obsolete DGF.	PJ27724
CYAB	Real-Time Assembler	Not Applicable	Changed	Updated to prevent a CTL-22 dump during cycle to NORM state.	PJ27762
CYAE	Real-Time Assembler	Not Applicable	Changed	Removed code related to the obsolete DGF.	PJ27636
CYPA	Real-Time Assembler	Not Applicable	Changed	Updated for ZMCPY command processing (PJ27430). Updated for multiple module copy support (PJ27482).	PJ27430, PJ27482
CYPB	Real-Time Assembler	Not Applicable	Changed	Updated for ZMCPY command processing (PJ27430). Updated for multiple module copy support (PJ27588).	PJ27430, PJ27588
CYPI	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ27583
CYPP	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26826
DCRZ	Offline Assembler	Not Applicable	Changed	Updated to define the description for the new 0003CC system error.	PJ27595
DRD0	Real-Time Assembler	Not Applicable	Changed	Updated to remove a comma as a valid parameter delimiter for ZRTDM MODIFY command processing. A blank space is the only valid delimiter.	PJ27432
DRD3	Real-Time Assembler	Not Applicable	Changed	Updated to prevent certain record IDs from becoming VFA candidates.	PJ27000
DRD6	Real-Time Assembler	Not Applicable	Changed	Updated to prevent certain record IDs from becoming VFA candidates.	PJ27000
DYDD	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
DYDF	Real-Time Assembler	Not Applicable	No Longer Supported	Removed code related to the obsolete DGF.	PJ27636
DYDU	Real-Time Assembler	Not Applicable	Changed	Removed code related to the obsolete DGF.	PJ27636
JRA2	Offline PL/I	DATAREAD	Changed	Updated to correct the calculation for VFA total data reads and total accesses for the Random File Access Summary report. Recompile the JRA2 segment and relink the DATAREAD link-edit module. See <i>TPF System Performance and Measurement Reference</i> for more information about the Random File Access Summary report.	PJ27462
JRF5	Offline PL/I	DATAREAD	Changed	Updated to correctly set up report headings on FILE detail reports for data reduction in a multiple subsystem environment. Recompile the JRF5 segment and relink the DATAREAD link-edit module.	PJ27702

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
LEDT	Real-Time Assembler	TPFLDR	Changed	Updated to preserve all data levels across TPFDF macro and function calls. Link-edit STC.	PJ27530
NLDTRL	Offline C Language	TPFLDR	Changed	Updated to preserve all data levels across TPFDF macro and function calls.	PJ27530
PROFFUNC	Real-Time Assembler	Not Applicable	Changed	Updated to turn off trace hooks in the descriptor and to disable restricted macro authorization around the progc() and getpc() calls.	PJ27563
TPFDBG	Offline	TPFDBG	New	Updated for TPF Assembler Debugger for VisualAge Client.	PJ27540
TLDR	Offline Assembler	TPFLDR	Changed	Updated to fix the control program link map when the control program includes unnamed CSECTs.	PJ27376
UCPY	Real-Time Assembler	Not Applicable	New	Created for the Module Copy Selection/Validation user exit.	PJ27430
UCTK	Real-Time Assembler	Not Applicable	Changed	Updated to preserve all data levels across TPFDF macro and function calls.	PJ27530
XLEE	Real-Time Assembler	Not Applicable	Changed	Updated to set up data levels for XLEE to interface with the error routine in XLZ4.	PJ27423
XLFF	Real-Time Assembler	Not Applicable	Changed	Changed a TDTAC macro call to a TWRTC macro call so that an end-of-volume condition can be handled correctly.	PJ27594
PUT 13					
ACPL	Real-Time Assembler	Not Applicable	Changed	Updated to correct problems IPLing the general file loader due to APAR PJ27393.	PJ27483
BKDB	Real-Time Assembler	Not Applicable	Changed	Recoup descriptor BKDB was modified to contain information about the new system recovery table (SRT) record type (#SRTRU). The old SRT record type (#SRTRI) was removed from the descriptor.	PJ27415
BXAG	Real-Time Assembler	Not Applicable	Changed	Updated to detect the MODULE parameter for the ZFCAP STATUS command and call the BXUB segment.	PJ27197
BXAZ	Real-Time Assembler	Not Applicable	Changed	Updated to improve XCP and KPT restore tape handling.	PJ27285
BXGY	Real-Time Assembler	Not Applicable	Changed	Updated to improve XCP and KPT restore tape handling.	PJ27285
BXUB	Real-Time Assembler	Not Applicable	New	Added to process the MODULE parameter for the ZFCAP STATUS command.	PJ27197
C190	Real-Time Assembler	Not Applicable	Changed	Changes to ZTPLF processing.	PJ27256
CAPK	Assembler	CAPK	Changed	Updated editing of the secondary action code.	PJ27246

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CBPK	Assembler	CBPK	Changed	Updated editing of the secondary action code.	PJ27246
CBR0	Assembler	Not Applicable	Changed	IPL not implemented on buffer size mismatch.	PJ27273
CCUEXT	Real-Time Assembler	Not Applicable	Changed	Updated to add support for user exits to be called without affecting the low core table in the CAPT segment.	PJ27019
CFID	Real-Time C Language	Not Applicable	Changed	Updated to support removal of nested directories from a directory other than the current working directory.	PJ27078
CGLOBA	Real-Time Assembler	Not Applicable	Changed	Updated to calculate the size of synchronizable global records correctly.	PJ27340
CITT	Real-Time Assembler	Not Applicable	Changed	Updated the check for enter log processing (APAR PJ27025). Updated by filling in ECB fields for use by CLGU (PJ27026).	PJ27025, PJ27026
CLCL	Real-Time Assembler	Not Applicable	Changed	Updated to check system resources before writing CLAW trace data to tape.	PJ27288
CLM3	Real-Time Assembler	Not Applicable	Changed	Updated for the ZRHLD DELETE command.	PJ27302
CLMB	Real-Time Assembler	Not Applicable	Changed	Updated for the ZRHLD DELETE command.	PJ27302
CLMC	Real-Time Assembler	Not Applicable	Changed	Updated for the ZRHLD DELETE command.	PJ27302
CLMD	Real-Time Assembler	Not Applicable	Changed	Updated for the ZRHLD DELETE command.	PJ27302
CLMG	Real-Time Assembler	Not Applicable	Changed	Updated for the ZRHLD DELETE command.	PJ27302
CLMI	Real-Time Assembler	Not Applicable	Changed	Updated for the ZRHLD DELETE command.	PJ27302
CMADAT	Real-Time Assembler	Not Applicable	Changed	Updated to save the inbound packet message length in the ECB work area.	PJ26858
CMAF	Real-Time Assembler	Not Applicable	Changed	Updated to check the MATIP terminal type.	PJ26858
CMARTN	Real-Time Assembler	Not Applicable	Changed	Updated to call conv_from_omsg to translate the message text.	PJ26858
CMOA	Real-Time Assembler	Not Applicable	Changed	Updated to call conv_from_omsg in CMARTN to translate the message text.	PJ26858
CMOB	Real-Time Assembler	Not Applicable	Changed	Updated to call conv_from_omsg in CMARTN to translate the message text.	PJ26858
CMQMGC	C++	CMQS	Changed	Updated to migrate changes.	PJ27190
CMQMGR	C++ Language	CMQS	Changed	Updated to migrate changes.	PJ27190
CMTB	Real-Time Assembler	Not Applicable	Changed	Updated to add the current entry control block (ECB) on the virtual file access count (VCT) list.	PJ27004

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CMTJ	Real-Time Assembler	Not Applicable	Changed	Updated to fix CTL-4 when running in BLKCHK mode.	PJ26897
CORB	Real-Time Assembler	Not Applicable	Changed	Updated to handle an error case where the library manager is offline.	PJ26851
CORC	Real-Time Assembler	Not Applicable	Changed	Updated to add new message CORC0289I.	PJ26527
CORE	Real-Time Assembler	Not Applicable	Changed	Updated to support CK1VOLS as a halfword field.	PJ27087
COS7	Real-Time Assembler	Not Applicable	Changed	Updated for the ZTGRP command.	PJ27309
COS8	Real-Time Assembler	Not Applicable	Changed	Updated for the ZTGRP command.	PJ27309
COS8	Real-Time Assembler	Not Applicable	Changed	Updated to change the display for the ZTGRP command with the DISPLAY and DEVICES parameters specified to include device assignments originally made with the SSU ALL option.	PJ27183
COSG	Real-Time Assembler	Not Applicable	Changed	Updated to write a tapemark after the dummy HDR1 label record is written to an ALT tape.	PJ27154
COSM	Real-Time Assembler	Not Applicable	Changed	Updated to issue a LOCKC macro on the tape allocate lock (CPMTALK) to serialize the modification of the tape status table (TSTB) during tape switch processing.	PJ26794
COT7	Real-Time Assembler	Not Applicable	Changed	Updated routine COT7MSG to specify LET=E for the WTOPC macro call instead of LET=I.	PJ26739
COTU	Real-Time Assembler	Not Applicable	Changed	Updated so this segment no longer attempts to release a resource that was not previously held when issuing an error message.	PJ27219
CRIO	Real-Time Assembler	Not Applicable	Changed	Updated to call conv_from_omsg in CMARTN to translate the message text.	PJ26858
CSGB	Real-Time Assembler	Not Applicable	Changed	Updated to allocate CW0CC areas for active links first.	PJ27198
CSJA	Real-Time Assembler	Not Applicable	Changed	Updated to restore addressability to the path information unit (PIU).	PJ27198
CSTJ	Real-Time Assembler	Not Applicable	Changed	Updated to bypass a check if system initialization was not done by the TPF 4.1 system (APAR PJ27294). Updated to support the mode name subfield with a length of one (APAR PJ27303).	PJ27294, PJ27303

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Updated for the TPF Assembler Debugger for VisualAge Client (APAR PJ27254). Updated to resolve the unresolved references that can occur when the CSTRTL startup code is assembled using the NOBATCH option (APAR PJ27361). Updated to handle unresolved references for the lowercase memmove function during prelinking and link-editing of TPF segments.	PJ27254, PJ27361, PJ27522
CTSI	Assembler	Not Applicable	Changed	Corrects the SIOCGIFFLAGS command of the <code>ioctl()</code> API.	PJ27438
CTS2	Real-Time Assembler	Not Applicable	Changed	Updated the loading of the timeout value.	PJ27187
CTX1	Real-Time Assembler	Not Applicable	Changed	Updated to check Internet Protocol (IP) link status before starting the XID3 exchange.	PJ27204
CVAH	Assembler	CVAH	Changed	Updated resegments.	PJ27246
CVAI	Assembler	CVAI	Changed	Updated resegments.	PJ27246
CVAW	Real-Time Assembler	Not Applicable	Changed	Updated to initialize the C DEBUGGER HOOK field of the ZDPAT command display to N/A for unallocated programs.	PJ27235
CVG5	Real-Time Assembler	Not Applicable	Changed	Updated to recognize data sets created with the NOIMBED option and to read the correct data set component required for the sequence set index records.	PJ27038
CVIQ	Real-Time Assembler	CVIQ	Changed	Added an additional check for TCC terminal messages.	PJ27359
CYAR	Real-Time Assembler	Not Applicable	Changed	Updated to perform pool directory migration.	PJ27354
CYPA	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ27347
CYPB	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ27097, PJ27347
CYPE	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ27296, PJ27097
CYPF	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ27289
CYPG	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ27296
CYPJ	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ27347
DCRS	Offline Assembler	DCRS	Changed	Updated the macro cross-reference program to read macros that are coded in lowercase characters.	PJ27208
DRD5	Real-Time Assembler	Not Applicable	Changed	Updated to change the length of the ENTRLEN label from X'1C' to X'14'.	PJ27017

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
DRD6	Real-Time Assembler	Not Applicable	Changed	Updated by APAR PJ27287.	PJ27287
DRVA	Offline Assembler	DRIVERA and MASM	Changed	Corrected the optimization parameter and removed support for old compilers.	PJ27075
DRVA	Offline Assembler	DRIVERA and MASM	Changed	Added two default compiler options.	PJ27473
DYO0	Offline PL/I	DYOPM	Changed	Updated to perform pool directory migration.	PJ27354
FTVA03	Offline C Language	FCTB	Changed	Updated for CRUISE multiple reference check (MRC).	PJ27305
GNTAGH	Offline C Language	GNTAGH	Changed	Updated for use with High Level Assembler (HLASM) Version 1.3.	PJ27339
JCD0	Real-Time Assembler	Not Applicable	Changed	Updated to enter the JC00 segment.	PJ25743
JCD1	Real-Time Assembler	Not Applicable	Changed	Updated to reset the new DC0SWSTR bit when necessary. This bit was added to the DC0SW2 byte in the DC0DC data macro.	PJ25743
JCD3	Real-Time Assembler	Not Applicable	Changed	Updated to reset the new DC0SWSTR bit when necessary. This bit was added to the DC0SW2 byte in the DC0DC data macro.	PJ25743
JC00	Real-Time Assembler	Not Applicable	New	Created to set the new DC0SWSTR bit when the ZMEAS command is entered. This bit was added to the DC0SW2 byte in the DC0DC data macro.	PJ25743
JRS3	Offline PL/I	DATAREAD	Changed	Updated to correct the indexing into the Time Available Supervisor shutdown indicator bit array for the System Summary report on TPF shutdown conditions. The JRS3 segment must be recompiled and DATAREAD must be relinked.	PJ27358
MASM	Offline	MASM	Changed	Corrected the optimization parameter and removed support for old compilers.	PJ27075
PTVB	Real-Time Assembler	Not Applicable	Changed	Updated to correct the 000004 system error.	PJ27262
PUT 12					
ACPD	Real-Time Assembler	Not Applicable	Changed	Updated the data loader to allow you to load a pilot tape to the TPF 4.1 system in any state. Normally, you can load a pilot tape to the TPF 4.1 system only in 1052 state; however, with this change, if the pilot tape has an ID of N, you can load it in any state.	PJ26090
ACPL	Core Image Restart Assembler	Not Applicable	Changed	The parameters passed to user exit UELI were modified to pass the program base as a character value instead of a decimal value.	PJ26744

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
BDBA	Real-Time Assembler	Not Applicable	Changed	Updated to correct a problem when restarting the output phase of database reorganization (DBR) in a multiple database function (MDBF) environment.	PJ26782
BDBK	Real-Time Assembler	Not Applicable	Changed	Updated to correct a problem when restarting the output phase of database reorganization (DBR) in a multiple database function (MDBF) environment.	PJ26782
BDBL	Real-Time Assembler	Not Applicable	Changed	Updated to correct a problem when restarting the input phase of database reorganization (DBR).	PJ26770
BDBN	Real-Time Assembler	Not Applicable	Changed	Updated to properly display output when dealing with a file address compute (FACE) program type of zero.	PJ26733
BDBP	Real-Time Assembler	Not Applicable	Changed	Updated to correct a problem when capturing pool records during the output phase of database reorganization (DBR).	PJ26749
BDBY	Real-Time Assembler	Not Applicable	Changed	Updated to correct a problem when restarting the output phase of database reorganization (DBR) in a multiple database function (MDBF) environment.	PJ26782
BKD7	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ26957.	PJ26957
BXAT	Real-Time Assembler	Not Applicable	Changed	Updated by APAR PJ26734.	PJ26734
CBP0	E-Type	Not Applicable	Changed	Updated with a check for a MPIF device that is already defined.	PJ26680
CCCLHR	CSECT	Not Applicable	Not Applicable	Reassemble this CSECT and relink it with the remainder of the CSECTs to support changes made to the CLHL copy member for APAR PJ26880.	PJ26880
CCENBK	CSECT	Not Applicable	Not Applicable	Reassemble this CSECT and relink it with the remainder of the CSECTs to support changes made to the IDS macro used by the CCED copy member.	PJ21337
CCNUCL	CSECT	Not Applicable	Not Applicable	Reassemble this CSECT and relink it with the remainder of the CSECTs to support changes made to the CTME and CAPT copy members for APAR PJ26880.	PJ26880
CCOMIC	Real-Time Assembler	Not Applicable	Changed	Updated to call the TPF Database Facility (TPDF) CL80 user exit when open TPDF files are detected.	PJ26746
CCSNA4	CSECT	Not Applicable	Not Applicable	Reassemble this CSECT and relink it with the remainder of the CSECTs to support changes made to the CS0B copy member for APAR PJ26880.	PJ26880

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CCTAPE	Assembler	Not Applicable	Not Applicable	Reassemble the CCTAPE tape control program to pick up changes to the copy members (CEFE, CEFR, CEFS, and CEFM) that were updated.	PJ26823
CCVAGE	CSECT	Not Applicable	Not Applicable	Updated to disable the TPF Assembler Debugger for VisualAge Client during PAUSC processing.	PJ26923
CDCO	Real-Time C Language	CDCO	New	Created for TPF Application Requester (TPFAR) continuous data collection (CDC).	PJ27095
CDCR	Real-Time Assembler	CDCP	New	Created for TPFAR CDC.	PJ27095
CDE1	Real-Time Assembler	Not Applicable	Changed	Updated to obtain the correct loadset name and only show the program displacement for assembler programs in the ZFECB command display.	PJ25546
CDE2	Real-Time Assembler	Not Applicable	Changed	Updated to obtain the correct program allocation table (PAT) slot address for the ZFECB command display.	PJ25546
CDL8	Real-Time Assembler	Not Applicable	Changed	Updated the processing of the ZNOPL MERGE command.	PJ26908
CEXIT	Real-Time Assembler	Not Applicable	Changed	Updated for multibyte character, wide character, and locale (MWL) support.	PJ21337
CHZY	Real-Time Assembler	Not Applicable	Changed	Updated to compare labels with a fullword instead of a byte.	PJ26290
CIP0	Real-Time Assembler	Not Applicable	Changed	Updated to correct a CTL-4 error during processing of the ZDPGM command.	PJ27003
CLM0	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26931.	PJ26931
CLTD	Offline Assembler	CLTD	Changed	Updated to support the DATE, TIME, and DUR parameters of the ZCLAW data trace postprocessor, which is activated by the ZCLAW TRACE command.	PJ26978
CL51	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL52	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL53	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL54	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL55	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL56	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL57	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CL58	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL59	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL60	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL61	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL62	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL63	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL64	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL65	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL66	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL67	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL68	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL69	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL70	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL71	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL72	Object Code Only	Not Applicable	New	Created for APAR PJ21337.	PJ21337
CL80	Real-Time Assembler	Not Applicable	Changed	Updated to detect open TPF Database Facility (TPPDF) files when closing a commit scope.	PJ26746
CL80	Real-Time Assembler	Not Applicable	Changed	Updated to add AIF to exclude TPDF references from non-TPPDF systems. If the &SBTPPDF bit is set off, the TPDF references are not generated and CL80 exits.	PJ27156
CMTJ	Real-Time Assembler	Not Applicable	Changed	Updated UNBIND () processing.	PJ26753
CMTV	Real-Time Assembler	Not Applicable	Changed	Updated to add sense code table entries..	PJ26753
CMVA	Real-Time Assembler	Not Applicable	Changed	Updated SRT slot delete processing.	PJ26783
CORO	Real-Time Assembler	Not Applicable	Changed	Updated the offline tape device configuration. Ensure the device is a tape device before attempting mount. Limit mount retries to a maximum of five and check for activity before dismount.	PJ26545, PJ26597
COSA	Real-Time Assembler	Not Applicable	Changed	Updated to avoid a hang condition in tape restart.	PJ26542

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
COSR	Real-Time Assembler	Not Applicable	Changed	Updated message skeletons to return response to originator.	PJ26678
CPAA	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26362.	PJ26362
CPAD	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26362.	PJ26362
CPSZ	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26923.	PJ26923
CRT0	Real-Time Assembler	Not Applicable	No Longer Supported	Obsoleted by APAR PJ26892.	PJ26892
CRZ1	Real-Time Assembler	Not Applicable	Changed	Added the SONIC macro to the CRZ1 segment to verify the record size with the file address specified. This record size will compare with the input displacement field to ensure the displacement is in the record size range. The CRZ10008E and CRZ10009E messages were also added to the CRZ1 segment.	PJ26941
CSBP	Real-Time Assembler	Not Applicable	Changed	Updated Search Only request processing (APAR PJ26570). Updated a bit setting for APPN processing (APAR PJ26912).	PJ26570, PJ26912
CSBW	Real-Time Assembler	Not Applicable	Changed	Updated Search Only processing.	PJ26570
CSG7	Real-Time Assembler	Not Applicable	Changed	Updated processing of SNA restart for dynamic LU support.	PJ26896
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Changed from object code only to C language source.	PJ21337, PJ26757
CS0E	Real-Time Assembler	CPS0	Changed	Updated session pacing processing.	PJ25893
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated to remove code that is no longer in use.	PJ26892
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated to prevent positive feedback from starting until the TPF 4.1 system is above UTIL state. Starting positive feedback before the system is above UTIL state causes errors because pool records are not available to be dispensed.	PJ27006
CTSG	Real-Time Assembler	Not Applicable	Changed	Updated to allow TPF debugger tracing of segments that are activated by activate_on_accept.	PJ26793
CTSI	Real-Time Assembler	Not Applicable	Changed	Updated TCP/IP native stack ioctl processor for ioctl TPF_NOSWEEP parameter processing.	PJ26917
CTSR	Real-Time Assembler	Not Applicable	Changed	Updated to determine if the CKSM instruction is available.	PJ26842
CTSW	Real-Time Assembler	Not Applicable	Changed	Updated TCP/IP native stack socket sweeper code to check if socket should be monitored by the sweeper.	PJ26917

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CTS9	Real-Time Assembler	Not Applicable	Changed	Updated select processing for socket descriptors.	PJ26895
CUDW	Real-Time Assembler	Not Applicable	New	Provides subsystem support for the TPF Assembler Debugger for VisualAge Client.	PJ26864
CVAX	Real-Time Assembler	Not Applicable	Changed	Corrected processing for the ZPTCH command when the EXECUTE parameter is specified.	PJ26933
CVC0	Real-Time Assembler	Not Applicable	Changed	Updated by APAR PJ26963 to correct parsing on the ZDTOD command.	PJ26963
CVF2	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26931.	PJ26931
CVHA	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVHB	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVHC	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVHF	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVHL	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVHY	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVH1	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVPQ	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVPT	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVPX	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ26909.	PJ26909
CVOJ	Real-Time Assembler	Not Applicable	Changed	Updated by APAR PJ26880.	PJ26880
CVRA	Real-Time Assembler	Not Applicable	Changed	Updated to eliminate operator intervention during an initial program load (IPL) of a processor with 2 GB of storage (where GB equals 1 073 741 824 bytes).	PJ26780
CVVA	Real-Time Assembler	Not Applicable	Changed	Updated by APAR PJ26781.	PJ26781
CYB3	Real-Time Assembler	Not Applicable	Changed	Corrected processing for the ZPTCH command when the EXECUTE parameter is specified.	PJ26933
DRD5	Real-Time Assembler	Not Applicable	Changed	Updated to remove code that is no longer in use.	PJ26892
FTVA02	Offline C Language	FCTBG	Changed	Updated because a protection exception (USER=3000) can occur when the file address compute program table generator (FCTBG) is run.	PJ26674

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
JRS3	Offline PL/I	DATAREAD	Changed	Updated to check the file system cache counters for zero before using them for computation.	PJ26779
RLCH	Real-Time Assembler	Not Applicable	Changed	Removed unnecessary calls to the KEYCC and KEYRC macros.	PJ26795
SADUMP	Offline Assembler	Not Applicable	Changed	Updated by APAR PJ26731.	PJ26731
TLDRMN	Offline C Language	TPFLDR	Changed	Corrected error checking when a file cannot be opened.	PJ26567
UFC1	Real-Time Assembler	Not Applicable	New	Updated by APAR PJ26781.	PJ26781
UFC2	Real-Time Assembler	Not Applicable	New	Updated by APAR PJ26781.	PJ26781
UFC3	Real-Time Assembler	Not Applicable	New	Updated by APAR PJ26781.	PJ26781
UFC4	Real-Time Assembler	Not Applicable	New	Updated by APAR PJ26781.	PJ26781
UFC5	Real-Time Assembler	Not Applicable	New	Updated by APAR PJ26781.	PJ26781
UFC6	Real-Time Assembler	Not Applicable	New	Updated by APAR PJ26781.	PJ26781
UFC7	Real-Time Assembler	Not Applicable	New	Updated by APAR PJ26781.	PJ26781
PUT 11					
CACHE	Real-Time Assembler	Not Applicable	New	Added for file system performance enhancements.	PJ26713
CAC6	Real-Time Assembler	Not Applicable	Changed	Updated for the IBM Enterprise Storage Server (ESS) disk storage system support.	PJ26511
CDB1	Real-Time Assembler	Not Applicable	Changed	Updated to reduce TPF 4.1 system overhead by reducing the number of calls to the CDB0 segment.	PJ26596, PJ26511
CGTB	Real-Time Assembler	Not Applicable	Changed	Updated the ZDWGT ENTRY command display.	PJ26214
CHDD	Real-Time Assembler	Not Applicable	Changed	Updated with an ECB check to determine if the CCB exists.	PJ26571
CHRS	Real-Time Assembler	Not Applicable	Changed	Updated CHRS to release data level DD before using it again.	PJ26124
CHSD	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CIPY	Real-Time Assembler	Not Applicable	Changed	Updated to correct the ZDPGM and ZAPGM command displays.	PJ26524, PJ26322
CIPZ	Real-Time Assembler	Not Applicable	Changed	Updated to search the pool management global table to determine whether a particular pool type has been generated for any device type.	PJ25582
CIP0	Real-Time Assembler	Not Applicable	Changed	Updated to correct the disassembled format of the ZDPGM command display.	PJ25748
CL11	Real-Time Assembler	Not Applicable	Changed	Updated to initialize the log access channel program.	PJ26439

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CL11	Real-Time Assembler	Not Applicable	Changed	Updated commit and rollback table initialization and restart.	PJ26687
CL21	Real-Time Assembler	Not Applicable	Changed	Updated to move channel program initialization logic to the CL11 segment and to check if the program name in the log header is known to the TPF system.	PJ26439
CL21	Real-Time Assembler	Not Applicable	Changed	Updated log manager and restart recovery for TPF transaction services.	PJ26687
CL22	Real-Time Assembler	Not Applicable	Changed	Updated the recovery log write routine for TPF transaction services.	PJ26687
CL23	Real-Time Assembler	Not Applicable	Changed	Updated the recovery log checkpoint routine for TPF transaction services.	PJ26687
CL42	Real-Time Assembler	Not Applicable	Changed	Updated the ZCORO command for TPF transaction services.	PJ26687
CL4A	Real-Time C Language	Not Applicable	Changed	Updated to correct the 000004 or 000075 system errors.	PJ26469
CL80	Real-Time Assembler	Not Applicable	New	Added TPF transaction services user exit for TPF Database Facility (TPPDF).	PJ26366
CLIB	Real-Time Assembler	Not Applicable	Changed	Updated to add the selective core resident load user exit (UCLB).	PJ26283
CLM2	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CLMM	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CMTA	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CMTB	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CMTF	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CMTL	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CMTS	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CMTZ	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CMVF	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CMWF	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CMWJ	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
COLL	Real-Time Assembler	Not Applicable	Changed	Updated to allow for ROUTC with expanded RCPL.	PJ25980
COSA	Real-Time Assembler	Not Applicable	Changed	Updated for tape restart. Note that since tape restart completes before E-type loader restart completes, you must load the code changes for APAR PJ26417 in one of two ways: using the tape (TLDR) loader; or by using E-type loader followed by activating and accepting the loadeset, and then performing an initial program load (IPL) of the TPF system.	PJ26417
COSE	Real-Time Assembler	Not Applicable	Changed	Updated for tape restart. Note that since tape restart completes before E-type loader restart completes, you must load the code changes for APAR PJ26417 in one of two ways: using the tape (TLDR) loader; or by using E-type loader followed by activating and accepting the loadeset, and then performing an initial program load (IPL) of the TPF system.	PJ26417
COSL	Real-Time Assembler	Not Applicable	Changed	Updated for tape restart. Note that since tape restart completes before E-type loader restart completes, you must load the code changes for APAR PJ26417 in one of two ways: using the tape (TLDR) loader; or by using E-type loader followed by activating and accepting the loadeset, and then performing an initial program load (IPL) of the TPF system.	PJ26417

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
COS9	Real-Time Assembler	Not Applicable	Changed	Updated for tape restart. Note that since tape restat completes before E-type loader restart completes, you must load the code changes for APAR PJ26417 in one of two ways: using the tape (TLDR) loader; or by using E-type loader followed by activating and accepting the loadeset, and then performing an initial program load (IPL) of the TPF system.	PJ26417
COT1	Real-Time Assembler	Not Applicable	Changed	Updated for tape restart. Note that since tape restat completes before E-type loader restart completes, you must load the code changes for APAR PJ26417 in one of two ways: using the tape (TLDR) loader; or by using E-type loader followed by activating and accepting the loadeset, and then performing an initial program load (IPL) of the TPF system.	PJ26417
CPAA	Real-Time Assembler	Not Applicable	Changed	Updated for the IBM Enterprise Storage Server (ESS) disk storage system support.	PJ26511
CPAA	Real-Time Assembler	Not Applicable	Changed	Updated to bypass TPF record caching checks for temporarily mounted devices when running in a VM test system environment.	PJ26679
CPAD	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CPAE	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CQAB	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the time-of-day (TOD) clock.	PJ25904
CQAJ	Real-Time Assembler	Not Applicable	Changed	Updated for changes to the time-of-day (TOD) value.	PJ25904
CSA7	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to RV2 RT CHN and SRO SACHN with OC or NC S390 instruction, have been changed to use CLC instruction.	PJ25575
CSBB	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSBD	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSBL	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSBP	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSBV	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSBZ	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CSCD	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSCQ	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSCQ	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to RV2 RT CHN and SRO SACHN with OC or NC S390 instruction, have been changed to use CLC instruction.	PJ25575
CSCR	Real-Time Assembler	Not Applicable	Changed	Wakes up OMT when a SIGNAL response is received.	PJ25751
CSD1	Real-Time Assembler	Not Applicable	Changed	Fix network address table (NAT) conflicts from LUs migrating to APPN.	PJ26198
CSEA	Real-Time Assembler	Not Applicable	Changed	Updated to add the CNT parameter to the ZNETW ACT command.	PJ26204
CSEF	Real-Time Assembler	Not Applicable	Changed	Updated to skip the LU, which has the same first four characters as the PLU.	PJ26204
CSEF	Real-Time Assembler	Not Applicable	Changed	Updated processing of the ZNETW INACT command.	PJ26351
CSEL	Real-Time Assembler	Not Applicable	Changed	Updated to add two new messages for the ZNETW ACT functional message.	PJ26204
CSES	Real-Time Assembler	Not Applicable	Changed	Updated to add the CNT parameter to the ZNETW ACT command.	PJ26204
CSE5	Real-Time Assembler	Not Applicable	Changed	Updated to skip the LU, which has the same first four characters as the PLU.	PJ26204
CSFQ	Real-Time Assembler	Not Applicable	Changed	Updated to add a dynamic LU indicator in the display and to change the NDLU0011I message to the NDLU0031I message and the NDLU0012I message to the NDLU0032I message.	PJ26203, PJ26566
CSFV	Real-Time Assembler	Not Applicable	Changed	Updated to add a dynamic LU indicator for Advanced Program-to-Program Communications (APPC) and to change the NDLU0011I message to the NDLU0031I message and the NDLU0012I message to the NDLU0032I message.	PJ26566
CSG7	Real-Time Assembler	Not Applicable	Changed	Updated processing of building the NAT during system restart.	PJ26198, PJ26351
CSI1	Real-Time Assembler	Not Applicable	Changed	Updated to fix processing of the PA3 key when entered from a 3270 terminal.	PJ26462
CSJM	Real-Time Assembler	Not Applicable	Changed	TPF SNA components that refer to the RV2 RT CHN and the SRO SACHN with the OC or the NC S390 instruction were changed to use the CLC instruction.	PJ25575
CSJO	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CSJU	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSNAPC	Real-Time Assembler	Not Applicable	Changed	SNAPC_REGS and SNAPC_NOECB are ignored for ISO-C for the snapc C function.	PJ26335
CSSB	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CSS5	Real-Time Assembler	Not Applicable	Changed	Updated to prevent system error 0001F2 when software errors are encountered reading cache allocation data when running under VM.	PJ26679
CSTB	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSTC	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSTI	Real-Time Assembler	Not Applicable	Changed	Updated Control Vector 60 (CV60) processing.	PJ25482
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ26468 to add a check to see if TPF C Debugger for VisualAge Client is running. Updated for APAR PJ26502 to restore the CE3 flag.	PJ26468, PJ26502
CTKO	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CTKR	Real-Time Assembler	Not Applicable	Changed	Updated to remove the Internet daemon (INETD) and all entry control blocks (ECBs) when the TPF 4.1 system cycles down from NORM to CRAS, MESW, or 1052 state.	PJ26280
CTMS	Real-Time Assembler	Not Applicable	Changed	Updated the parameters for the TMSLC macro.	PJ26219
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated to allow the pool commands (ZDFPC, ZGAGA, ZGAFI, ZGFSP, ZPOOL, and ZRFPC) to be processed in the subsystem from which they were entered.	PJ25973
CVAB	Real-Time Assembler	Not Applicable	Changed	Added an entry for the ZDECB command.	PJ26534
CVAY	Real-Time Assembler	Not Applicable	Changed	Updated the routine that initializes the root record used during ZPTCH command processing.	PJ26002
CVBV	Real-Time Assembler	Not Applicable	Changed	Updated to correct the disassembled format of the ZDPGM command display.	PJ25748
CVOF	Real-Time Assembler	Not Applicable	Changed	Updated to change the ZSTAT S command to the ZSTAT STOP command.	PJ26098
CVPR	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CVPU	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CVYB	Real-Time Assembler	Not Applicable	Changed	Updated to add the CNT parameter to the help display for the ZNETW ACT command.	PJ26204
CYPA	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPB	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPE	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPF	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPG	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPH	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPI	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPJ	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPK	Real-Time Assembler	Not Applicable	Changed	Updated for the IBM Enterprise Storage Server (ESS) disk storage system support.	PJ26511
CYPL	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPM	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPN	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPO	Real-Time Assembler	Not Applicable	New	Created for multiple module copy support.	PJ26686
CYPP	Real-Time Assembler	Not Applicable	New	Created for multiple module copy support.	PJ26686
CYPR	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPS	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CYPT	Real-Time Assembler	Not Applicable	New	Created for multiple module copy support.	PJ26686
CYPU	Real-Time Assembler	Not Applicable	Changed	Updated for multiple module copy support.	PJ26686
CZXF	Real-Time Assembler	Not Applicable	Changed	Updated to add timeslicing and delay processing.	PJ26273
DRVA	Offline Assembler	DRIVERA and MASM	Changed	Updated to removed C and D compiler options.	PJ26578
GTSZ	Offline Assembler	Not Applicable	Changed	Updated to increase the size of data structure ESD_CardImage to 80 bytes.	PJ26436
IB02	Offline Assembler	IPLB	Changed	Updated with console write retry logic and multiple module copy support.	PJ26432, PJ26686

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
IB04	Offline Assembler	IPLB	Changed	Updated to ensure TPF record cache checks are always performed when running in an IBM VM test system environment.	PJ26679
IPLA	Offline Assembler	Yes	Changed	Updated IPLA to allow writing of messages to devices with 9663–001 host connection card.	PJ26277
JCD1	Real-Time Assembler	Not Applicable	Changed	Updated for file system performance enhancements.	PJ26713
JCD4	Real-Time Assembler	Not Applicable	Changed	Updated for TPF transaction services to collect the name of the subsystem where the recovery log resides.	PJ26687
JCS0	Real-Time Assembler	Not Applicable	Changed	Updated for file system performance enhancements.	PJ26713
JRA1	Offline PL/I	DATAREAD	Changed	Updated for TPF transaction services to extract the subsystem name from data collection records.	PJ26687
JRA2	Offline PL/I	DATAREAD	Changed	Updated for file system performance enhancements.	PJ26713
JRA3	Offline PL/I	DATAREAD	Changed	Updated for TPF transaction services to extract the subsystem name from data collection records.	PJ26687
JRS3	Offline PL/I	DATAREAD	Changed	Updated for TPF transaction services to display the name of the subsystem where the recovery log resides.	PJ26687
JRS3	Offline PL/I	DATAREAD	Changed	Updated for file system performance enhancements.	PJ26713
MASM	Offline Assembler	MASM	Changed	Updated to remove C and D compiler options.	PJ26578
SALO	Offline C Language	SALO	Changed	Updated to correct #include statements based on new compiler changes.	PJ26403
UIO2	RT Assembler	Not Applicable	Changed	Updated to save base register to avoid corruption.	PJ26011
XLFF	Real-Time Assembler	Not Applicable	Changed	Updated the ZPLMT command.	PJ26437
PUT 10					
BRPC	Real-Time Assembler	Not Applicable	Changed	Updated to issue the LEVTA macro to determine if data level 5 (D5) is being held.	PJ26390
BSSC	Real-Time Assembler	Not Applicable	Changed	Updated to issue the LEVTA macro to determine if data level 5 (D5) is being held.	PJ26390
BXDP	Real-Time Assembler	Not Applicable	Changed	Removed support for the 3380 record format request for price quotation (RPQ) feature.	PJ26160
CAC8	Real-Time Assembler	Not Applicable	Changed	Removed support for the 3380 record format request for price quotation (RPQ) feature.	PJ26160
CCVAGE	CSECT	Not Applicable	New	Updated for APARs PJ25981 and PJ26008.	PJ25981, PJ26008

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CFDS	Real-Time Assembler	Not Applicable	Changed	Removed support for the 3380 record format request for price quotation (RPQ) feature.	PJ26160
CGSVAC	Real-Time Assembler	Not Applicable	New	Added for TPF Assembler Debugger for VisualAge Client.	PJ25981
CIPY	Real-Time Assembler	Not Applicable	Changed	Updated for positive feedback support.	PJ25880
CLDF	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CLDL	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CORO	Real-Time Assembler	Not Applicable	Changed	Updated to support APAR PJ25841.	PJ25841
CPAA	Real-Time Assembler	Not Applicable	Changed	Updated for fiber channel support to save the channel path identifier (CHPID) type indicator in the DASD device module file status table (MFST) during DASD device mount online processing.	PJ26144
CPAA	Real-Time Assembler	Not Applicable	Changed	Removed support for the 3380 record format request for price quotation (RPQ) feature.	PJ26160
CPAG	Real-Time Assembler	Not Applicable	Changed	Removed support for the 3380 record format request for price quotation (RPQ) feature.	PJ26160
CPEP	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CPLKMP	CSECT	Not Applicable	Changed	Updated for APAR PJ25981	PJ25981
CPROGC	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CSTDLL	Assembler	Not Applicable	Changed	Updated for TPF Performance Execution Trace Analyzer for VisualAge Client.	PJ25983
CSTRTD	Assembler	Not Applicable	Changed	Updated for TPF Performance Execution Trace Analyzer for VisualAge Client.	PJ25983
CTKR	Real-Time Assembler	Not Applicable	Changed	Updated to bypass entering the CMIR program if the current subsystem is not the basic subsystem (BSS).	PJ26359
CTKT	Real-Time Assembler	Not Applicable	Changed	Updated for positive feedback support. Updated to bypass entering the CMIT program if the current subsystem is not the basic subsystem (BSS).	PJ25880, PJ26359
CUDX	Real-Time Assembler	Not Applicable	New	Added for TPF Assembler Debugger for VisualAge Client.	PJ25981
CVAB	Real-Time Assembler	Not Applicable	New	Updated to process the ZFCRU command introduced by the TPFDF capture/restore utility, information and statistics environment (CRUISE).	PJ26125

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CVAK	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CVAO	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CVAW	Real-Time Assembler	Not Applicable	Changed	Updated for positive feedback support and TPF Assembler Debugger for VisualAge Client	PJ25880, PJ25981
CVA6	Real-Time Assembler	Not Applicable	Changed	Updated for positive feedback support.	PJ25880
CVA6	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CVBV	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981, PJ26008
CVVA	Real-Time Assembler	Not Applicable	Changed	Updated to process the ZFCRU command introduced by the TPFDF capture/restore utility, information and statistics environment (CRUISE).	PJ26125
CYB3	Real-Time Assembler	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
CYEM	Real-Time Assembler	Not Applicable	Changed	Removed support for the 3380 record format request for price quotation (RPQ) feature.	PJ26160
DRDO	Real-Time Assembler	Not Applicable	Changed	Updated for positive feedback support.	PJ25880
FTBD00	C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTBD03	C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTBD04	C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTBD11	C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTER00	Offline C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTPS03	C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTRG05	C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTVA01	C Language	FCTBG	Changed	Updated to add the VTOC parameter to the RAMFIL macro.	PJ26160
FTVA03	Offline C Language	FCTB	Changed	Updated for positive feedback support and TPFDF capture/restore utility, information and statistics environment (CRUISE).	PJ25880, PJ26125
JCD6	Real-Time Assembler	Not Applicable	Changed	Removed support for the 3380 record format request for price quotation (RPQ) feature.	PJ26160
SALO	C Language	Not Applicable	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ25981
STPP	Offline	PPCP	Changed	Updated for TPF Assembler Debugger for VisualAge Client.	PJ26008

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
TPFDBG	Offline	TPFDBG	New	Updated for TPF Assembler Debugger for VisualAge Client.	PJ26008
PUT 9					
BKP0	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ25805	PJ25805
BKP5	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ25805	PJ25805
CCISOC	CSECT	Not Applicable	Changed	Updated for APAR PJ25292.	PJ25292
CJ16	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ25805.	PJ25805
COSB	Real-Time Assembler	Not Applicable	Changed	Cont. with ASSIGN processing if State not indicated.	PJ25656
CESFAC	Real-Time Assembler	Not Applicable	New	The interface to the ESFAC system macro for the c\$sonf header file for the SONFMT DSECT.	PJ25199
CTALXV	Real-Time Assembler	Not Applicable	Changed	Added tpf_esfac.	PJ25199
PUT 8					
BCC2	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
BKB0	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
BKD7	Real-Time Assembler	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
BRPC	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
BRPE	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
B RTP	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
BRTR	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
BRTV	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
BSSC	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
C190	Real-Time Assembler	Not Applicable	Changed	TPFxd_ tape robotic enhancements.	PJ25207

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CCPRTS	C Language	Not Applicable	Changed	Eased migration to file system support and enabled the coexistence of C language applications that require old versions of assert, gets, printf, puts, or scanf C functions with C language applications that use file system support.	PJ25240
CDE0	Real-Time Assembler	Not Applicable	New	The entry control block (ECB) display driver segment for the ZFECB command..	PJ23981
CDE1	Real-Time Assembler	Not Applicable	New	The entry control block (ECB) display formatted ECB process for the ZFECB command.	PJ23981
CDE2	Real-Time Assembler	Not Applicable	New	The entry control block (ECB) display formatted ECB process for the ZFECB command.	PJ23981
CDE3	Real-Time Assembler	Not Applicable	New	The entry control block (ECB) display active ECB process for the ZFECB command.	PJ23981
CDE4	Real-Time Assembler	Not Applicable	New	The entry control block (ECB) display active ECB process for the ZFECB command.	PJ23981
CDEP	Real-Time Assembler	Not Applicable	New	The entry control block (ECB) display formatted ECB template for the ZFECB command.	PJ23981
CDPLT	C Language	Not Applicable	New	Added for processing the ZDPLT command.	PJ25075
CENV	C Language	Not Applicable	Changed	Eased migration to file system support and enabled the coexistence of C language applications that require old versions of assert, gets, printf, puts, or scanf C functions with C language applications that use file system support.	PJ25240
CEXTDV	C Language	Not Applicable	Changed	TPFxd_ tape robotic enhancements.	PJ25207
CFIN	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS002	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS016	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS020	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS021	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS022	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CFS032	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS033	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS101	C Language	Not Applicable	New	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS105	C Language	Not Applicable	New	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS106	C Language	Not Applicable	No Longer Supported	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS108	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS111	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS115	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS121	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS145	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS148	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS150	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS152	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS157	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS160	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS164	C Language	Not Applicable	No Longer Supported	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS165	C Language	Not Applicable	No Longer Supported	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFS166	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CFS167	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFZF	C Language	Not Applicable	Changed	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CFZI	C Language	Not Applicable	New	Improved file creation and deletion performance by using multiple allocators.	PJ25266
CJ12	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
CJ16	Real-Time Assembler	Not Applicable	Changed	Miscellaneous TPF collection support recoup enhancements and corrections.	PJ25207
COBD	Real-Time Assembler	Not Applicable	Changed	Changed the interface to the COBD segment. In the parameter list based on R7, bit 4 in the RELFILE field is now set to indicate the message destination is a Systems Network Architecture (SNA) SCS printer. You must be sure this bit is not set.	PJ25068
CORM	C Language	Not Applicable	Changed	TPFxd_ tape robotic enhancements.	PJ25207
CVAB	Real-Time Assembler	Not Applicable	Changed	Added an entry for the ZFECB command. Added an entry for the ZDPLT command..	PJ23981 PJ25075
CZXS	Real-Time Assembler	Not Applicable	Changed	Added a program interface for the ZFECB command.	PJ23981
PUT 7					
CDSI	Real-Time Assembler	Not Applicable	New	Display input/output (I/O) device status information.	PJ23984
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Updated for APAR PJ24528.	PJ24528
CVAB	Real-Time Assembler	Not Applicable	Changed	Added an entry for the ZDDSI command.	PJ23984
PUT 6					
ACPL	Core Image Restart Assembler	Not Applicable	Changed	Modified to postpone CTK6 updates until the prime module is IPLed.	PJ23526
BRCH	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted from IBMPAL.	PJ21694
CAPD	Real-Time Assembler	Not Applicable	Changed	Replaced the ECBL0013I, ECBL0015I, and ECBL0016I messages with the ECBL0021I, ECBL0022I, and ECBL0023I messages, respectively, to display certain information in decimal format rather than hexadecimal format.	PJ23871
CCENBK	Assembler	Not Applicable	Changed	Must be reassembled because of changes to the IDSCID data macro.	PJ23493

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CCIISC	C Language	Not Applicable	Changed	Comment was changed.	PJ23923
CCRESC	Assembler	Not Applicable	New	Implementation of the C Language tpf_cresc function.	PJ23923
CCUEXT	Real-Time Assembler	Not Applicable	Changed	Changed the UXCMC service routine to support multi-use activate and deactivate capability.	PJ20868
CDFT	C Language	Not Applicable	New	Display information contained in the file address compute program (FACE) table that pertains to a specific record type.	PJ23297
CDL4	Real-Time Assembler	Not Applicable	New	ZNOPL MERGE command, Part 2.	PJ23922
CDL8	Real-Time Assembler	Not Applicable	Changed	ZNOPL MERGE command, Part 1.	PJ23922
CEXIT	Real-Time Assembler	Not Applicable	Changed	Added an optional return value.	PJ23923
CGT4	Real-Time Assembler	Not Applicable	Changed	Updated for processing of the ZDWGT command.	PJ23338
CGTB	Real-Time Assembler	Not Applicable	New	Added for processing of the ZDWGT command.	PJ23338
CRZ1	Real-Time Assembler	Not Applicable	New	Added for processing of the ZCHCH command.	PJ23430
CSAV CSAW	Real-Time Assembler	Not Applicable	New	Added for processing of the ZDEBB command.	PJ22843
CSCZ	Real-Time Assembler	Not Applicable	New	Process the begin session (SNABBEGS) command for LU 6.2 sessions.	PJ23620
CTKR	Real-Time Assembler	Not Applicable	Changed	Modified to call the USC3 user exit at the beginning of cycle-down schedules.	PJ22937
CTKS	Real-Time Assembler	Not Applicable	Changed	Modified to initialize environment lists for each subsystem.	PJ23923
CTKT	Real-Time Assembler	Not Applicable	Changed	Modified to call the USC4 user exit at the end of cycle-up schedules just before calling the CVCX segment to set the state indicator.	PJ22937
CVAB	Real-Time Assembler	Not Applicable	Changed	Updated for processing of the ZDEBB command, the ZDFCT command, and the ZCHCH command.	PJ22843, PJ23297, PJ23430
CVC0	Real-Time Assembler	Not Applicable	New	Added for processing of the ZDTOD command to build the time-of-day (TOD) clock.	PJ23434
CVC1	Real-Time Assembler	Not Applicable	New	Added for processing of the ZDTOD command to display the time-of-day (TOD) clock.	PJ23434
CVOJ	Real-Time Assembler	Not Applicable	Changed	Added the C function trace XHOOKS parameter for the ZSTRC command to trace other breakpoints.	PJ23493
DCR2	Offline		Changed	Added processing for new system errors.	PJ23923

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
ICDF	Real-Time Assembler	Not Applicable	Not Changed	Although this segment was not changed, the CFMCC system macro (IBM use only) was changed so the ICDF segment must be assembled.	PJ23493
JRA1	Offline	DATAREAD	Changed	Added the value of the C function trace XHOOKS parameter on the ZSTRC command at the start of data collection to data collection output.	PJ23493
JRA3	Offline	DATAREAD	Changed	Added the value of the C function trace XHOOKS parameter on the ZSTRC command at the end of data collection to data collection output.	PJ23493
STPP	Offline	PPCP	Changed	Added support for C function trace of other breakpoints.	PJ23493
UOLD	Real-Time Assembler	Not Applicable	No Longer Supported	Deleted from SPPGML and IBMPAL.	PJ21694
PUT 5					
BXAC	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to the CTUU segment.	PJ21701
BXBA	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to the CTUU segment.	PJ21701
BXBB	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to the CTUU segment.	PJ21701
BXCB	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to the CTUU segment.	PJ21701
BXDC	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to the CTUU segment.	PJ21701
BXDK	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to the CTUU segment.	PJ21701
BXEB	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to the CTUU segment. Return code from the CTUU segment is now checked in R15 instead of R6.	PJ21701
CAPC	Real-Time Assembler	Not Applicable	Changed	The ZECBL command with the E parameter specified removes the input ECB even if the ECB issued the LONGC macro. This command also removes all input/output blocks (IOBs) associated with this ECB that are waiting to hold the record.	PJ23103
CCUEXT	Real-Time Assembler	Not Applicable	Changed	Added new overlays for CSOE and CSOX.	PJ21907
CEFE	Real-Time Assembler	Not Applicable	Changed	The tests for CCW address past the end of working storage were removed from the TDCTC macro service routine, which is CPMTCW.	PJ21709
CLMINT	Assembler	Not Applicable	New	Moved code from the CSTRTD segment to a library function in CISO.	PJ21907

Table 1293. Segment Changes by PUT and APAR (continued)

Segment	Type	Link-Edit Module (Where Offline Segment Is Linked)	New, Changed, or No Longer Supported?	Description of Change	APAR Number
CNAH	Real-Time Assembler	Not Applicable	Changed	The return code from the CNAM ISO-C DLM is checked in register 15 (R15) rather than register 6 (R6).	PJ21705
CSTRTD	Assembler	Not Applicable	Changed	Removed executable code.	PJ21907
CSTRTL	Real-Time Assembler	Not Applicable	Changed	Added the address of the CLMINT function.	PJ21907
CTKS	Real-Time Assembler	Not Applicable	Changed	R1 used instead of R6 to pass parameters to CTUU.	PJ21701
C000	Real-Time Assembler	Not Applicable	Changed	The CLIBFUN entry for C190 was commented out and a CLIBFUN dummy entry for C190 was created.	PJ21709
C190	Real-Time Assembler	Not Applicable	Changed	The return code is passed back to the caller in R6 via the TMSEC macro. This will result in the contents of R6 being loaded into R15 prior to return to the caller.	PJ21709
DRVA	Offline Assembler	DRIVERA	Changed	Added the new compiler options for IBM C/C++ for MVS/ESA Version 3 Release 1.	PJ21907
MASM	Offline Assembler	MASM	Changed	Added the new compiler options for IBM C/C++ for MVS/ESA Version 3 Release 1.	PJ21907
PUT 4					
CLEF	Real-Time C Language	Not Applicable	Changed	The CRLU transfer vector has been removed from the CLEF segment. The remainder of the CLEF segment remains unchanged. This APAR is a prerequisite for APAR PJ20388.	PJ20974
CIPY	Real-Time Assembler	Not Applicable	Changed	The return code from the ISO-C DLM CYB2 (ZxPGM) is loaded from R15 rather than R6. For the call to the DLM UELM, the parameter list is loaded into R1.	PJ20388
COA4	Real-Time Assembler	Not Applicable	Changed	The parameter list is loaded into R1 for the call to the DLM UELH (the E-type loader (ELDR) user exit).	PJ20388
CVAW	Real-Time Assembler	Not Applicable	Changed	The parameter list is passed in R1 rather than R6 for the call to the DLM UELM (E-type loader (ELDR) user exit).	PJ20388
CVAX	Real-Time Assembler	Not Applicable	Changed	The return code from the DLM CYB2 (ZxPGM) is loaded from R15 rather than R6.	PJ20388
CVA6	Real-Time Assembler	Not Applicable	Changed	The check of the return code from the DLM CVA7 (ZxPAT) in R6 is changed to R15.	PJ20388

System Equates

The following section summarizes system equate changes.

SYSEQ Tags

Table 1294 summarizes changes to equates that are not configuration dependent (in SYSEQ). This information is presented in alphabetic order by the name of the SYSEQ tag.

Table 1294. SYSEQ Tag Changes by PUT and APAR

SYSEQ Tag	Equate Value	New, Changed, or No Longer Supported?	APAR Number
PUT 15			
PUT 12			
#CDC_1	18	New	PJ27095
#CDC_EOT	0	New	PJ27095

User Exits

The following section summarizes changes for control program (CP) and entry control block (ECB) user exits. See *TPF System Installation Support Reference* for a complete description of all user exits.

Control Program (CP) User Exits

Table 1295 summarizes control program (CP) user exit changes. This information is presented in alphabetic order by the name of the CP user exit.

Table 1295. Control Program (CP) User Exit Changes by PUT and APAR

Control Program (CP) User Exit Activated In	User Routine Label	New, Changed, or No Longer Supported?	APAR Number
PUT 15			
CCCPSE	UCGPFA	New	PJ28014
PUT 10			
CCCPSE	UCCPER	Changed	PJ26008
CCCPSE	UCCPER2	New	PJ26008
CCENBK, CCCLHR	UCCCREB	Changed	PJ25981
CCENBK	UCCDBTS	New	PJ26008
CCENBK, CCCLHR	UCCFREB	Changed	PJ25981
CCENBK	UCCRTNX	Changed	PJ25981
CLMINT	UCCEFCX	Changed	PJ25981
PUT 6			
CTRC	UCCCTRC	Changed	PJ23493

ECB User Exits

Table 1296 summarizes the ECB user exit changes. This information is presented in alphabetic order by the name of the function.

Table 1296. ECB User Exit Changes by PUT and APAR

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change	APAR Number
PUT 15					
User Data Recovery Copy Support	ZFDRS	UDRS	New	Permits the use of user-defined data recovery copy support.	PJ27728

Table 1296. ECB User Exit Changes by PUT and APAR (continued)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change	APAR Number
User Data Recovery Restore Support	ZRDRS	UDRR	New	Permits the use of user-defined data recovery restore support.	PJ27728
PUT 14					
Socket Cycle-Up	CLCA	CLCV	Changed	Updated to allow a call from CLCA when using TCP/IP Native Stack.	PJ27628
Module Copy Select/Validate	CYPB	UCPY	New	Created for module copy selection/validation to perform additional module verification checks.	PJ27430
PUT 13					
MATIP Translation	CMADAT	UMATTR	Changed	Updated to provide the message length..	PJ26858
PUT 12					
Continuous Data Collection Information Storage	CDCQ	CDCB	New	Allows the storage of user data into tables previously created with CDCA.	PJ27095
Continuous Data Collection Table Creation	CDCO	CDCA	New	Allows the creation of tables needed to store data.	PJ27095
MATIP Host Name	CMACMD	UMATCH	Changed	Updated prologue and removed internal code.	PJ26873
Not Applicable	ACPL, CRLX, CIL1	UELI	Changed	All calling segments now properly pass a consistent character type in the program base field UELIPGMBP.	PJ26744
PUT 11					
Selective Core Resident Load	CLIB	UCLB	New	Allows you to specify if a specific core resident program will be loaded during restart.	PJ26283
PUT 10					
Debug Registration	CDB0	CDBPUX	New	Added for TPF Assembler Debugger for VisualAge Client.	PJ26008
Trace by Terminal	CDB0	CDBUXT	New	Added for TPF Assembler Debugger for VisualAge Client.	PJ26008
PUT 8					
ZFECB	CDE3	UDE0	New	The entry control block (ECB) display user exit for the ZFECB command.	PJ23981
PUT 7					
ZAPGM	CIPY	UELM	Changed	Now called when any ZAPGM command is issued on the file copy of a program. Now has a block on data level 7 on input when called by ZAPGM.	PJ21730
PUT 6					
APPN Select A Host	CSBU	UAPN	Changed	The TPF host that is selected must be in CRAS state or above.	PJ23762
Select ALS to Adjacent APPN Node	CSCZ	UALS	New	Select the ALS over which the TPF 4.1 system sends a BIND request to an adjacent APPN node.	PJ23620

Table 1296. ECB User Exit Changes by PUT and APAR (continued)

Function	User Exit Activated In	User Exit Program	New, Changed, or No Longer Supported?	Description of Change	APAR Number
System State Change	CTKR	USC3	New	The CTKR segment activates the USC3 user exit at the beginning of each of these cycle-down schedules: <ul style="list-style-type: none"> • CRAS state to 1052 state • MESW state to 1052 state • MESW state to CRAS state • NORM state to 1052 state • NORM state to CRAS state • NORM state to MESW state. 	PJ22937
Initialize Global Environment List	CTKS	UENV	New	During system restart, the CTKS segment activates the UENV user exit for each subsystem. Global environment list entries may be defined by coding setenv functions in the user exit.	PJ23923
System State Change	CTKT	USC4	New	The CTKT segment activates the USC4 user exit at the end of these cycle-up schedules just before calling the CVCX segment to set the state indicator: <ul style="list-style-type: none"> • 1052 state to UTIL state • 1052 state to CRAS state • 1052 state to MESW state • 1052 state to NORM state • CRAS state to MESW state • CRAS state to NORM state • MESW state to NORM state. 	PJ22937
PUT 4					
Program History	CILA	UELM	Changed	A change has been made to a structure that is passed to UELM. Therefore, modify any user-defined code and compile or assemble any user modules that call UELM.	PJ16018
ZOLDR Command	Not Applicable	Not Applicable	Changed	No new user exits have been added. However, the ZOLDR user exits are now ISO-C DLMS (migrated from TARGET(TPF) to ISO-C) so IBM recommends that you perform some analysis of any unique user-exit code in these programs to determine if any need to be changed because of the ISO-C migration. See the APEDIT for APAR PJ20388 for more information about these changes.	PJ20388

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