MQSeries® for VSE/ESA

System Management Guide

Version 2 Release 1 Modification 1

GC34-5364-01

Note!

Before using this information and the product it supports, be sure to read the general information under Appendix J, “Notices” on page 253.

Second edition (September 2000)

This edition applies to the following product:

- MQSeries for VSE/ESA Version 2 Release 1 Modification 1

and to any subsequent releases and modifications until otherwise indicated in new editions.

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About this book

MQSeries for VSE/ESA Version 2.1.1—referred to in this book as MQSeries for VSE/ESA or simply MQSeries, as the context permits—is part of the MQSeries family of products. These products provide application programming services that enable application programs to communicate with each other using *message queues*. This form of communication is referred to as *commercial messaging*. The applications involved can exist on different nodes on a wide variety of machine and operating system types. They use a common application programming interface, called the Message Queuing Interface or MQI, so that programs developed on one platform can be readily transferred to another.

This book describes the system administration aspects of MQSeries for VSE/ESA Version 2.1.1 and the services it provides to support commercial messaging in an VSE/ESA environment. This includes managing the queues that applications use to receive their messages, and ensuring that applications have access to the queues that they require.

Who this book is for

Primarily, this book is for system administrators, and system programmers who manage the configuration and administration tasks for MQSeries. It is also useful to application programmers who must have some understanding of MQSeries administration tasks.

What you need to know to understand this book

To use this book, you should have a good understanding of the VSE/ESA operating system, and utilities associated with it. You do not need to have worked with message queuing products before, but you should have an understanding of the basic concepts of message queuing.

How to use this book

Read Chapter 1, “Introduction” on page 1 first for an understanding of MQSeries for VSE/ESA.

The body of this book contains:

- Chapter 2, “Installation” on page 9
- Chapter 3, “Configuring network communications” on page 31
- Chapter 4, “System operation” on page 45
- Chapter 5, “MQSeries for VSE/ESA utility functions” on page 89
- Chapter 6, “Problem determination” on page 101
- Chapter 7, “Message data conversion” on page 117
- Chapter 8, “Security” on page 121

At the back of the book there are some appendixes giving information (which will be incorporated in the appropriate MQSeries books at the next opportunity) on the following topics:

- Appendix A, “MQSeries for VSE/ESA at a glance” on page 133

- Appendix B, “CICS control table definitions” on page 135
- Appendix C, “Application Programming Reference” on page 143
- Appendix D, “Application Programming Guidance” on page 165
- Appendix E, “Sample programs” on page 173
- Appendix F, “Example configuration - MQSeries for VSE/ESA Version 2.1.1” on page 209
- Appendix G, “MQSeries clients” on page 223
- Appendix H, “System messages” on page 225
- Appendix I, “Security implementation” on page 243

Summary of changes

This section describes changes to this edition of the *MQSeries for VSE/ESA System Management Guide*. Changes since the previous edition of the book are marked by vertical lines to the left of the changes.

Changes in this edition (GC34-5364-01)

The changes in this edition of the System Management Guide are updates to describe the new function in MQSeries for VSE/ESA Version 2.1.1.

The major additions to the product for this release include:

- Security control for connections, queues, queue managers, and messages. This is described in Chapter 8, “Security” on page 121 and Appendix I, “Security implementation” on page 243.
- Message data conversion. The queue manager supports conversion of a number of built-in formats. For other formats, you can create a data conversion exit program.This is described in Chapter 7, “Message data conversion” on page 117.
- Improved VSAM file reorganization. The VSAM file associated with a selected queue can be reorganized automatically at specified time intervals. This is described in “Creating local queues” on page 53.
- Enhanced batch interface, described in “Using the batch interface” on page 94.

Other additions include:

- Support for Java clients
- Trigger user data support
- TCP/IP domain name support
- TCP/IP performance and recovery improvements

Changes in this edition

Chapter 1. Introduction

This chapter introduces MQSeries for VSE/ESA from an administrator's perspective, and describes the basic concepts of MQSeries and messaging.

MQSeries and message queuing

MQSeries lets VSE/ESA applications use message queuing to participate in message-driven processing. Applications can communicate across different platforms by using the appropriate message queuing software products. For example, VSE/ESA and MVS/ESA applications can communicate through MQSeries for VSE/ESA and MQSeries for OS/390 respectively. The applications are shielded from the mechanics of the underlying communications.

MQSeries products implement a common application programming interface (message queue interface or MQI) whatever platform the applications are run on. This makes it easier to port applications from one platform to another.

The MQI is described in detail in the *MQSeries Application Programming Reference* manual.

Time-independent applications

With message queuing, the exchange of messages between the sending and receiving programs is time independent. This means that the sending and receiving applications are decoupled so that the sender can continue processing without having to wait for the receiver to acknowledge the receipt of the message. In fact, the target application does not even have to be running when the message is sent. It can retrieve the message after it is started.

Message-driven processing

Applications can be automatically started by messages arriving on a queue using a mechanism known as *triggering*. If necessary, the applications can be stopped when the message or messages have been processed.

Messages and queues

Messages and queues are the basic components of a message queuing system.

What messages are

A *message* is a string of bytes that has meaning to the applications that use it. Messages are used for transferring information from one application to another (or to different parts of the same application). The applications can be running on the same platform, or on different platforms.

MQSeries messages have two parts; the *application data* and a *message descriptor*. The content and structure of the application data is defined by the application programs that use them. The message descriptor identifies the message and contains other control information, such as the type of message and the priority assigned to the message by the sending application.

The format of the message descriptor is defined by MQSeries for VSE/ESA. For a complete description of the message descriptor, see the *MQSeries Application Programming Reference* manual.

Message lengths

In MQSeries for VSE/ESA, the maximum message length is 4 MB (where 1 MB equals 1 048 576 bytes). In practice, the message length may be limited by:

- The maximum message length defined for the receiving queue.
- The maximum message length defined for the queue manager.
- The maximum message length defined by either the sending or receiving application.
- The amount of storage available for the message.

  This parameter is extremely important for MQSeries for VSE/ESA. The storage will be used from the CICS® partition in which the queue manager is active.

It may take several messages to send all the information that an application requires.

What queues are

A *queue* is a data structure that stores zero or more messages. The messages may be put on the queue by applications or by a queue manager as part of its normal operation.

Each queue belongs to a *queue manager*, which is responsible for maintaining it. The queue manager puts the messages it receives on the appropriate queues.

Applications send and receive messages using MQI calls. For example, one application can put a message on a queue, and another application can retrieve the message from the same queue. The sending application opens the queue for put operations by making an MQOPEN call. Then it issues an MQPUT call to put the message onto that queue. When the receiving application opens the same queue for gets, it can retrieve the message from the queue by issuing an MQGET call.

For more information about MQI calls, see the *MQSeries Application Programming Reference* manual.

MQSeries for VSE/ESA supports only *predefined queues*, which are those created by an administrator using the appropriate command set, for example, those defined using the MQSeries Master Terminal (MQMT) utility. Predefined queues are permanent; they exist independently of the applications that use them and survive MQSeries for VSE/ESA restarts.

Retrieving messages from queues

In MQSeries for VSE/ESA, suitably authorized applications can retrieve messages from a queue according to these retrieval algorithms:

- First-in-first-out (FIFO).
- A program request for a specific message, identified by a message identifier or correlation identifier.

The MQGET request from the application determines the method used.

Objects

Many of the tasks described in this book involve manipulating MQSeries *objects*. In MQSeries for VSE/ESA, there are three different types of object:

- Queue managers; see “MQSeries queue managers” on page 4.
- Queues; see “MQSeries queues” on page 4.
- Channels; see “Channels” on page 6.

Object names

Each instance of a queue manager is known by its name. This name must be unique within the network of interconnected queue managers, so that one queue manager can unambiguously identify the target queue manager to which any given message should be sent.

For the other types of object, each object has a name associated with it and can be referenced in MQSeries for VSE/ESA by that name. These names must be unique within one queue manager and object type. For example, you can have a queue and a process with the same name, but you cannot have two queues with the same name.

In MQSeries, names can have a maximum of 48 characters, with the exception of *channel names*, which have a maximum of 20 characters.

Managing objects

MQSeries provides commands for creating, altering, displaying, and deleting objects through the panel driven MQSeries Master Terminal (MQMT) system administration transaction; see “MQSeries master terminal (MQMT) – main menu” on page 46 for further details.

Note: Default object definitions are not supplied with MQSeries for VSE/ESA.

You can perform some limited administration, for example, the starting and stopping of queues and channels, by using the MQCL transaction. See Chapter 5, “MQSeries for VSE/ESA utility functions” on page 89 for further details.

Local and remote administration

Local administration means carrying out administration tasks on any queue managers you have defined on your local system. You can access other systems, for example through TCP/IP, and carry out administration there. In MQSeries, you can consider this as local administration because no channels are involved, that is, the communication is managed by the operating system.

Object attributes

The properties of an object are defined by its attributes. Some you can specify, others you can only view. For example, the maximum message length that a queue can accommodate is defined by its *MaxMsgLength* attribute (see Figure 18 on page 55). You can specify this attribute when you create a queue.

In MQSeries for VSE/ESA, there are two ways of accessing an attribute:

- Using the MQMT transaction, described in “MQSeries master terminal (MQMT) – main menu” on page 46.

- Using the MQINQ function call, described in “MQINQ – Inquire about object attributes” on page 154.

MQSeries queue managers

A queue manager provides queuing services to applications, and manages the queues that belong to it. There can only be one queue manager on each MQSeries for VSE/ESA system. It ensures that:

- Object attributes are changed according to the commands received.
- Special events such as trigger events are generated when the appropriate conditions are met.
- Messages are put on the correct queue, as requested by the application making the MQPUT call. The application is informed if this cannot be done, and an appropriate reason code is given.

Each queue belongs to a single queue manager and is said to be a *local queue* to that queue manager. The queue manager to which an application is connected is said to be the local queue manager for that application. For the application, the queues that belong to its local queue manager are local queues.

A *remote queue* is simply a queue that belongs to another queue manager. A *remote queue manager* is any queue manager other than the local queue manager. A remote queue manager exists on a remote machine across the network.

MQI calls

A queue manager object may be used in some MQI calls. For example, you can inquire about the attributes of the queue manager object using the MQI call MQINQ.

Note: You cannot put messages on a queue manager object; messages are always put on queue objects, not on queue manager objects.

MQSeries queues

Queues are defined to MQSeries using the appropriate MQMT transaction. The transaction specifies the type of queue and its attributes. For example, a local queue object has attributes that specify what happens when applications reference that queue in MQI calls. Examples of attributes are:

- Whether applications can retrieve messages from the queue (GET enabled).
- Whether applications can put messages on the queue (PUT enabled).
- Whether access to the queue is exclusive to one application or shared between applications.
- The maximum number of messages that can be stored on the queue at the same time (maximum queue depth).
- The maximum length of messages that can be put on the queue.

Using queue objects

In MQSeries for VSE/ESA, there are three types of queue object. Each type of object can be manipulated by the product commands and is associated with real queues in different ways:

1. A *local queue* object identifies a local queue belonging to the queue manager to which the application is connected. All queues are local queues in the sense that each queue belongs to a queue manager and, for that queue manager, the queue is a local queue.
2. A *remote queue object* identifies a queue belonging to another queue manager. This queue must be defined as a local queue to that queue manager. The information you specify when you define a remote queue object allows the local queue manager to find the remote queue manager, so that any messages destined for the remote queue go to the correct queue manager.

   You must also define a transmission queue and channels between the queue managers, before applications can send messages to a queue on another queue manager.
3. An *alias queue object* allows applications to access a queue by referring to it indirectly in MQI calls. When an alias queue name is used in an MQI call, the name is resolved to the name of either a local or a remote queue at run time. This allows you to change the queues that applications use without changing the application in any way—you merely change the alias queue definition to reflect the name of the new queue to which the alias resolves.

   An alias queue is not a queue, but an object that you can use to access another queue.

Specific local queues used by MQSeries

MQSeries uses some local queues for specific purposes related to its operation. You ***must*** define them before MQSeries can use them.

Application queues: A queue that is used by an application (through the MQI) is referred to as an *application queue.* This can be a local queue on the queue manager to which an application is linked, or it can be a remote queue that is owned by another queue manager.

Applications can put messages on local or remote queues. However, they can only get messages from a local queue.

Transmission queues: A *transmission queue* temporarily stores messages that are destined for a remote queue manager. You must define at least one transmission queue for each remote queue manager to which the local queue manager is to send messages directly. For information about the use of transmission queues in distributed queuing, see the *MQSeries Intercommunication* book.

Dead-letter queues: A *dead-letter queue* stores messages that cannot be routed to their correct destinations. This occurs when, for example, the destination queue is full. The supplied dead-letter queue is called SYSTEM.DEAD.LETTER.QUEUE. These queues are also referred to as undelivered-message queues on other platforms.

For distributed queuing, you should define a dead-letter queue for each queue manager.

Event queues: MQSeries for VSE/ESA does not support instrumentation events.

Channels

Channels are objects that provide a communication path from one queue manager to another. Channels are used in distributed message queuing to move messages from one queue manager to another. They shield applications from the underlying communications protocols. The queue managers may exist on the same, or different, platforms. For queue managers to communicate with one another, you must define one channel object at the queue manager that is to send messages, and another, complementary one, at the queue manager that is to receive them.

For information on channels and how to use them, see the *MQSeries Intercommunication* book.

Clients and servers

MQSeries for VSE/ESA supports client-server configurations for MQSeries applications, and can act as a server to which all current MQSeries clients can connect.

Note: There is no VSE/ESA client.

An *MQSeries client* is a part of the MQSeries product that is installed on a machine to accept MQI calls from applications and pass them to an *MQI server* machine. There they are processed by a queue manager. Typically, the client and server reside on different machines but they can also exist on the same machine.

An *MQI server* is a queue manager that provides queuing services to one or more clients. For VSE/ESA, there is one MQSeries process for each client connection.

All the MQSeries objects, for example queues, exist only on the queue manager machine, that is, on the MQI server machine. A server can support normal local MQSeries applications as well.

The difference between an MQI server and an ordinary queue manager is that a server has a dedicated communications link with each client. For more information about creating channels for clients and servers, see the *MQSeries Intercommunication* book.

MQSeries applications in a client-server environment

When linked to a server, client MQSeries applications can issue MQI calls in the same way as local applications. The client application issues an MQCONN call to connect to a specified queue manager. Any additional MQI calls that specify the connection handle returned from the connect request are then processed by this queue manager. You must link your applications to the appropriate client libraries. See the *MQSeries Application Programming Guide* for further information.

MQSeries and CICS

Note to users

MQSeries for VSE/ESA runs as a CICS task. Consequently, various features of the product are controlled by CICS itself.

These features include security and recovery. If you install MQSeries for VSE/ESA with the new security feature, security will be handled by your External Security Manager (ESM).

Chapter 2. Installation

This chapter describes the procedure for installing MQSeries for VSE/ESA. It consists of the following sections:

1. “Contents of the library tape”
2. “Installing MQSeries for VSE/ESA – all users” on page 10
3. “Procedures for new users” on page 12
4. “Starting MQSeries” on page 18
5. “MQSeries installation verification test” on page 21
6. “Post installation verification test CICS modifications” on page 27
7. “Migration procedures for existing users” on page 27

Contents of the library tape

The distribution tape is in standard IBM MSHP format and is in V2 stacked format. The tape may include other IBM products and contains a sublibrary for “PRD2.MQSERIES”.

This sublibrary contains:

- Copy books, used by your CICS applications whenever you intend to call the MQSeries Application Programming Interface (API).
- Object decks, called at linkedit time when you are building your own MQSeries applications (autolink).
- Phases, which are all compiled in COBOL for VSE with LE/VSE and linkedited with AMODE(31) and RMODE(ANY).
- Samples having member type Z. Some of these need to be modified for the VSE/POWER JECL statements, as follows:

```
* ** JOB  to   * $$ JOB
* ** LST  to   * $$ LST
* ** SLI  to   * $$ SLI
* ** EOJ  to   * $$ EOJ
```

The samples are:

MQJCONFG.Z	Creation of MQSeries configuration file
MQJSETUP.Z	Creation of the setup file
MQJQUEUE.Z	VSAM cluster definitions for MQSeries queues
MQJMIGR1.Z	Migration of old configuration file (step 1)
MQJMIGR2.Z	Migration of old configuration file (step 2)
MQJREORG.Z	Batch job to reclaim space of deleted records
MQJUTILY.Z	Various batch functions
MQJLABEL.Z	Label definitions for the CICS start-up job
MQJCSD.Z	Define CICS resources into the CICS CSD
MQCICDCT.Z	Entry definitions for CICS DCT
MQCICFCT.Z	Entry definitions for CICS FCT

MQUSERID.Z	Sample assembler to allow a change of user identifier for MCA communications with remote AS/400® systems
MQJCSD24.Z	Define CICS resources into the CICS CSD for CICS TS customers.
MQBICALL.Z	Sample batch interface program that shows how to write an MQI batch program.
MQBISTOP.Z	Sample program to stop the batch interface from a batch partition.
DCHFMT4.Z	Sample data conversion exit program for message data conversion.

Installing MQSeries for VSE/ESA – all users

To install the product, carry out the following procedure:

1. Decide the name of the :
   - Target sublibrary

     The target sublibrary can be the default supplied, “PRD2.MQSERIES”, or a name that you specify.

     If you use the supplied default sublibrary, go to step 2 on page 11.

     If you specify your own library, you must customize the JCL listed in step 1b.
   - VSAM catalog into which the product is to be installed

   a. Create a VSAM user catalog.

      You are recommended to use the Interactive Interface Dialogs (II) to create this catalog. In the following examples, the VSAM catalog named MQMCAT is used, and it is assumed that its label is already defined in the disk label area.

   b. Allocate a VSE library.

      This step is not required if you restore the product into the PRD2 library. However, if you want to install MQSeries in another library, you must create one. You are recommended to use the Interactive Interface dialogs for creating this library, or run the following sample adapted for your environment.

      If you adapt this sample you must modify all the other provided samples accordingly, by changing the following fields:

      - NAME from `VSE.MQMUSR1.LIBRARY` to your selected name
      - VOLUMES from `volid` to your volume identifier
      - DATA (NAME from `VSE.MQMUSR1.LIBRARY.DATA` to your selected data name
      - CATALOG from `catalog.name` to your catalog name

```
* $$ JOB JNM=DEFLIB,CLASS=0,DISP=D
// JOB   DEFINE MQSeries Library MQMUSR1
// EXEC IDCAMS,SIZE=AUTO
 DEFINE CLUSTER (                                  -
        NAME (VSE.MQMUSR1.LIBRARY)                 -
        CYLS (3 1)                                 -
        SHAREOPTIONS (3)                           -
        RECORDFORMAT (NOCIFORMAT)                  -
        VOLUMES (volid)                            -
        NOREUSE                                    -
        NONINDEXED                                 -
        TO (99366))                                -
    DATA (NAME (VSE.MQMUSR1.LIBRARY.DATA))         -
    CATALOG (catalog.name)
/*
/&
* $$ EOJ
```

2. Restore the MQSeries sublibrary from the library tape. You can do this by either:

   a. Using the Interactive Interface Dialogs, as follows:

      1) From an administrator ICCF signon, select the “Installation” option.

      2) Select “Install Programs – V2 format”.

      3) Select “Prepare for installation”.

         This presents you with a series of panels and options to identify the tape address and process a job, by scanning the mounted tape and identifying which stacked products are available for installation.

         Monitor the VSE console to see when this job has completed. When it has completed, proceed to the step 2a4.

      4) Select “Install Program(s) from Tape”.

         You are presented with a list of products available from the install tape and suggested install sublibraries. You can select either the default install library, “PRD2.MQSERIES”, or the name of the customized library you created in Step 1 on page 10.

      5) Select option 1 to proceed with the installation and press function key five (PF5) to create a job to be submitted.

   or

   b. Customizing and processing the following JCL, using the library name from step 1 on page 10.

```
* $$ JOB JNM=MQMTAPE,CLASS=0,DISP=D
// JOB MQMTAPE Restore MQSeries from tape
// ASSGN SYS006,cuu
// MTC REW,SYS006
// EXEC MSHP,SIZE=1M
INSTALL PRODUCT FROMTAPE ID='MQSeries..2.1.1' -
PROD INTO=lib.sublib
/*
/&
* $$ EOJ
```

Where:

cuu Is the tape drive address

lib.sublib Is the sublibrary into which the product is to be installed, for example, PRD2.MQSERIES

Installation checkpoint (MQSeries installation)

You should now have correctly installed the MQSeries sublibrary. This can be verified using a VSE Librarian job to inspect the contents of the library.

The MQSeries phases, objects, and sample jobs are visible.

Note: If the MQSeries product has not installed correctly, check through the preceding instructions to ensure that they all completed correctly.

If you are a new user, see "Procedures for new users." If you are migrating to MQSeries for VSE/ESA V2.1.1 from an earlier release, see "Migration procedures for existing users" on page 27.

Procedures for new users

The following steps describe how to

- Allocate and initialize the required MQSeries files
- Customize your CICS system to utilize the MQSeries facilities

The samples for the following jobs can be found in the installation library you selected, or "PRD2.MQSERIES".

Allocate and initialize the required MQSeries files

You must now run the jobs to:

- Create the setup file
- Create the MQSeries configuration file
- Create cluster definitions for MQSeries queues

Note to users

The sample JCL jobs **must** be modified and customized to refer to your own volume identifiers and catalog names.

This should be done by your VSE systems programmer.

MQJSETUP.Z

Allocate a VSAM ESDS, MQFSSET, which is needed to populate the MQSeries configuration file with text and help messages at initialization time.

Note: Review the section "Installing security" on page 13 before running this sample JCL.

MQJCONFG.Z

Allocates the MQSeries (CICS) subsystem configuration file. For this VSAM KSDS file, each record is a fixed length of approximately 2 KB.

To estimate the space you require, allocate one record, consisting of one cylinder for normal operation, for each MQSeries channel and queue.

MQJQUEUE.Z

Allocates and initializes the MQSeries message queue files. For these VSAM KSDS files, each record is of varying length, depending upon the size of the user data area. A message queue file is required for each queue defined to the MQSeries (CICS) subsystem.

To estimate the space required for each message queue, use the following guidelines:

- Each message queue file contains one header record for each local queue.
- One record is written for each user message.
- Each record is of variable length and consists of a header of 740 bytes plus the actual variable-length user data area.
- This job allocates the following system queue files:

  MQSERIES.MQFERR – Dead letter queue file
  MQSERIES.MQFLOG – Error log queue file
  MQSERIES.MQFMON – Monitor queue file
  MQSERIES.MQFREOR – Automatic VSAM reorganization file

  The following files are sample definitions for user message queues:

  MQSERIES.MQFI001
  MQSERIES.MQFO001
  MQSERIES.MQFI002
  MQSERIES.MQFO002
  MQSERIES.MQFI003
  MQSERIES.MQFO003

You are strongly recommended to define one local queue in each physical file. If you intend to use the automatic VSAM reorganization feature with a queue, that queue must be the only queue in a physical VSAM file.

Installing security

You can protect your MQSeries subsystem from unauthorized access by installing the new security feature available with MQSeries for VSE/ESA 2.1.1. For full details on the security feature, refer to Chapter 8, “Security” on page 121.

Before installing security, ensure that your environment includes the following prerequisite systems:

- VSE/ESA 2.4 or above.
- CICS TS 1.1 or above.
- External Security Manager (see below).

  You must have an External Security Manager (ESM) that supports the SAF RACROUTE interface. MQSeries for VSE/ESA is not dependent on any specific ESM; however, your ESM should recognize and support standard RACROUTE macro calls. For more information, contact your ESM vendor.

If you have the correct prerequisites and intend to install MQSeries for VSE/ESA security for your queue manager, you must copy and edit the SYSIN.Z installation

file, available in the MQSeries installation library PRD2.MQSERIES. You must also change the MQJSETUP.Z sample JCL file that processes the SYSIN.Z file.

The SYSIN.Z file contains installation and configuration parameters that generally should not be changed. However, the file also contains switches for security, which are set off by default and need to be set on to activate security.

To activate the security feature, proceed as follows:

1. Make a copy of your SYSIN.Z file.

   The file resides in your installation library (default PRD2.MQSERIES). When making the copy, note down the target file and sublibrary names for later use. It is important that you edit the security switches in the copy rather than the original to ensure that the settings are not overwritten by subsequent maintenance operations.

2. Edit the SYSIN.Z file settings:

   a. Search for keyword QMDEF. This is positioned ahead of a list of queue manager definition defaults which, with the exception of the security defaults, can be changed once your system is installed and configured. The security defaults can only be changed by reinstallation.

   b. Locate the default parameter QM-STATUS-SECURITY. The default value for this parameter is DISABLED. To activate security, change the setting to ENABLED and save the file.

      You will also notice a default parameter for security audit. This is not implemented in MQSeries for VSE/ESA 2.1.1. It is reserved for future product extensions.

3. Update the MQJSETUP.Z sample JCL.

   The MQJSETUP.Z file defines a VSAM ESDS and imports the contents of the SYSIN.Z file. You must change the * $$ SLI card in MQJSETUP.Z to identify your SYSIN.Z copy as follows:

   Change:

   ```
   * $$ SLI MEM=SYSIN.Z,S=PRD2.MQSERIES
   ```

   To:

   ```
   * $$ SLI MEM=sysin.copy,S=your.lib
   ```

Once you have made these changes, you can run the MQJSETUP.Z sample JCL to import the contents of the SYSIN.Z file into a VSAM ESDS. The ESDS is processed by installation transaction MQSU to build your starting MQSeries subsystem configuration. See “Starting MQSeries” on page 18. Security installation is not complete until you run the MQSU transaction.

Changing the MQER TDQ definition

Security installation may also require changes to the MQER transient data queue (TDQ) definition of MQSeries for VSE/ESA. The default definition for this TDQ is shipped in file MQCICDCT.Z (see “Preparing CICS for MQSeries” on page 16).

The MQER TDQ definition requires a trigger transaction to be fired every time an entry is written to the TDQ. The transaction that is started is also called MQER.

With CICS TS, this transaction will run as the CICS default user (DFLTUSER) unless the DCT definition identifies a USERID.

For security purposes, the user identified with the MQER transaction must have MQSeries CONNECT authority and UPDATE authority to the SYSTEM.LOG queue. Therefore, you must decide whether to grant these privileges to the CICS default user, or to a special user. For security purposes, we recommended that you identify a special user to run the MQER transaction.

If you intend to grant the appropriate authority to the CICS default user, you do not need to change the MQCICDCT.Z sample file. However, if you intend to identify a special user to run the MQER transaction, you need to perform the following:

1. Create a user with your ESM.
2. Grant CONNECT and UPDATE authority to the user. For details on granting security access to users, refer to Chapter 8, “Security” on page 121.
3. Copy the MQCICDCT.Z file. We recommend that you copy the MQCICDCT.Z file rather than directly edit the base file. The MQCICDCT.Z file is a source fragment that should be included in the DCT source file for your CICS system.
4. Change the MQER TDQ definition in MQCICDCT.Z as follows:

   Change:

   ```
   MQER     DFHDCT TYPE=INTRA,
                   RSL=PUBLIC,
                   DESTID=MQER,
                   DESTFAC=FILE,
                   TRANSID=MQER,
                   TRIGLEV=1
   ```

   To:

   ```
   MQER     DFHDCT TYPE=INTRA,
                   RSL=PUBLIC,
                   DESTID=MQER,
                   DESTFAC=FILE,
                   USERID=youruser,
                   TRANSID=MQER,
                   TRIGLEV=1
   ```

5. Rebuild your DCT phase. Your CICS system programmer can use the MQCICDCT.Z source fragment to do this.

Other considerations for installing security

Other installation steps involve:

1. Activation of security classes.
2. Creation of ESM resources.
3. Creation of users.
4. Assignment of resource permissions to users.

Each of these is covered in detail in Chapter 8, “Security” on page 121.

Preparing CICS for MQSeries

Various CICS tables and definitions must be created and customized for use by the MQSeries subsystem.

You must define the following:

- CICS resources into the CICS CSD
- Entry definitions for the CICS Destination Control Table
- Entry definitions for the CICS File Control Table

The definitions should be reviewed by your CICS systems programmer.

Use the samples (see Appendix E, “Sample programs” on page 173) provided with the product. See Appendix B, “CICS control table definitions” on page 135 for further information.

To help you install the PCT and PPT CICS definitions, the sample MQJCSD.Z is provided. MQJCSD.Z automatically defines the MQSeries entries required into the CICS Definition Data Set (without using migrated CICS, DFHPPT and DFHPCT tables).

You may need to modify this sample to fit your own environment, because all entries are defined in group “MQM”, which is then added to the VSELIST list.

MQJCSD.Z – Define CICS resources into the CICS CSD
Sample code that can be used to create CICS-specific PCT and PPT definitions, which are required by the MQSeries subsystem.

MQJCSD24.Z – Define CICS resources for CICS TS
Sample JCL that can be used to create PCT, PPT, and FCT definitions specific to CICS TS that are required by the MQSeries subsystem.

MQCICFCT.Z – File Control Table (FCT)
The sample code provided can be used for creating CICS definitions for the MQSeries configuration and sample queue files. These definitions may require changing to your site’s specific requirements.

Note: If you install under CICS TS, you do not need to create your File Control Table (FCT) definitions with this sample. File definitions are provided in the MQJCSD24.Z sample JCL file.

MQCICDCT.Z – Destination Control Table (DCT)
The MQSeries product requires intrapartition transient data queues (TDQ), CSMT and MQER, for the processing of log messages. This sample provides a suitable definition for MQER.

Note: If you install the new security feature, you may need to make special changes to the MQER transient data queue definition. See “Installing security” on page 13 for more details.

Modify CICS start-up deck

For CICS applications to use the MQSeries facilities, you must inform CICS of the MQSeries configuration and workfiles, and the location of the MQSeries for VSE/ESA phases as follows:

- Add the label definitions for the CICS start-up job (MQJLABEL.Z) to your CICS start-up deck, or to the standard label procedures. It contains information about the datasets that MQSeries for VSE/ESA uses.

Note to users

This file **must** be modified and customized to refer to the correct volume identifiers and catalog names.

This should be done by your VSE systems programmer.

- Add the MQSeries for VSE/ESA subsystem install library defined in "Installing MQSeries for VSE/ESA – all users" on page 10 (default name "PRD2.MQSERIES") to the LIBDEF control statement in your CICS startup deck.
- If you are using TCP/IP for queue manager to queue manager or client connections, you must also ensure the PRD1.BASE (TCP/IP base library) is concatenated ahead of the PRD2.SCEEBASE (LE base library). This will ensure that the TCP/IP runtime is correctly referenced.

  For example:

```
// LIBDEF       *,SEARCH=(PRD2.MQSERIES,  *
                       PRD2.CONFIG,        *
                       PRD1.BASE,          *
                       PRD2.SCEECICS,      *
                       PRD2.SCEEBASE,      *
                       ...)
```

Recovery and restart

Although MQSeries uses its own recovery and restart logic, it also uses standard CICS file management. It is important, therefore, that you define all the MQSeries VSAM clusters in the DFHFCT with the LOG parameter set to YES. In addition, ensure that the CICS logging facility is activated with `JCT = xx` or `YES` in your DFHSIT.

If you do not fulfil the above conditions, unpredictable results can occur. For example, loss of messages or inaccurate values for message sequence numbers may occur.

CICS journal control table

The CICS journal control table (JCT) can be affected by the queue definitions. If a physical record is larger than the buffer size specified in the JCT, a CICS task abend of "AFCL" occurs.

The provided sample FCT queue definitions specify a maximum record length of 4089 bytes. If large records are written, you should set the BUFSIZE parameter of the CICS DFHJCT to a different value; a BUFSIZE value of 4200 is usually sufficient.

For further information, see the *CICS/VSE Resource Definition (Macro)* manual.

This is reflected in either the MQSeries System Log or the CSMT TD queue when an MQPUT call is processed trying to perform this function.

Uppercase translation

Queue manager, queue and channel names are case sensitive on MQSeries systems. If MQSeries for VSE/ESA sends messages to other MQSeries systems, you must specify UCTRAN = TRANID or UCTRAN = NO in your CICS terminal definitions.

If you do not do this, the names you enter into the MQSeries panels are translated into uppercase, and they may not match the actual names on the target MQSeries system.

Installation checkpoint (CICS)

You have now set up the CICS system, and it is ready to be restarted to update the system configuration and utilize the MQSeries subsystem.

Note: If the CICS system has not been updated correctly, check through the preceding instructions to ensure that they all completed correctly.

Starting MQSeries

When you have restarted the CICS system, you need to initialize and populate the MQSeries for VSE/ESA configuration file before you can use the MQSeries subsystem.

You do this with the `MQSU` transaction. However, you are strongly recommended to ensure that all the MQSeries for VSE/ESA subsystem files are available for access by CICS before running this job.

You do this by issuing the CICS transaction:

```
CEMT  INQUIRE FILE(MQF*)
```

All of the MQSeries for VSE/ESA files defined in “Allocate and initialize the required MQSeries files” on page 12 should be visible, and you should be able to open, close, enable, and disable the files.

If you cannot access these files, refer to your CICS systems programmer and review the steps in “Preparing CICS for MQSeries” on page 16.

If the files are accessible, issue the transaction `MQSU`. This completes with the message “`MQSU – MQSeries Install Completed`”.

Note that you need only run the `MQSU` transaction once whenever you install MQSeries for VSE/ESA. This rule applies to initial installations of the product, as well as subsequent installations.

MQSeries initialization

Before you initialize your MQSeries for VSE/ESA system, if you decide to install the security feature, you must carry out a basic security implementation first. For details of how to implement security, refer to Chapter 8, “Security” on page 121.

If you have already implemented security, or you do not wish to install the security feature, you can now initialize your MQSeries for VSE/ESA subsystem as follows:

1. Set up the MQSeries for VSE/ESA environment.

Issue MQSE (Setup Environment).

The response "MQSE:MQSeries environment setup completed" is displayed, after approximately one minute.

2. Specify the queue manager name.

   There can be only one queue manager on each MQSeries for VSE/ESA system and each MQSeries system should have a unique queue manager name. The name is specified using the MQMT System Administration transaction, as follows:

   a. Enter the transaction code MQMT on a CICS terminal.

   b. Select option 1 for the "Configuration" menu.

   c. Select option 1 for the "Global System Definition" update screen.

```
 06/20/2000          IBM MQSeries for VSE/ESA Version 2.1.1           IYBPZS01
 08:30:48                 Global System Definition                   MQ51
 MQMMSYS                 Queue Manager Information                   SFC1
  Queue Manager . . . . . . .: VSE.QM1
  Description Line 1. . . . .: MQSeries for VSE/ESA V2.1.1
  Description Line 2. . . . .:
                         Queue System Values
  Maximum Number of Tasks . .: 00000100      System Wait Interval : 00000005
  Maximum Concurrent Queues .: 00000100      Max. Recovery Tasks  : 0000
  Allow TDQ Write on Errors  : Y   CSMT      Allow Internal Dump  : Y
                         Queue Maximum Values
  Maximum Q Depth . . . . . .: 01000000      Maximum Global Locks.: 00000100
  Maximum Message Size. . . .: 00002048      Maximum Local Locks .: 00000100
  Maximum Single Q Access . .: 00000100      Checkpoint Threshold : 1000
                         Global QUEUE /File Names
  Local Code Page . . : 01047                TCP/IP Listener Port :  01414
  Configuration File. : MQFCNFG              Licensed Clients . . :  00000
  LOG Queue Name. . . : SYSTEM.LOG
  Dead Letter Name. . : SYSTEM.DEAD.LETTER.QUEUE
  Monitor Queue Name. : SYSTEM.MONITOR

Requested record displayed.
 PF2 = Main Config    PF3 = Quit     PF4/ENTER = Read       PF6 = Update
```

Figure 1. Default screen

   d. Change the "Queue Manager" field to the name that you are giving to your local queue manager.

   e. Press function key six (PF6) to update the configuration.

   f. Press function key three (PF3) to quit the screen.

   You can leave the other fields unchanged.

3. Define a local queue.

   You must define some local queues to test the operation of the MQSeries for VSE/ESA subsystem. This task is also carried out by using the MQMT transaction.

   The following definitions allow the installation verification program, TST2, to send messages to ANYQ.

   Carry out the following procedure:

   a. Type MQMT at the system prompt.

b. Type 1 on the main menu to select Configuration.

c. Type 2 on the Configuration menu to select queue definitions. The “Queue Main Options” screen appears.

d. Complete the following fields:

- Object Type L
- Object Name ANYQ

e. Press PF5 (Add) to display the “Local Queue Definition” screen.

f. Press PF5 (Add) to display the “Queue Extended Definition”screen and change the default values in the following fields:

- Usage mode N (Normal)
- Physical File Name MQFI001 (file name from FCT)
- Maximum Q Depth 00000100
- Maximum Message Length 00002048

g. Press PF5 (Add) to save the changes.

h. Press PF2 (Options) to return to the Queue Main Options Screen.

i. Press PF9 (List) to display a selection screen.

j. On the selection screen, use the cursor keys to select the queue. Press any character key followed by the Enter key.

A screen displays the queue parameters that you have entered. Check that the correct data has been entered.

4. Initialize the MQSeries for VSE/ESA queue manager. There are two ways of doing this. Either:

a. Type MQIT on a CICS terminal.

The response “MQIT: No channel definitions. Initialization completed” is displayed when the process has completed. This is normal.

or

b. Use the MQSeries for VSE/ESA System Administration transaction (MQMT), as follows:

1) Issue MQMT to display the main menu panel of MQSeries Administration.
2) Select 2 - Operation.
3) Select 4 - Initialization/Shutdown.
4) Type I in the function field and press function key six (PF6).

Note: If you carry out the initialization before you perform system setup, you receive the message MQ900000:MQSERIES VSE ENVIRONMENT NOT INITIALIZED.

In the future, you can combine Step 1 on page 18 and Step 4 by issuing MQSE with the parameter I to perform the initialization step, as follows:

```
MQSE  I
```

The response “MQSE:MQSeries environment setup and initialized” is displayed when the process has completed.

Defining the SYSTEM.LOG queue

When you have completed the steps listed in “MQSeries initialization” on page 18, the queue manager is active and you can verify this by typing MQMT on a CICS console, to display Figure 2.

```
06/20/2000        IBM MQSeries for VSE/ESA Version 2.1.1            IYBPZS01
09:31:48           *** Configuration Main Menu ***                  MQ51
MQMMCFG                                                             SFC1
                            SYSTEM IS ACTIVE

                          Maintenance Options :
                              1. Global System Definition
                              2. Queue Definitions
                              3. Channel Definitions
                              4. Code Page Definitions

                          Display Options     :
                              5. Global System Definition
                              6. Queue Definitions
                              7. Channel Definitions
                              8. Code Page Definitions

                       Option:



Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

Figure 2. Configuration main menu

Ensure that the “SYSTEM HAS BEEN SHUTDOWN” message is displayed.

The MQSeries for VSE/ESA subsystem records log messages to a standard MQSeries queue with the name “SYSTEM.LOG”. This queue needs to be defined to the system, as with any other queue.

To do this, follow the instructions listed in Step 3 on page 19 and set the:

- Queue name to “SYSTEM.LOG”
- Physical file name to “MQFLOG”

MQSeries installation verification test

The MQSeries subsystem is now ready for the installation verification procedures.

Stop the MQSeries subsystem, using either the MQST transaction, or the Operations Shutdown menu – MQMT option 2.4, and then reinitialize the MQSeries subsystem (see “MQSeries initialization” on page 18).

To carry out the installation verification test you need:

- One local queue
- The sample transaction TST2
- The program TTPTST2 provided with the product
- Access to two terminals

Local queue verification test

The local queue verification test consists of five steps:

1. Initialize the MQSeries runtime environment.
2. Use the test program TTPTST2 to send a number of messages.
3. Use MQMT to verify that these messages are on the queue.
4. Use the test program TTPTST2 to read the messages.
5. Use MQMT to verify that the messages have been delivered.

Step 1 (initializing the MQSeries runtime environment) has already been performed. You only need to test the ability to send and receive messages, as follows:

1. On one terminal, issue the transaction code `TST2`. This invokes the MQSeries for VSE/ESA test program TTPTST2 and produces the screen in Figure 3.

```
TST2 is a test facility for SENDING / RECEIVING messages
The format of command is as follows:
TST2 XXXX [NN] QQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQ

NOTE a single space or comma separates the params)
 XXXX  4-character function code, pad with trailing blank
                     HELP - DISPLAY THIS HELP TEXT
                     PUT  - MQPUT  MESSAGES
                     PUT1 - MQPUT1 MESSAGES
                     PUTR - MQPUT W/ REPLY MESSAGE
                     GET  - MQGET  MESSAGES
                     GETD - MQGET W/ BROWSE & DELETE
                     BOTH - MQPUT FOLLOWED BY MQGET
                     INQ  - INQ ABOUT QUEUE (no count NN)
 NN    2-digit number with leading zero (01 TO 99)
 QQQQ  A 48-character field giving the name of a queue.
 An additional prompt will ask for the name of the reply queue for PUTR option.
```

Figure 3. TTPTST2 screen

2. On a second terminal, start MQMT and use option 3.1 to monitor queue operations. This displays the screen in Figure 4 on page 23.

```
06/21/2000            IBM MQSeries for VSE/ESA Version 2.1.1         MQ21CICS
10:20:18                   Monitor Queues                            CICS
MQMMMOQ                                                              B001
                           QUEUING SYSTEM IS ACTIVE

QUEUE                        FILE     T INBOUND  OUTBOUND        LR     QDepth
ANYQ                         MQFI001  N IDLE     IDLE             0          0
SYSTEM.LOG                   MQFO001  N IDLE     IDLE             0          1









Information displayed.
    ENTER = Refresh      PF2 = Main Monitor
    PF7 = Back   PF8 = Forward   PF9 = All   PF10 = Detail
```

Figure 4. Monitor queues screen

3. On the first terminal, issue:

   ```
   TST2 PUT 10 ANYQ
   ```

   Note: If you type TST2 without parameters, the HELP screen for using TTPTST2 is displayed.

4. TTPTST2 sends the specified messages addressed to ANYQ.

   You receive the following message on successful completion of the transaction:

   ```
   FULL CYCLE HAS BEEN PERFORMED SUCCESSFULLY
     QUEUE USED - ANYQ
     NUMBER OF MESSAGES PROCESSED -  10
     TOTAL SECONDS ..................... -  hh:mm:ss
   ```

   where:

   - `10` is the number of messages you specified (`nn`).
   - `hh:mm:ss` is the time taken to process `nn` messages.

5. Return to the terminal running the MQMT Monitor Queue process.

6. Press the `Enter` key on this terminal.

   The QDEPTH column for queue ANYQ now equals 10. This is the value specified for `nn` in Step 4.

7. Messages on an MQSeries for VSE/ESA queue can be displayed at any time using the MQMT Browse Queue facility (MQMT option 4). Select this option, enter the queue name in the “Object” field, and press the `Enter` key.

   This displays the screen in Figure 5 on page 24.

```
06/21/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQ21CICS
10:19:19                  Browse Queue Records                      CICS
MQMDISP                     SYSTEM IS ACTIVE                        B001

    Object Name: ANYQ
    QSN Number : 00000001       LR-        0, LW-       10, DD-MQFI001
                      Queue Data Record
Record Status : Written.        PUT date/time  : 20000509102430
Message Size  : 00000200        GET date/time  :
Queue line.
THIS IS A MESSAGE TEXT









Information displayed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process  PF2 = Main Menu    PF3 = Quit   PF4 = Next    PF5 = Prior
 PF7 = Up     PF8 = Down    PF9=Hex/Char   PF10=Txt/Head
```

Figure 5. Browse Queue Records screen – status written

The queue can then be browsed forwards and backwards using function keys four and five (PF4 and PF5).

Note that in this example, the “Record Status” field is `Written`. This indicates that the message has been placed on the queue but not retrieved.

8. Move to the other terminal.
9. At the CICS prompt, type:

   ```
   TST2 GETD  10 ANYQ
   ```

   Note: If you type TST2 without parameters, the HELP screen for using TTPTST2 is displayed.

10. TTPTST2 reads the specified messages from ANYQ.

    You receive the following message on successful completion of the transaction:

    ```
    FULL CYCLE HAS BEEN PERFORMED SUCCESSFULLY
      QUEUE USED - ANYQ
      NUMBER OF MESSAGES PROCESSED -  10
      TOTAL SECONDS ..................... -  hh:mm:ss
    ```

    where:

    - `10` is the number of messages you specified (`nn`).
    - `hh:mm:ss` is the time taken to process `nn` messages.

11. Return to the terminal, running the MQMT Monitor Queue process.
12. Press the `Enter` key. The Monitor Queue screen still displays ANYQ as the only defined queue.

Notes:

a. The QDEPTH number, representing the number of messages on the queue, has decreased to zero.

b. The total number of messages read from the queue (LR) has increased by the number you read using TTPTST2.

13. Use the MQMT Browse facility to view ANYQ. The “Record Status” field has changed to `Deleted`, and the “GET date/time” field is now completed.

    This indicates that the record has now been retrieved by an application. In this case the test transaction TST2 was used with parameters “TST2 GETD 5 ANYQ”.

```
06/21/2000          IBM MQSeries for VSE/ESA Version 2.1.1           MQ21CICS
10:19:19                   Browse Queue Records                      CICS
MQMDISP                      SYSTEM IS ACTIVE                        B001

    Object Name: ANYQ
    QSN Number : 00000001       LR-        5, LW-       10, DD-MQFI001
                      Queue Data Record
Record Status : Deleted         PUT date/time  : 20000509102430
Message Size  : 00000200        GET date/time  : 20000509102825
Queue line.
THIS IS A MESSAGE TEXT









Information displayed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process  PF2 = Main Menu    PF3 = Quit   PF4 = Next    PF5 = Prior
 PF7 = Up     PF8 = Down    PF9=Hex/Char   PF10=Txt/Head
```

Figure 6. Browse Queue Records screen – status deleted

Note that MQSeries for VSE/ESA differs from many other MQSeries platforms, in that when a message is retrieved from a queue it is logically deleted but not physically deleted. The messages are merely flagged as “Deleted”.

As a consequence of this technique of flagging messages as “written” and “deleted”, messages can have their logical state changed, and where necessary, reprocessed.

You can do this using MQMT option 2.5. However, you are advised to carry out this procedure only when you are familiar with the MQSeries for VSE/ESA system.

You have now completed a local installation verification test demonstrating that two applications can send and receive messages through an MQSeries queue.

Remote queue verification test

In order to expand this test to include a remote link, you must carry out the following steps:

1. Using the appropriate manufacturer's directions, install the prerequisite hardware and software required to support the selected transport protocol (SNA LU6.2 or TCP/IP).
2. Define the MQSeries channels that you require. See "Channel definitions" on page 63, and coordinate this task with the remote system administrator.
3. Configure the transmission queues and remote queues required by MQSeries to communicate over the channel – see "Channel definitions" on page 63.

In order for new queue definitions and channels to take effect at run time, you must shut down MQSeries by:

1. Closing the channels.
2. Stopping the queues.
3. Shutting down MQSeries for VSE/ESA.

You must then reinitialize MQSeries as described in "MQSeries initialization" on page 18.

You have now installed and locally verified MQSeries and you can use the administrative programs and the MQI libraries.

However, before your user applications can effectively use the system for message transmission, you must fully configure the system with your queue definitions.

This last step is the most important part of the installation. The requirements are detailed in:

- Chapter 3, "Configuring network communications" on page 31, which provides the configuration guidelines.
- Chapter 4, "System operation" on page 45, which describes the MQSeries system administration screens used in the configuration.

Installation checkpoint (installation verification test)

You can now:

- Define local queues.
- Start and stop the queue manager.
- Browse queues using MQMT.
- Monitor the status of queues.
- Run simple MQSeries programs that use local queues.

Note: If the installation verification test has not completed, check through the preceding instructions.

Post installation verification test CICS modifications

The MQSeries for VSE/ESA subsystem can be started and stopped automatically as part of the normal CICS startup and shutdown procedures. You do this by adding appropriate entries to the CICS Initialization and Shutdown parameters.

Note to users

You **must** not carry out these steps until you have installed MQSeries for VSE/ESA.

CICS Program List Table Post Initialization (PLTPI)

The MQSeries subsystem requires initialization before applications can start using the queue manager. These steps set up the MQSeries environment and initialize the MQSeries resources.

To start MQSeries automatically, you can add the following programs to the CICS initialization PLT (PLTPI) list:

MQPSENV Set up the MQSeries environment.
MQPSTART Initialize the resources.

For example:

```
DFHPLT TYPE=ENTRY, PROGRAM=MQPSENV
DFHPLT TYPE=ENTRY, PROGRAM=MQPSTART
```

Other methods are given in “MQSeries initialization” on page 18.

CICS Program List Table Shut Down (PLTSD)

The MQSeries subsystem should be shutdown correctly before shutting down CICS. This can be done:

- Manually, using transaction MQST
- Automatically, by placing the MQSeries program MQPSTOP in the CICS shutdown PLT before the DFHDELIM statement

  For example:

  ```
  DFHPLT TYPE=ENTRY, PROGRAM=MQPSTOP
  ```

  This ensures that MQSeries ends during the first phase of CICS shutdown.

Migration procedures for existing users

You are strongly recommended to review the section “Installing MQSeries for VSE/ESA – all users” on page 10 before proceeding with the instructions in this section.

Conveniently, migration from MQSeries for VSE/ESA 2.1.0 to 2.1.1 does not require the deletion and recreation of your VSAM datasets. This means your existing files can be used with their existing data. The only exception to this is the MQSeries configuration file.

To carry out the migration, follow the procedure under “Installing MQSeries for VSE/ESA – all users” on page 10 with the following modifications:

1. Do not run sample job MQJCONFG.Z.

Running MCJCONFG.Z will delete and redefine your MQSeries configuration file, which contains, among other things, your application queue definitions.

Instead, the execution of the MQJSETUP.Z job and transaction MQSU will ensure your configuration is upgraded correctly to 2.1.1. MQJSETUP.Z and MQSU are standard steps during installation.

2. Do not run sample job MQJQUEUE.Z.

   The MQJQUEUE.Z job deletes and redefines your MQ VSAM datasets. You must not run this job if you want to keep your existing queue data.

   You should edit the MQJQUEUE.Z file to remove all the IDCAMS DELETE and DEFINE statements, except the DELETE and DEFINE statements for file MQSERIES.MQFREOR. This is a new VSAM file that must exist if you intend to use the the automatic VSAM reorganization feature. (We recommend that you create this dataset regardless of whether you plan to use the reorganization feature.)

   The cut down version of MQJQUEUE.Z should retain the following IDCAMS instructions:

```
DELETE (MQSERIES.MQFREOR) CL NOERASE PURGE         -
  CATALOG(?cat?)

SET MAXCC = 0

DEF CLUSTER(NAME(MQSERIES.MQFREOR)                 -
  FILE(MQFREOR)                                    -
  VOL(?volid?)                                     -
  RECORDS (300 100)                                -
  RECORDSIZE (200 4089)                            -
  INDEXED                                          -
  KEYS(56 0)                                       -
  SHR(2))                                          -
  DATA (NAME (MQSERIES.MQFREOR.DATA) CISZ(4096))   -
  INDEX (NAME (MQSERIES.MQFREOR.INDEX) CISZ(1024)) -
  CATALOG(?cat?)
```

   Create a copy of MQJQUEUE.Z, make these changes, and submit the job.

3. Upgrade your CICS startup deck.

   Your CICS startup deck uses the contents of sample file MQJLABEL.Z, which provides DLBLs and EXTENTS for your VSAM datasets. Since these have not changed, you should use the DLBLs and EXTENTs from your 2.1.0 system in the startup for your 2.1.1 CICS system.

   You will need to add the following:

```
// DLBL MQFREOR,'MQSERIES.MQFREOR',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
```

   These DLBL and EXTENT statements are required for a new file used by the automatic VSAM reorganization feature.

4. Reset your queue manager definition.

   When you run the MQSU transaction as part of your normal installation, your queue manager definition will be reset to installation default values. This is unavoidable.

To restore your queue manager settings, you can use the system administration transaction (MQMT) to manually reset your system parameters. Your queue manager settings can be modified from MQMT option 1.1.

When, after completing the full installation process with the above modifications, you start MQSeries for VSE/ESA 2.1.1, you should see your existing queues with their previous data, and your existing channel definitions. This completes the migration process.

Note: If the migration has not completed correctly, check through the preceding instructions.

Chapter 3. Configuring network communications

This chapter describes the steps you perform to configure MQSeries to run on the CICS system and communicate with other MQSeries systems. The chapter assumes that your chosen communications software has been installed and correctly configured on your system.

For ACF/VTAM®, using MQSeries should not require any changes to the:

- VTAM® parameters
- Definition of CICS systems to VTAM

However, you must define all the LUs that are involved.

For TCP/IP, using MQSeries with the TCP/IP communications protocol requires the installation of TCP/IP for VSE/ESA V1.3 or later.

TCP/IP is shipped as part of the VSE/ESA base product in library PRD1.BASE, and simply requires that you install a product key together with your customer information. For further details refer to the *TCP/IP for VSE/ESA User's Guide*.

MQSeries for VSE/ESA does not have any special TCP/IP installation or configuration requirements.

Note: If TCP/IP is to be used as a transport protocol, the TCP/IP phase library must be added to the LIBDEF statement in the CICS startup JCL before the SCEEBASE library.

This is because SCEEBASE contains a TCP/IP phase stub that handles TCP/IP API calls when TCP/IP is not installed.

This chapter describes how to configure:

- The queue manager
- Queues
- Channels

MQSeries system definitions required

The local MQSeries for VSE/ESA system has to be informed about remote MQSeries systems with which it will communicate. MQSeries has to be defined to:

- MQSeries on CICS (in the network specific parts of the channel definition)
- CICS itself, in one of the following ways:
  - In a TERMINAL definition
  - In CONNECTION/SESSION definitions
  - Through the CICS AUTOINSTALL facility
- VTAM (either predefined, or by VTAM dynamic resource definition), if you are using SNA LU6.2.

Definitions in CICS

If the CICS end of an MQSeries channel is to initiate the channel connection (that is, the CICS channel-endpoint is a sender), CICS performs an EXEC CICS ALLOCATE. However, this succeeds only if CICS is:

- A contention winner
- Already bound
- Not already allocated

If CICS has no definition of the resource, CICS is incapable of formulating a request to VTAM for session establishment. In these circumstances, CICS AUTOINSTALL is inappropriate – autoinstall is for incoming session establishment requests, not for outgoing ones.

Therefore, for sender channel-endpoints on VSE, a definition of the remote system is required at the CICS level.

If the remote system, at the network level, is capable of supporting parallel sessions (for example, it has independent LU6.2 capability, or it is another CICS system) and, you intend to configure several channels between the two systems, you should use CONNECTION and SESSIONS definitions.

Typical definitions, using the CICS Resource Definition Online (RDO) transaction, CEDA, are shown in Figure 7.

```
DEFINE GROUP(<group name 1>)
CONNECTION(<remote conn>)
NETNAME(<remote luname>)
ACCESSMETHOD(VTAM)
PROTOCOL(APPC)
SINGLESESS(NO)

DEFINE GROUP(<group name 1>)
SESSIONS(<sess name>)
CONN(<remote conn>)
MODE(<logmode 1>)
MAXIMUM(<max sessions>,<max CICS contention winners>)

INSTALL GROUP(<group name 1>)

ADD GROUP(<group name 1>) LIST(<start-up list>) {AFTER(<group name>)}
```

Figure 7. Definitions in CICS using RDO for parallel session partner LU

If the remote LU is capable of only one session, then it may be defined to CICS as either a single-session connection definition or as a terminal definition (Figure 9 on page 33).

```
DEFINE GROUP(<group name 2>)
CONNECTION(<remote conn>)
NETNAME(<remote luname>)
ACCESSMETHOD(VTAM)
PROTOCOL(APPC)
SINGLESESS(YES)

DEFINE GROUP(<group name 2>)
SESSIONS(<sess name>)
CONN(<remote conn>)
MODE(<logmode 2>)
MAXIMUM(1,1)

INSTALL GROUP(<group name 2>)

ADD GROUP(<group name 2>) LIST(<start-up list>) {AFTER(<group name>)}
```

Figure 8. Definitions in CICS for single-session capable partner LU

```
DEFINE GROUP(<group name 3>)
TERMINAL(<remote conn>)
NETNAME(<remote luname>)
TYPETERM(DFHLU62T)
MODENAME(<logmode 2>)

INSTALL GROUP(<group name 3>)

ADD GROUP(<group name 3>) LIST(<start-up list>) {AFTER(<group name>)}
```

Figure 9. Definitions in CICS singles-session capable LU

The CICS supplied typeterm definition, DFHLU62T, provides a suitable terminal type definition. It exists in group DFHTYPE, which should be installed on your system.

Sample definitions for CICS tables can be found in the sublibrary PRD2.MQSERIES. However, other definitions are specific to your environment and you have to create them manually using the CEDA transaction, or DEFINE commands if using the DFHCSDUP batch program.

The definitions consist of a:

- Connection definition – see “Connection definition”
- Session definition – see “Session definition” on page 34

Connection definition

CICS uses the connection name to identify the other systems. For example, if sessions in VSE1 are to converse with sessions in VSE2 and MVS, you must define both VSE and MVS connections in each direction.

You must also define all the sessions and terminals involved if you are using SNA LU6.2.

Type `CEDA DEF CONN GROUP(MQSERIES)` to create connections, and set the fields to the following values:

Table 1. Object Characteristics of Connection		
Category	**Parameter**	**Desired Value**
	Connection	VSE2
	Group	MQSERIES
Connection Identifiers	Netname	vse2lu62
Connection Properties	ACcessmethod	Vtam
	Protocol	Appc
	Datastream	User
	RECordformat	U
Operational Properties	AUtoconnect	Yes
	INService	Yes
Security	ATtachsec	Local

The settings detailed, together with default values are sufficient for operation. For other parameters, refer to the *CICS/VSE 2.3 Resource Definition (Macro)* manual.

You can also display the connection status by typing `CEMT I CEMT I CONN`, to display:

Table 2. CEMT I CONN display output.	
STATUS: RESULTS - OVERTYPE TO MODIFY	
Conn(VSE2) Net(xxxxxxxx)	Ins Acq
Conn(MVS) Net(xxxxxxxx)	Ins Rel

Session definition

Type `CEDA DEF SESSION G(MQSERIES)` to create session names. Enter the values shown in Table 3 on page 35 to complete the fields.

Table 3. CEDA V SESS display parameter settings		
Category	**Parameter**	**Desired Value**
	Sessions	VSE1VSE2
	Group	MQSERIES
Session Identifiers	Connection	VSE2
Session Properties	Protocol	Appc
	Maximum	00006,00003
	RECEIVEcount	No
	SENDCount	No
	SENDSize	04096
	RECEIVESize	04096
Operational Properties	Autoconnect	Yes
	Buildchain	Yes
	RELreq	No
	Discreq	No
Recovery	RECOvoption	Sysdefault

The settings detailed, together with default values, are sufficient for operation. For other parameters, refer to the *CICS/VSE 2.3 Resource Definition Guide*.

Note: The DFHSIT Table must have the parameter ISC = YES to make the MQSeries system work.

MQSeries for VSE/ESA configuration guidelines

The following guidelines refer to the MQSeries master terminal (MQMT) administration dialogs. For information about using MQMT, see “MQSeries master terminal (MQMT) – main menu” on page 46.

There are three levels of configuration:

- The queue manager
- The channel
- The queue

Some fields are the same in all three levels, for example, the Maximum Message Size.

Notes:

1. The maximum message size defined in the queue manager configuration must be the largest of all those defined in the channels for this queue manager.
2. The size defined in the channel configuration must be equal to, or greater than, the largest message size that is accessing this channel.
3. Each level of maximum message size configuration utilizes different kinds of resources. Unnecessarily large sizes will consume address space.

Queue manager configuration guidelines

When configuring the queue manager (see “Global system definition” on page 48), use the following guidelines:

Maximum Number of Tasks
The maximum number (integer) of simultaneous connections to the queue manager. Though there is a slight overhead for each unused reservation, there is no harm in setting a large number, for example, 200.

Maximum Concurrent Queues
The maximum number of simultaneous open local queues allowed for the queue manager. You are recommended to set this to a large number, for example, 200.

System Wait Interval
The maximum polling time (in seconds) for the system monitor program after the system starts. A value of five seconds is usually sufficient.

Note: The system monitor task remains active until the CICS region is shut down, but exists in a wait state until the task is activated by the expiration of the System Wait Interval or by some specific application interface tasks.

The system monitor task starts up the trigger program and schedules the processes that reclaim resources held by applications that have ended abnormally. If there are too many, the System Wait Interval should be reduced to schedule this cleanup process more frequently.

Maximum Q Depth
The maximum number of active messages allowed by the queue manager for each queue. This value serves as the default Maximum Q Depth value when defining a queue. Any inbound message that causes the queue depth to exceed this size will be rejected as “Queue Full”.

If this value is smaller than the Maximum Q Depth specified in the queue definition, it becomes the limiting value for the queue. You should set the value to double the maximum number of messages expected to be queued before any application starts to process them.

Maximum Message Size
The maximum number of characters allowed by the queue manager for each message. This field needs only to be large enough to accommodate the largest message. Setting a higher value than necessary wastes resource.

For example, if you anticipate the largest message to be 10 KB (10,240 bytes) you should set this field to 10240.

Note: Messages are stored in VSAM clusters and large messages can span multiple VSAM records. However, you should avoid spanning multiple clusters wherever possible, because of performance implications.

Where an entire message is stored within a single VSAM record, a message header of 740 bytes, for identification and description, is prefixed to the message.

Where a message is split across multiple records, each subsequent record uses a 56-byte header as a prefix to the data.

Maximum Single Q Access
This field defines the maximum number of MQOPEN calls against any queue handled by this queue manager. A value of 1000 calls is an acceptable value, if the maximum number of opens for each queue in the system is 100.

Maximum Global Locks
The maximum number of entries that the queue manager can use to maintain uncommitted MQPUT or MQGET calls, for each queue in the system, for recovery. A value of 500 is normally used.

Maximum Local Locks
The maximum number of entries that the queue manager can use to maintain uncommitted MQPUT or MQGET calls for each queue and task for recovery. Since an entry of a local lock is deleted once an application issues an explicit SYNCPOINT CICS command to commit updates, the more often an application takes the checkpoint, the fewer the maximum number of local locks needed. You should specify a value greater than the largest message batch size for all the channel records. A value of 20 is usually sufficient.

Checkpoint Threshold
The maximum number of queue accesses between checkpoints to be taken by the queue manager. The smaller the value specified, the more often the queue manager takes checkpoints to secure the data integrity, thereby increasing the speed of recovery in the event of a system failure. The larger the checkpoint threshold, the fewer the resources that are used.

A value between 100 and 1000 is a good compromise between the requirements for performance and recovery speed. A high value can have data recovery implications.

Channel configuration guidelines

Defining the remote MQSeries system to the local queue manager is described in “Channel definitions” on page 63. However, from the point of view of showing where fields in the various definitions have to correspond, an outline MQSeries channel definition is shown in Figure 10 on page 38.

```
06/21/2000          IBM MQSeries for VSE/ESA Version 2.1.1          IYBPZS01
08:50:14                    Channel Record           DISPLAY         MQ51
MQMMCHN     Last Check Point               Last Update  00000000    SFC1
MSN 00000000  Time 07:53:13  Interv 000000  Create Date  20000324
Name :  VSEM_TO_VSEP
Protocol :  L   (L/T)  Port :   0000   Type :   R  (S/R/C)
Partner :

        Allocation Retries               Get Retries
    Number of Retries: 00000000       Number of Retries : 00000000
    Delay Time - fast: 00000000       Delay Time        : 00000000
    Delay Time - slow: 00000000

  Max Messages per Batch : 000001         Max Transmission Size   : 032000
  Message Sequence Wrap  : 999999         Max Message Size        : 008192

   Mess Seq Req(Y/N): Y     Convert Msgs(Y/N): Y      Split  Msg(Y/N): N

 Transmission Queue Name  :
 TP Name:
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) Y      Dead Letter Store(Y/N) N
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

Figure 10. Outline MQSeries channel definition

Note that the TP Name field, which identifies the remote task identifier on the CICS system, need only be coded for a sender channel.

When configuring the channel, use the following guidelines:

Protocol
: The required transport options for this channel. The options are:

  - L – LU6.2 (SNA)
  - T – TCPIP

Port
: The port number; relevant for TCP/IP defined channels only.

  This field is relevant only for sender channels. Receiver channels are started by the MQSeries listener program which uses the port number configured in the global system definition.

Type
: Channel type of sender, receiver, or client.

Partner
: The channel partner name. This is the CICS connection ID for LU6.2 channels, or the remote hostname or IP address for TCP/IP channels.

  For TCP/IP this field is relevant only for sender channels. Sender channels identify a specific host for communications, whereas receiver channels can accept communications from any host.

Allocation Retries – sender channels only

Number of Retries

The retry count field represents the number of times an allocation is retried when the conversation has not been established. You should set the retry count at less than 10. If this value is exceeded, the system can be placed under stress.

For receiver channels, this value should be set to zero.

Note: When you configure a new environment, failures occurring more frequently than this can indicate a network problem. You should investigate the problem LU, and its associated resources, to ensure that the session is bound and to establish why the conversation cannot be allocated.

Delay Time-Fast
The time interval, in seconds, that an allocation of conversation is retried for the first cycle of retries. A value of one to five seconds is sufficient for this field, with the longer time being used for a slow environment, for example, a dial-up SDLC.

For receiver channels, this value should be set to zero.

Delay Time-Slow
The time interval, in seconds, that an allocation of conversation is retried for the next cycle of retries, should the first cycle of retries fail. A value between three and 10 seconds is sufficient for this field, with the longer time being used for a slow environment.

For receiver channels, this value should be set to zero.

Get Retries – sender channels only

Number of Retries
The number of retries for the MQGET call when the queue is depleted. If a transmission queue is empty, the queue manager retries at the Delay-Time interval before disconnecting the channel or making a request to disconnect the channel.

For receiver channels, this value should be set to zero.

Delay Time
The time interval, in seconds, between retries. The value of this field may depend on the size of message and the platforms where the LU resides. The optimum value can vary from 1 to 20 seconds.

The longer the delay time specified, the less frequently a channel is reopened. For time-consuming dial-up connections, you are recommended to use a value of 20 seconds.

For receiver channels, this value should be set to zero.

Note: By using a value of zero for the Number of Retries, and a value of “n” seconds for the Delay Time it is possible for you to set a simple disconnection interval similar to that provided on other MQSeries platforms.

Max Messages per Batch
The maximum number of messages in the batch.

Message Sequence Wrap
The message sequence number (MSN) wrap count represents the highest MSN value used on this channel, after which the MSN reverts to one. You are recommended to set this value to 999 999.

Note: The value of the MSN Wrap count must be the same at both the sending and receiving ends of the channel.

Max Transmission Size
The mutually accepted maximum number of characters for each transmission. The minimum value should be equal to the maximum message size expected on this channel, plus 476 bytes for the transmission header.

Max Message Size
The maximum number of bytes for each message that is allowed for this channel.

Mess Seq Req
The message sequence number is required by default. This field should always be set to Y.

Convert Msgs
A field that identifies whether message data is converted before it is sent to a remote queue manager. To convert message data, set this field to Y.

Split Msg
A field that identifies whether message data can be split across network transmissions. For example, if the transmisson size is 8 KB and message data lengths are up to 30 KB, then the message data must be split across transmissions.To split message data in such situations, set this field to Y.

TP Name
The remote task ID, character only, of the receiver on a remote CICS region or a Transaction Program name on a remote system. This is required by the sender, and since CICS uses four bytes as the transaction identifier, only the first four bytes of the remote task ID are meaningful for CICS to CICS conversation.

This field is not relevant for TCP/IP channels.

Note: VSE converts the name to uppercase, therefore, the corresponding name on the remote system should be defined in uppercase characters.

Checkpoint Frequency
A checkpoint event of this channel is taken after the specified input and output activities have occurred. The optimum value, in seconds, varies from 10 to 1000 depending on the emphasis of system throughput against channel recoverability.

Checkpoint Time Span
A checkpoint event of this channel is taken after the specified time interval, in seconds, has expired. You are recommended to use a value of 10 seconds as this does not present too much overhead.

Note: The Checkpoint Frequency and Checkpoint Time Span parameters are used for optimizing performance, where the link to remote systems is both stable and reliable. These parameters reduce the frequency with which MQSeries checkpoints the local MSN values.

Where the systems are not stable, or possible interruptions to message transmission are possible, you are recommended to set values of zero. This ensures that MQSeries issues frequent checkpoints, and greatly reduces the possibility of MSNs getting out of sequence.

Queue configuration guidelines

When configuring the queue (see “Queue definitions” on page 52), use the following guidelines:

Physical File Name
The CICS file name, of up to seven characters, used to store messages for this queue. A physical file can hold as many queues as required. A message queue can be logically replenished, if its associated physical file name is changed.

Note: You should not use the MQFREOR file for queue definitions. The MQFREOR file is used by the automatic VSAM reorganization feature and is deleted and redefined during reorganization. Therefore, message data for queues defined in MQFREOR would be lost.

Maximum Q Depth
The maximum number of records that can remain unread on this queue. Any inbound message that causes the queue depth to exceed this size is rejected as “Queue Full”. The minimum value you set should be the maximum number of messages on the queue before the application starts to read and process the queue. In practice, you can set this to 9,999,999.

Maximum Message Length
The maximum number of characters for each message that this queue allows. If this queue is a transmission queue, the value needs to be sufficiently large to accommodate all messages using this queue as the outbound queue.

Maximum Concurrent Accesses
The maximum number of MQOPEN calls that can occur on this queue. You are recommended to set a value of 100 for each queue that is not a transmission queue. For a transmission queue you should add a value of 100 calls, to the base of 100 calls, for each additional target queue that receives messages from this transmission queue. Setting a high value can use too much overhead.

Global Lock Entries
The maximum number of entries that the queue manager uses to maintain committed MQPUT and MQGET calls for this queue for system recovery. You should set this value to be equal to, or a little less than, the Maximum Number of Opens for this queue.

Local Lock Entries
The maximum number of entries that the queue manager uses to maintain uncommitted MQPUT and MQGET calls for this queue for recovery. Since an entry of a local lock is deleted once an application issues an explicit SYNCPOINT CICS command to commit updates, the more often an application takes the checkpoint, the fewer the maximum number of local locks needed. Specifying a value of 20 is usually sufficient.

Checkpoint Threshold
The maximum number of queue accesses between checkpoints to be taken by the queue manager for this queue. The smaller the value specified, the more often the queue manager takes checkpoints to secure the data integrity, thereby increasing the reliability. The larger the checkpoint threshold, the fewer the resources that are used by the queue manager. A value between 500 and 5000 is a good compromise between the requirements for performance and reliability.

Trigger Type
"F" is used to generate a trigger when an MQPUT call changes the status of a queue from empty to nonempty. The triggered transaction must have sufficient logic to empty the queue, including messages that may arrive during the process, in a single thread. "E" is used to generate a trigger whenever an MQPUT call occurs and may have as many threads as specified in Max Trigger Starts.

Maximum Trigger Starts
The maximum number of trigger threads that can be activated simultaneously. This field applies to Trigger Type "E" only.

Trans ID
The transaction to be started by the trigger. This field is mutually exclusive with the Program ID. You are recommended to leave this field blank and use a Program ID, for example MQPSEND, unless you require a user transaction.

MQSeries for VSE/ESA cannot guarantee that the maximum trigger starts value will be honored if you use Trans ID. If it is important to have a definite number of trigger instances running against a queue, you should use Program ID to identify your trigger program.

Program ID
You should use the MQPSEND call on a transmission queue if you require triggering.

Term ID
You should leave this field blank unless you require a terminal for problem determination purposes.

User Data
This field is for static data that you want to pass to the trigger instance. When a trigger instance is activated, it is passed data in the form of the MQTM structure (see the CMQTML and CMQTMV copybooks). Data in the User Data field is passed in the MQTM-USERDATA field.

Permitted number of channels

The limit on the number of channels depends upon the availability of system resources. The queue manager can support as many channels and transmission queues as the resource in the system permits.

Example configuration

The following tables give a set of values that can be used to set up your system. See:

- Table 4 for the queue manager
- Table 5 on page 43 for a channel
- Table 6 on page 43 for a queue

Table 4 (Page 1 of 2). Example queue manager configuration

Parameter	Value	Units
Maximum Number of MQCONN	200	integer
Maximum Open Queue	200	integer
System Wait Interval	5	seconds

Table 4 (Page 2 of 2). Example queue manager configuration

Parameter	Value	Units
Maximum Q Depth	9999999	integer
Maximum Message Size	3345	bytes
Maximum Number of Opens	500	integer
Max Number of Global Locks	500	integer
Max Number of Local Locks	20	integer
Checkpoint Threshold	500	integer

Table 5. Example channel configuration

Parameter	Value	Units
Allocation Retries	4	integer
Delay Time-Fast	1	second
Delay Time-Slow	3	seconds
Get Retries	1	integer
Delay Time	10	seconds
Message Sequence Wrap	999999	integer
Maximum Transmission Size	3821	bytes
Maximum Message Size	3345	bytes
Checkpoint Time Span	10	seconds

Table 6. Example queue configuration

Parameter	Value	Units
Maximum Q Depth	999999	integer
Maximum Message Size	3345	bytes
Maximum Number of Opens	1000 (transmit queue) 100 (other queues)	integer
Max Number of Global Locks	1000 (transmit queue) 100 (other queues)	integer
Max Number of Local Locks	20	integer
Checkpoint Threshold	100	integer
Trigger Type	E	character
Maximum Trigger Starts	1	integer
Transaction Id	<blank>	character
Program Id	MQPSEND	character

Chapter 4. System operation

There are two ways of managing an MQSeries for VSE/ESA system:

- You can use the CICS transaction MQMT.

  MQMT allows you to configure, operate, and monitor an MQSeries for VSE/ESA system. MQMT also supports the browsing of message queues and is described in this chapter.

- You can use the MQSeries Command Line interface (MQCL).

  MQCL supports management of queues and channels, and is described in Chapter 5, “MQSeries for VSE/ESA utility functions” on page 89.

MQSeries master terminal displays

The MQMT menus and display screens are organized in an *informal* hierarchy as depicted in the following diagram. The hierarchy is informal in the sense that non-hierarchical paths between screens can be invoked by using the function keys. For improved legibility, the chart omits certain exit and return paths available from lower level screens.

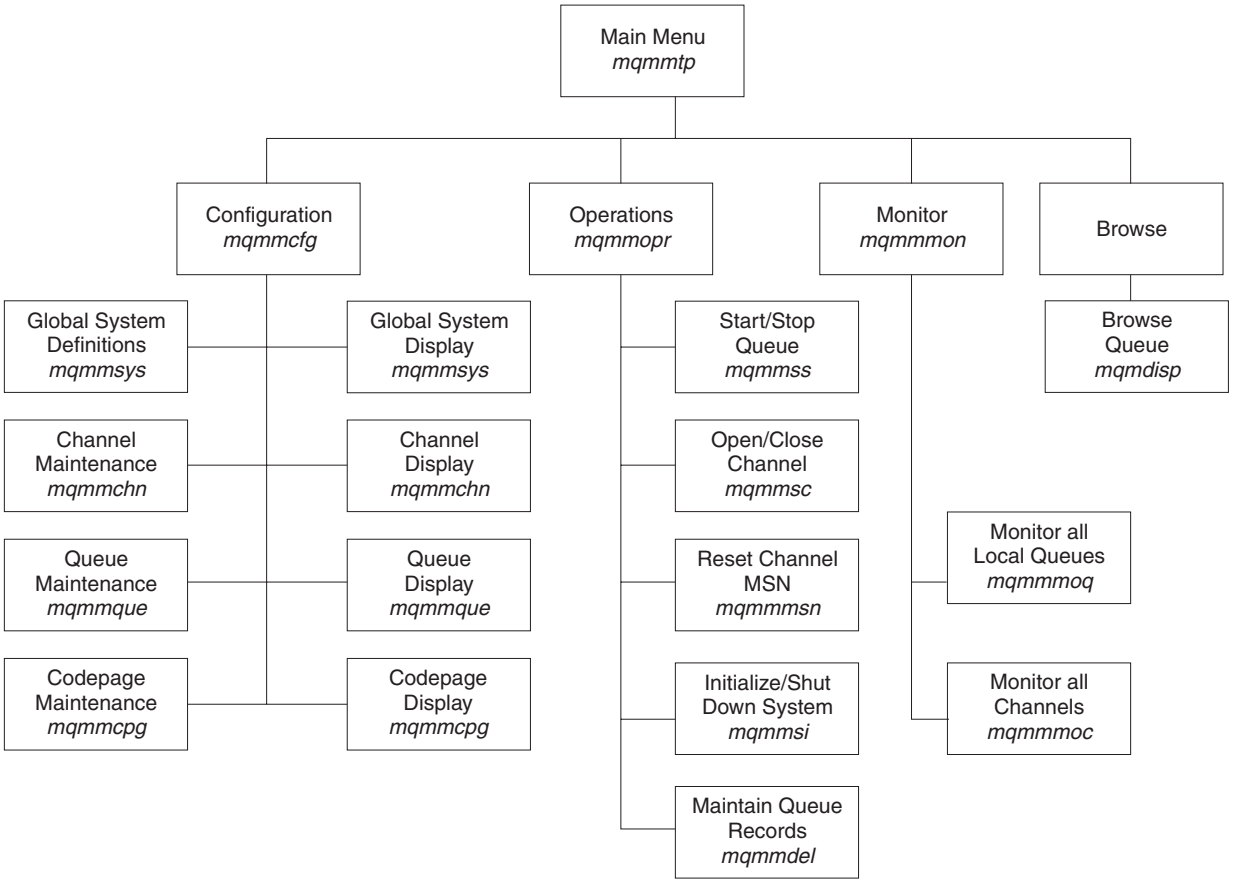

Figure 11. Display screen relationships

The main MQMT menu is shown in “MQSeries master terminal (MQMT) – main menu” on page 46, and the operator functions available through each of the secondary panels are shown in “Configuration functions” on page 48.

General panel layout

MQSeries panels are either menu panels or data entry panels. In either case, they show the following fields:

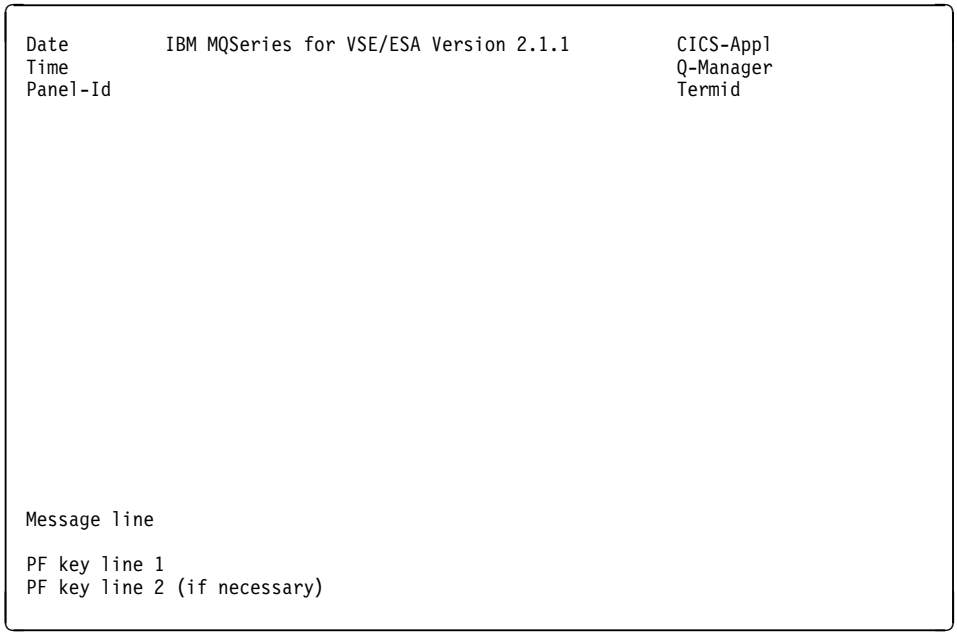

Figure 12. General panel layout

Where:

CICS-Appl
The VTAM application ID for this CICS partition.

Panel-Id
The name of the displayed panel.

Q-Manager
The name of the MQSeries queue manager specified in the global definitions.

Termid
The ID of the CICS terminal on which this panel is displayed.

MQSeries master terminal (MQMT) – main menu

You can invoke the MQSeries system administrator program, MQMT, from any 3270 terminal. To access the operator functions, type `MQMT` at the CICS prompt.

When MQMT starts, the main menu is displayed.

```
07/06/2000        IBM MQSeries for VSE/ESA Version 2.1.1            MQBDTS
10:55:25           *** Master Terminal Main Menu ***                CIC1
MQMMTP                                                              A001
                         SYSTEM IS ACTIVE

                           1. Configuration

                           2. Operations

                           3. Monitoring

                           4. Browse Queue Records


                    Option:




Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
    CLEAR/PF3 = Exit                          ENTER=Select
```

Figure 13. Master terminal main menu

From the main menu, one of several submenus can be selected. The first three selections correspond to broad categories that include most MQSeries operator functions:

- Configuring MQSeries
- Operating (controlling) MQSeries
- Monitoring MQSeries

The fourth function allows you to display the records on a selected queue:

- Browsing MQSeries queues

Each submenu presents a list of operator functions available from that screen. When a specific function is selected, the appropriate data entry or data display screens are presented to the operator.

Operator screen action keys

The action keys available on each MQSeries operator screen are displayed at the bottom of the screen with an explanation of their function. In general, the following keys are available and associated with the indicated action:

CLEAR – Exit MQMT
PF2 – Return to previous menu
PF3 – Exit to CICS
PF4 – Select/Read (Same as Return or Enter keys)
PF5 – Add
PF6 – Update
PF7 – Backward
PF8 – Forward
PF9 – List
PF10 – Screen-dependant
PF12 – Delete

Configuration functions

Selecting option 1 (Configuration) from the master terminal main menu (see Figure 13 on page 47) displays the following screen:

```
07/06/2000        IBM MQSeries for VSE/ESA Version 2.1.1            MQBDTS
11:23:47           *** Configuration Main Menu ***                  CIC1
MQMMCFG                                                             A001
                            SYSTEM IS ACTIVE

                          Maintenance Options :
                              1. Global System Definition
                              2. Queue Definitions
                              3. Channel Definitions
                              4. Code Page Definitions

                          Display Options     :
                              5. Global System Definition
                              6. Queue Definitions
                              7. Channel Definitions
                              8. Code Page Definitions

                       Option:



Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

Figure 14. Configuration main menu

On this screen, selections 1, 2, 3, and 4 allow you to perform maintenance functions on various MQSeries configuration objects. Selections 5, 6, 7 and 8 allow viewing of the same objects.

Notes:

1. Changes to parameters on configuration screens take effect only when the queuing system is reinitialized.
2. When values are shown on the screens, they are default values.

Global system definition

Before you can do anything with messages and queues, you must create a queue manager. Once the installation process is complete, you use the MQSeries “Global System Definition” screen to create a queue manager and start it.

Default objects form the basis of any object definitions that you make. System objects are required for queue manager operation and you must create these objects for the queue manager that you created.

Guidelines for creating queue managers

A queue manager manages the resources associated with it, in particular the queues that it owns. It provides queuing services to applications for Message Queuing Interface (MQI) calls and commands to create, modify, display, and delete MQSeries objects. Some tasks you must consider when creating a queue manager are:

- Selecting a unique queue manager name, as described on Page 49.

- Creating a dead-letter queue, as described on Page 49.
- Backing up the configuration file, as described on Page 52.

The tasks in this list are explained in the sections that follow.

Specifying a unique queue manager name

When you create a queue manager, you must ensure that no other queue manager has the same name, anywhere in your network. Queue manager names are not checked at create time, and non-unique names will prevent you from using channels for distributed queuing.

One method of ensuring uniqueness is to prefix each queue manager name with its own (unique) node name. For example, if a node is called `accounts`, you could name your queue manager `accounts.saturn.queue.manager`, where `saturn` identifies a particular queue manager and `queue.manager` is an extension you can give to all queue managers. Alternatively, you can omit this, but note that `accounts.saturn` and `accounts.saturn.queue.manager` are *different* queue manager names.

If you are using MQSeries for communicating with other enterprises, you can also include your own enterprise as a prefix. We do not actually do this in the examples, because it makes them more difficult to follow.

Specifying a dead-letter queue

The dead-letter queue is a local queue where messages are put if they cannot be routed to their correct destination.

Attention: It is vitally important to have a dead-letter queue on each queue manager in your network. Failure to do so may mean that errors in application programs cause channels to be closed or that replies to administration commands are not received.

You create a dead-letter queue as a local queue; “Creating local queues” on page 53 for details.

For example, if an application attempts to put a message on a queue on another queue manager, but the wrong queue name is given, the channel is stopped, and the message remains on the transmission queue. Other applications cannot then use this channel for their messages.

The channels are not affected if the queue managers have dead-letter queues. The undelivered message is simply put on the dead-letter queue at the receiving end, leaving the channel and its transmission queue available.

Therefore, when you create a queue manager you should specify the name of the dead-letter queue.

Creating a queue manager

For each installation of the MQSeries system, one (and only one) queue manager must be defined. This is accomplished through the screen shown in Figure 15 on page 50. This screen is also used to modify previously defined global parameters.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
13:26:11                  Global System Definition                  CIC1
MQMMSYS                 Queue Manager Information                   A001
 Queue Manager . . . . . .: VSE.QM1
 Description Line 1. . . . .:
 Description Line 2. . . . .:
                       Queue System Values
 Maximum Number of Tasks . .: 00000100      System Wait Interval : 00000030
 Maximum Concurrent Queues .: 00000100      Max. Recovery Tasks  : 0000
 Allow TDQ Write on Errors  : Y   CSMT      Allow Internal Dump  : Y
                       Queue Maximum Values
 Maximum Q Depth . . . . . .: 00100000      Maximum Global Locks.: 00001000
 Maximum Message Size. . . .: 00004096      Maximum Local Locks .: 00001000
 Maximum Single Q Access . .: 00000100      Checkpoint Threshold : 1000
                       Global QUEUE /File Names
 Local Code Page . . : 01047                TCP/IP Listener Port :  01414
 Configuration File. : MQFCNFG              Licensed Clients . . :  00020
 LOG Queue Name. . . : SYSTEM.LOG
 Dead Letter Name. . : SYSTEM.DEAD.LETTER.QUEUE
 Monitor Queue Name. : SYSTEM.MONITOR

Requested record displayed.
 PF2 = Main Config    PF3 = Quit     PF4/ENTER = Read       PF6 = Update
```

Figure 15. System queue manager information

On this screen, the data entry fields are:

Queue Manager
This is the name of the local queue manager for this MQSeries system installation. The name may be up to 48 characters and must conform to the MQSeries naming requirements.

Description Lines 1 & 2
Text fields for operator use only. They may each be up to 32 characters.

Queue System Values

Maximum Number of Tasks
The maximum number of simultaneous connections to the queue manager.

Maximum Concurrent Queues
The maximum number of simultaneously open queues.

Allow TDQ Write on Errors
Y – allow writes to the CICS TDQ 'CSMT' if SYSTEM.LOG not available

N – do not allow write to the CICS TDQ

B – write to both SYSTEM.LOG and the CMST TDQ.

System Wait Interval
The sleep time in seconds for the system monitor program and startup of trigger programs after system initialization.

Max. Recovery Tasks
Maximum number of tasks attached by the system monitor when errors are detected in queues or control blocks attached to queues. A high number would lead to the use of too many CICS resources and have a negative impact on the overall CICS performance. The suggested value is zero.

Allow Internal Dump
Allow the MQSeries API to process a CICS Task Dump if the internal areas are corrupted.

Queue Maximum Values

Maximum Q Depth:
The maximum number of records that will be left unread on a queue.

Maximum Message Size
The maximum size of any message.

Maximum Single Q Access
The maximum number of object handles allowed for a queue.

Maximum Global Locks
The maximum number of entries that the queue manager uses to maintain destructive PUT or GET locks, per queue, for the system.

Maximum Local Locks
The maximum number of entries that the queue manager uses to maintain destructive PUT, or GET locks, per queue, for each individual task.

Checkpoint Threshold
The maximum number of queue accesses between checkpoints.

Global QUEUE /File Names

Local Code Page
The code page in use on the local system. If you plan to support remote client connections, you must use a local code page that can be translated into the code page of the remote client system. Generally, code page 1047 is a good choice, because many translations for this code page are provided with LE. Alternatively, you can define your own translation tables (see Appendix G, “MQSeries clients” on page 223) and set the local code page appropriately.

Configuration File
The CICS file definition name of the MQSeries configuration file.

LOG Queue Name
The queue name where the MQSeries programs write information and error messages.

Dead Letter Name
The file where channel programs write messages that are received with the wrong queue manager name or queue name. These messages will have the dead letter header placed in front of the queue record.

Monitor Queue Name
The queue that the API application requests when the system monitor is turned on.

TCP/IP Listener Port
The port number that MQSeries uses for accepting TCP/IP requests from remote queue managers and TCP/IP clients. The number reserved for MQSeries is 1414.

Licensed Clients
The number of clients for which this system is registered. Use the number from your MQSeries for VSE/ESA license documentation.

Note: Queue maximum value fields restrict the allowed values in the queue definition field values, while the rest of the fields affect the run-time values when the System is initialized.

Backing up the configuration file after creating the queue manager

When you create the queue manager, the queue manager configuration file MQFCNFG is updated. This contains configuration parameters for the queue manager, and the queue and channel definitions.

You should make a backup of this file. If you have to create another queue manager, perhaps to replace the existing queue manager if it is causing problems, you can reinstate the backup when you have removed the source of the problem.

Queue definitions

Selecting 2 on the configuration menu allows you to maintain (add, modify, or delete) queue definitions for the local installation of MQSeries.

Note: The same screens are used to accomplish the three functions of adding, modifying, or deleting a queue definition; the required action being selected through the function keys. The following sections present the screens that you see if you are adding a new queue definition.

"Modifying and deleting queue definitions" on page 62 explains how you modify or delete a queue.

To create a queue definition, multiple screens may be involved. The first screen is the same for all queues, and allows entry of the queue name and type.

Based on the type you enter, an appropriate second screen is displayed for you to enter the remainder of the data to complete the definition.

In the case of local queues, a third screen, the Extended Queue Definition Screen can be displayed.

The first screen displayed is as shown in Figure 16.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
13:29:59                Queue Main Options                          CIC1
MQMMQUE                                                             A001
                        SYSTEM HAS BEEN SHUTDOWN

        Default Q Manager  : VSE.QM1

                Object Type:       L=Local Q, R=Remote Q, AQ=Alias Queue,
                                                          AM=Alias Manage
                                                          AR=Alias Reply

                Object Name:









ENTER NEEDED INFORMATION.

PF2=Main Config PF3 = Quit PF4/ENTER = Read   PF5 = Add          PF6 = Update
                           PF9 = List                           PF12= Delete
```

Figure 16. Queue main options screen

On this screen, the data entry fields are:

Object Type
This is a two character field with the acceptable entries listed on the screen. The type determines the next screen to be displayed.

Object Name
This is the name of the queue (or alias) being defined. The name may be up to 48 characters, must be unique among all other defined queues for this installation, and must conform to the MQSeries naming requirements.

The Object Type you select on this screen is used to determine which of the definition screens is displayed:

- L selects a local queue definition; see "Creating local queues"
- R selects a remote queue definition; see "Create remote queue" on page 58
- AQ selects an alias queue definition; see "Create alias queue" on page 59
- AM selects an alias manager definition; see "Create alias queue manager" on page 60
- AR selects an alias reply queue definition; see "Create alias reply queue" on page 61

Creating local queues

Selecting "L" on the screen in Figure 16 on page 52 displays the screen shown in Figure 17.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
13:32:20               Queue Definition  Record                     CIC1
MQMMQUE           QM - VSE.QM1                                      A001

                      LOCAL QUEUE DEFINITION

 Object Name. . . . . . . . : ANYQ
 Description line 1 . . . . : Test q
 Description line 2 . . . . :

 Put Enabled  . . . . . . . : Y   Y=Yes, N=No
 Get Enabled  . . . . . . . : Y   Y=Yes, N=No

 Default Inbound status . . : A   Outbound .. :  A      A=Active,I=Inactive

 Dual Update Queue . . . . .:


 Automatic Reorganize (Y/N) : N   Start Time. : 0000    Interval .. :  0000
 VSAM Catalog . . . . . . . :

Requested record displayed.
PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add           PF6 = Update
                PF9 = List  PF10= Queue                          PF12= Delete
```

Figure 17. Local queue definition

On this screen, the data entry fields are:

Object Name
Filled in from the previous screen.

Description lines 1 & 2
Text fields for operator use only. They may each be up to 32 characters.

Put Enabled
A toggle that enables or disables MQPUT operations against this queue.

Get Enabled
A toggle that enables or disables MQGET operations against this queue.

Default Inbound status
Sets the initial status to active (A) or inactive (I) at run time for the inbound direction of the queue.

Outbound
Sets the initial status at run time for the outbound direction of the queue.

Dual Update Queue
When an existing queue name is entered here, dual queuing is activated. The queue being created becomes the primary queue, and the queue entered in this field becomes the dual queue. The definition of the dual queue is updated automatically with the name of the primary queue. The queue display of the dual queue has a corresponding heading “Dual Source Queue”.

Dual Source Queue
The name of the primary queue, for which the queue being displayed is the dual queue. This field appears only when a local queue serves as a dual update queue.

Note: When an existing queue is defined as the dual to a primary queue, these two queues both participate in the same logical units of work.

If, for any reason, it becomes impossible to update the dual queue (for example, if the queue becomes disabled, the associated file is closed, or an ISC link is lost), updates continue to be made to the primary queue and the dual queue goes to a recovery status.

Automatic Reorganize
A toggle that enables or disables automatic reorganization of the VSAM file associated with the selected queue, at specified time intervals.

Notes:

1. MQSeries for VSE/ESA uses VSAM files to move messages. The indexes of these files can become fragmented, causing the performance of the system to suffer.

   To reorganize these files you must use VSAM utilities, and the Automatic Reorganize feature automates the process.

2. You are recommended to use the Automatic Reorganize feature only for queue files with high activity.

3. When you specify a queue file that is to be automatically reorganized, you should ensure that there is only one MQSeries queue associated with each VSAM file.

4. The Start Time identifies the time of day when the reorganization runs. For example, 0230 is 2:30 a.m., and 2345 is 11:45 p.m..

5. The Interval, in minutes, identifies the frequency that the reorganization runs. For example, 1440 is daily, and 0120 is every two hours.

6. The VSAM Catalog identifies the VSAM Catalog of the VSAM file that contains the queue.
7. The reorganization can take place even when there are messages on the queue. Message data is retained. However, logically deleted messages are removed.
8. Be aware that during reorganization, application programs do not have access to the queue. If there are any active applications, the reorganization will retry or postpone. Applications that attempt to access the queue after the reorganization starts will wait. The processing time for the reorganization varies, depending on the number of unprocessed messages remaining on the queue. We recommend that you attempt to clear queues before the reorganization time to minimize the unavailability of the queue.

Local queue extended definition screen

By pressing function key 10 (PF10), you can display a second screen to enter the extended definition fields for the queue. In the case of a request to add a queue, this Extended Definition Screen is presented automatically. This detailed screen is shown in Figure 18:

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1           MQBDTS
13:46:14               Queue Extended Definition                     CIC1
MQMMQUE           QM - VSE.QM1                                       A001
Object Name. . . . . . . . : ANYQ
                         Physical Queue Information
Usage Mode . . . . . . . . : N     N=Normal, T=Transmission
Share Mode . . . . . . . . : Y     Y=Yes, N=No
Physical File Name . . . . : MQFO001    MQSERIES.MQFO001
                            Maximum Values
Maximum Q Depth. . . . . . : 00010000     Global Lock Entries . : 00000100
Maximum Message Length . . : 00002048     Local Lock Entries. . : 00000100
Maximum Concurrent Accesses: 00000100     Checkpoint Threshold  : 1000
                          Trigger Information
Trigger Enable . . . . . . : N     Y=yes, N=No
Trigger Type   . . . . . . :       F=First, E=Every
Maximum Trigger Starts . . : 0001
Allow Restart of Trigger   : N     Y=Yes, N=No
Trans ID   :                                Term ID:
Program ID :                               Channel Name:
User data  :
           :
Requested record displayed.
PF2=Main Config PF3 = Quit PF4/ENTER = Read   PF5 = Add           PF6 =Update
                PF9 = List PF10= Queue                           PF12=Delete
```

Figure 18. Local queue extended definition

On this screen, the data entry fields are:

Object Name
Filled in from the previous screen. Cannot be modified.

Local Queue Information

Usage Mode
Normal (N) means that the queue is used by an application to receive inbound messages. Transmission (T) means that the queue is used by MQSeries to hold outbound messages destined for another MQSeries queue manager.

Share Mode
Defines a queue as shareable or exclusive on input.

Physical File Name
The CICS file name, with a maximum of seven characters, used to store messages for this queue.

Note: Do not use the MQFREOR file for queue definitions. This file is used by the automatic VSAM reorganization feature, and is deleted and redefined during reorganization. Consequently, message data for queues defined in MQFREOR will be lost.

Maximum Values

Maximum Q Depth
The maximum number of messages allowed on this queue. The default value is the value specified in the global system definition.

Maximum Message Length
The maximum length of an application message processed on this queue.

Maximum Concurrent Accesses
The maximum number of MQOPEN calls that can occur for this queue simultaneously.

Global Lock Entries
Allocates the locking table for this queue for all committed MQGET calls.

Local Lock Entries
This is used to allocate the locking table for this queue for each task's noncommitted MQGET calls.

Checkpoint Threshold
The maximum number of queue accesses between checkpoints.

Trigger Information

Trigger Enable
If you are defining a transmission queue for use with a sender channel, set this value to Yes (Y). Otherwise, for use with a server or receiver channel, set this field to No (N).

Trigger Type

F A trigger is generated when the first message arrives on an empty queue.

E A trigger is generated every nth message, where n is determined by the Maximum Trigger Starts field.

Only one transaction can be active against the queue if the Trigger Type is set to F.

Maximum Trigger Starts
The maximum number of trigger threads that can be active at once.

Allow Restart of Trigger
Allows the automatic restart of an application if the trigger count goes to zero. It restarts one trigger if messages are available on this queue.

Trans ID
The name of the transaction to be started by a trigger, with a length of four characters. If a transaction ID is specified, this transaction will be started. For a transmission queue, this field is left blank.

If a transaction identifier is defined, the program identifier should be left blank.

MQSeries for VSE/ESA cannot guarantee that the maximum trigger starts value will be honored if you use Trans ID. If it is important to have a definite number of trigger instances running against a queue, use Program ID to identify your trigger program.

Program ID
The name of the user program to be invoked, with a length of eight characters. If you are defining a transmission queue to be used with a sender channel, MQPSEND must be used. If the field for Trans ID is left blank and this field contains a program ID, the specified program is linked.

Term ID
Optional field of four characters used for problem determination. It is attached to the transaction ID specified in the Trans ID field.

Channel Name:
Is the channel name, with a maximum of 20 characters.

User Data
A field for static data to be passed to the trigger instance. When a trigger instance is activated, it is passed data in the form of the MQTM structure (see the CMQTML and CMQTMV copybooks). Data in the User Data field is passed in the MQTM-USERDATA field of the MQTM structure. The trigger instance can use this data for its own internal logic.

Notes:

1. The PF10 key can be used to toggle between the Local Queue Definition screen (Figure 17 on page 53) and the Local Queue Extended Definition screen (Figure 18 on page 55).
2. Either Trans ID or Program ID is required if triggering is enabled.
3. The internal MQSeries trigger API transaction MQ02 cannot be used as a trigger transaction ID.
4. Both a trigger transaction and a trigger program can be defined, but only the trigger transaction is activated and the trigger program name is passed in the trigger communications area.
5. .The maximum message length is restricted by the global system maximum message size. The maximum message size cannot be bigger than the application message size plus the MQSeries header, and cannot be bigger than the VSAM CISIZE-7.

Navigation through the screens is dependent upon the PF keys.

Create remote queue

Selecting “R” on the screen in Figure 16 on page 52 displays the screen shown in Figure 19.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
14:00:53               Queue Definition  Record                     CIC1
MQMMQUE           QM - VSE.QM1                                      A001

                      REMOTE QUEUE DEFINITION

 Object Name. . . . . . . . : VSE1.NT1.RQ1
 Description line 1 . . . . :
 Description line 2 . . . . :

 Put Enabled  . . . . . . . : Y   Y=Yes, N=No
 Get Enabled  . . . . . . . : Y   Y=Yes, N=No



 Remote Queue Name . . . . .: NT1.LQ1
 Remote QM Name. . . . . . .: NT1.QM1
 Transmission Q Name . . . .: VSE1.XQ1



Requested record displayed.
PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add          PF6 = Update
                PF9 = List                                      PF12= Delete
```

Figure 19. Remote queue definition

On this screen, the data entry fields are:

Object Name
Filled in from the previous screen.

Description lines 1 & 2
Text fields for operator use only. They may each be up to 32 characters.

Put Enabled
A toggle that enables or disables MQPUT operations against this queue.

Get Enabled
A toggle that enables or disables MQGET operations against this queue.

Remote Queue Name
The queue name on the remote MQSeries system to which the definition in progress will refer.

Remote QM Name
The name of the remote MQSeries system queue manager on which the remote queue is defined as a local queue. This name must be defined as a local transmission queue unless the Transmission Q Name field is used.

Transmission Q Name
The name of the local transmission queue to be used by MQSeries to convey messages to this remote queue. If the field is left blank, the remote queue manager name is required to map to a local transmission queue.

Note: Some other operating systems, with which you could be communicating, may be case sensitive. You should read the information in “Uppercase translation” on page 18 before devising a name for a queue, channel or queue manager.

Navigation through the screens is dependent upon the PF keys.

Create alias queue

Selecting “AQ” on the screen in Figure 16 on page 52 displays the screen shown in Figure 20.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
14:06:34                Queue Definition  Record                    CIC1
MQMMQUE           QM - VSE.QM1                                      A001

                       ALIAS QUEUE DEFINITION

 Object Name. . . . . . . . : EMPLOYEE
 Description line 1 . . . . : ALIAS FOR EMPLOYEE QUEUE
 Description line 2 . . . . : WITH PUT INHIBITED

 Put Enabled  . . . . . . . : N   Y=Yes, N=No
 Get Enabled  . . . . . . . : Y   Y=Yes, N=No



 Alias Queue Name. . . . . .: EMPLOYEE.DETAILS




Requested record displayed.
PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add          PF6 = Update
                PF9 = List                                       PF12= Delete
```

Figure 20. Alias queue definition

On this screen, the data entry fields are:

Object Name
Filled in from the previous screen.

Description lines 1 & 2
Text fields for operator use only. They may each be up to 32 characters.

Put Enabled
A toggle that enables or disables MQPUT operations against this queue.

Get Enabled
A toggle that enables or disables MQGET operations against this queue.

Alias Queue Name
The name of another object already defined in the local configuration. This must be a local queue name. It cannot identify another alias.

Navigation through the screens is dependent upon the PF keys.

Create alias queue manager

Selecting “AM” on the screen in Figure 16 on page 52 displays the screen shown in Figure 21.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:03:41               Queue Definition  Record                     CIC1
MQMMQUE           QM - VSE.QM1                                      A001

                      ALIAS MANAGER DEFINITION

 Object Name. . . . . . . . : VSE.LOCAL1
 Description line 1 . . . . : ALIAS QUEUE MANAGER
 Description line 2 . . . . : VSE.QM1

 Put Enabled  . . . . . . . : Y   Y=Yes, N=No
 Get Enabled  . . . . . . . : Y   Y=Yes, N=No




 Alias QM Name . . . . . . .: VSE1.QM1
 Transmission Queue. . . . .:



Requested record displayed.
PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add          PF6 = Update
                PF9 = List                                      PF12= Delete
```

Figure 21. Alias queue manager definition

On this screen, the definitions cannot be used in an MQCONN call; they may used for MQOPEN substitution only. The data entry fields are:

Object Name
Filled in from the previous screen.

Description lines 1 & 2
Text fields for operator use only. They may each be up to 32 characters.

Put Enabled
A toggle that enables or disables MQPUT operations against this queue.

Note: You cannot enter data in this field.

Get Enabled
A toggle that enables or disables MQGET operations against this queue.

Note: You cannot enter data in this field.

Alias QM Name
The name of a known queue manager. This can be a local transmission queue name, a remote queue manager name, or the local queue manager name. It cannot identify another alias.

Transmission Queue
The name of the local transmission queue to be used by MQSeries to convey messages to this remote queue manager. If this field is left blank, the Alias QM Name field is required to map to a local transmission queue or to the local queue manager name.

Navigation through the screens is dependent upon the PF keys.

Create alias reply queue

Selecting “AR” on the screen in Figure 16 on page 52 displays the screen shown in Figure 22.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:21:46               Queue Definition  Record                     CIC1
MQMMQUE           QM - VSE.QM1                                      A001

                      ALIAS REPLY DEFINITION

 Object Name. . . . . . . . : REPLYQ
 Description line 1 . . . . : ALIAS REPLY DEFINITION
 Description line 2 . . . . :

 Put Enabled  . . . . . . . : Y   Y=Yes, N=No
 Get Enabled  . . . . . . . : Y   Y=Yes, N=No



 Alias Queue Name. . . . . .: ANYQ
 Alias QM Name . . . . . . .: VSE.QM1



Requested record displayed.
PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add          PF6 = Update
                PF9 = List                                       PF12= Delete
```

Figure 22. Alias queue reply definition

On this screen, the definitions cannot be used in the MQOPEN call; they may only be used for reply queue name substitution with a MQPUT call. The data entry fields are:

Object Name
Filled in from the previous screen.

Description lines 1 & 2
Text fields for operator use only. They may each be up to 32 characters.

Put Enabled
A toggle that enables or disables MQPUT operations against this queue.

Note: You cannot enter data in this field.

Get Enabled
A toggle that enables or disables MQGET operations against this queue.

Note: You cannot enter data in this field.

Alias Queue Name
The name of another object already defined in the local configuration. This can be a local queue name or a remote queue name. It cannot identify another alias.

Alias QM Name
The name of a known queue manager. This can be a local transmission queue name, a remote queue manager name, or the local queue manager name. It cannot identify another alias.

Navigation through the screens is dependent upon the PF keys.

Modifying and deleting queue definitions

Selecting 2 on the configuration menu also allows you to modify or delete queue definitions.

Note: You use the same primary screens for modifying, deleting, or adding a queue.

Selecting an existing queue definition

To modify or delete an existing queue definition, you must select the definition on which to work, and display it.

To do this, select option 2 on the "Configuration Main Menu" screen to display the "Queue Main Options" screen (see Figure 16 on page 52) and use either the PF4, or PF9, function key.

PF4 is the Read key, and you use it to bring a specific queue definition to the screen as follows:

1. Enter the name of the desired queue in the Object Name field.
2. Press PF4 or Enter.
3. MQSeries reads and displays the selected queue definition.

PF9 is the **LIST** key, and you use it to bring a specific queue definition to the screen as follows:

1. Press PF9.
2. The MQSeries System displays a list of all defined queues (see Figure 23).
3. Select the desired queue by typing an "X" next to its name, or by placing the cursor on the appropriate object.
4. Press PF4 or Enter.
5. MQSeries reads and displays the selected queue definition.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:24:52                   Object List Screen                       CIC1
MQMMQUE                                                             A001


S Object                                          Type
  ANYQ                                            Local Queue
  EMPLOYEE                                        Alias Queue
  REPLYQ                                          Alias Reply
  SYSTEM.LOG                                      Local Queue
  VSE.LOCAL1                                      Alias Manager
  VSE1.NT1.RQ1                                    Remote Queue









Records found                - Select one object name.

PF2 = Options   PF3 = Quit  PF4/Enter = Read
                PF7 = Backward  PF8 = Forward
```

Figure 23. Object list screen

Modifying an existing queue definition

When you have displayed the required queue definition, as described in “Selecting an existing queue definition” on page 62, you can modify any field in the definition. This may involve multiple screens to include all fields of the queue definition – see “Queue definitions” on page 52.

When you have made the changes you need, update the screen using the PF6 (UPDATE) function key.

Deleting an existing queue definition

When you have displayed the required queue definition, as described in “Selecting an existing queue definition” on page 62, you can delete it using the PF12 (DELETE) function key.

You will be asked to confirm that you want to delete the queue definition. You must press the PF12 function key again to delete the queue.

Channel definitions

Selecting 3 on the configuration menu allows you to maintain (add, modify, or delete) channel definitions for the local installation of the MQSeries System.

Note: The same screens are used to accomplish the three functions of adding, modifying, or deleting a channel definition; the required action being selected through the function keys. The following sections present the screens that you see if you are adding a new channel definition.

“Modifying and deleting channel definitions” on page 65 explains how you modify or delete a queue.

The screen shown in Figure 24 is displayed to create a channel definition:

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1           MQBDTS
16:33:40                    Channel Record           DISPLAY         CIC1
MQMMCHN     Last Check Point               Last Update  00000000    A001
MSN 00000000  Time 00:00:00  Interv 000000  Create Date  20000706
Name :  VSE1_TO_NT1
Protocol :  T   (L/T)  Port :   1414   Type :   S  (S/R/C)
Partner :  NTSERV1

        Allocation Retries               Get Retries
    Number of Retries: 00000003        Number of Retries : 00000003
    Delay Time - fast: 00000001        Delay Time        : 00000005
    Delay Time - slow: 00000010

  Max Messages per Batch : 000050         Max Transmission Size   : 032766
  Message Sequence Wrap  : 000000         Max Message Size        : 0002048

   Mess Seq Req(Y/N): Y     Convert Msgs(Y/N): N      Split  Msg(Y/N): N

 Transmission Queue Name  : VSE1.XMIT1
 TP Name:
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) N      Dead Letter Store(Y/N) N
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

Figure 24. Channel record

On this screen, the data entry fields are:

Name
The name of the channel to be defined.

Protocol
The protocol being used by the selected channel, which can be LU 6.2, or TCP/IP.

Port
The port number that MQSeries uses for accepting TCP/IP requests from remote queue managers and TCP/IP clients. The number reserved for MQSeries is 1414.

Type
S: A sender only channel.

R: A receiver only channel.

C: A client channel.

Requester Channels are not supported for IBM MQSeries for VSE/ESA.

Partner
The name of the LU6.2 connection, or for TCP/IP sender channels, the remote host name or IP address.

Allocation Retries

Number of Retries
Number of allocation retries when not successful.

Delay Time - fast
Time between retries (in seconds).

Delay Time - slow
Time between retries (in seconds) after fast number of retries has been depleted.

Get Retries

Number of Retries
The number of Get retries when queue is empty.

Delay time
The time between retries (in seconds).

Channel negotiation fields

Max Messages per Batch
The mutually accepted maximum number of messages per batch to be transmitted.

Message Sequence Wrap
The mutually agreed maximum messages count before the count sequence starts over.

Max Transmission Size
The mutually accepted maximum number of bytes per transmission.

Max Message Size
The mutually accepted maximum number of bytes per message. The Maximum Message Size must be bigger than the application message size, plus approximately 1,000 bytes for the MQSeries header.

Mess Seq Reqd
This **must** be set to Y for MQSeries for VSE/ESA. Both ends of the channel must use message sequence numbers.

Convert Msgs
A field that identifies whether message data is converted before it is sent to a remote queue manager. To convert message data, set this field to Y. Data is converted to the code page of the remote host only if the code page is supported.

Split Msg
This **must** be set to Y if messages longer than the maximum transmission size for the channel are to be sent across the channel.

Other channel data

Connection ID
A four-byte field identifying the connection. Required by the sender, not recognized for the receiver.

Transmission Queue Name
The name of the transmission queue. Required for the sender, optional for the receiver.

TP Name
A 64-character field identifying the remote task ID of the receiver on the remote CICS region, or a TPNAME on the remote system (for example, AMQCRS6A). This is required by the sender for LU6.2 use only. This field is not recognized for TCP/IP.

Note: Although the TPNAME can be up to 64 bytes in other MQSeries products, on MQSeries for VSE/ESA it can have a maximum of 4 bytes only.

Checkpoint values

Parameters that effect how often synchronization is performed for this channel.

Frequency
Determines checkpoint event based upon I/O frequency.

Time Span
Determines checkpoint event based upon time span in seconds.

Enable
Enable the channel for communications at initialization time.

Dead Letter Store
A field that identifies whether inbound messages are written to the dead letter queue whenever an inbound message cannot be written to its intended target queue. The dead letter queue is identified in your Global System Definition.

Modifying and deleting channel definitions

Selecting 3 on the configuration menu also allows you to modify or delete channel definitions.

Note: You use the same primary screens for modifying, deleting, or adding a channel.

Selecting an existing channel definition

To modify or delete an existing channel definition, you must select the definition on which to work, and display it.

To do this, select option 3 on the “Configuration Main Menu” screen to display the “Channel Record” screen (see Figure 24 on page 63), and use either the PF4 or PF9 function key.

PF4 is the Read key, and you use it to bring a specific channel definition to the screen as follows:

1. Enter the name of the desired channel in the Channel Name field.
2. Press PF4 or Enter.
3. MQSeries reads and displays the selected channel definition.

PF9 is the List key, and you use it to bring a specific channel definition to the screen as follows:

1. Press PF9.
2. MQSeries displays a list of all defined channels (see Figure 25).
3. Select the desired channel by typing an “S” next to the channel name.
4. Press PF4 or Enter.
5. MQSeries reads and displays the selected channel definition.

```
07/06/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:45:59                    Channel List                            CIC1
MQMMCHN                                                             A001

S    CHANNEL NAME     TYPE  STATUS LAST MSN  LAST CHECKPOINT

  MVS_TO_VSE1           R   DISABLE  000000       00:00:00       TCP
  NT1_TO_VSE1           R   DISABLE  000000       00:00:00       TCP
  OS2_TO_VSE1           R   DISABLE  000000       00:00:00       TCP
  VSE1_TO_MVS           S   DISABLE  000000       00:00:00       TCP
  VSE1_TO_NT1           S   DISABLE  000000       00:00:00       TCP
  VSE1_TO_OS2           S   DISABLE  000000       00:00:00       TCP









ENTER 'S' to select Channel
    PF2 = Menu      PF3 = Quit     PF4 = Read     F7 = Backward  PF8 = Forward
```

Figure 25. Channel list

On this screen, the display fields are:

Channel Name
The names of all channels.

Type
Type is sender (S), receiver (R), or client (C).

Status
Channel may be enabled (ENABLE) or disabled (DISABL).

Last MSN
The last checkpointed message sequence number of the channel.

Last Checkpoint
The time of the last checkpoint.

Modifying an existing channel definition

When you have displayed the required channel definition, as described in "Selecting an existing channel definition" on page 66, you can modify any field in the definition.

When you have made the changes you need, update the screen using the PF6 (Update) function key.

Deleting an existing channel definition

When you have displayed the required channel definition, as described in "Selecting an existing channel definition" on page 66, you can delete it using the PF12 (Delete) function key.

You will be asked to confirm that you want to delete the channel definition. You must press the PF12 function key again to delete the channel.

Code page definitions

Selecting 4 on the configuration menu allows you to define global parameters and maintain a set of user-defined code pages for data conversion.

Figure 26 shows the screen that is displayed when you select 4 from the configuration menu.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
09:58:32                   Code Page Definition                     CIC1
MQMMCPG                Data Conversion Information                 A001



          Default ASCII code page....: 0850


          Default EBCDIC code page...: 1047


          Convert EBCDIC newline.....: L    L=Ascii NL, T=Table, I=ISO




Record initialized - New record.
 PF2 = Main Config    PF3 = Quit     PF4/ENTER = Read    PF5 = Add PF6 =Update
                                     PF9 = List CodePages
```

Figure 26. Data conversion definitions

To change values on this screen, use PF6 (Update). To add user-defined code pages, use PF5 (Add).

On this screen, the data entry fields are:

Default ASCII code page
Code page used for default conversion when a code page that represents an ASCII code page fails normal conversion.

The default data conversion process is used if data conversion fails and the default ASCII code page is valid. Default conversion takes place only if the conversion is from ASCII to EBCDIC, or EBCDIC to ASCII. Otherwise, data is passed without conversion.

A value of 0 means no default conversion.

Default EBCDIC code page
Code page used for default conversion when a code page that represents an EBCDIC code page fails normal conversion.

The default data conversion process is used if data conversion fails and the default EBCDIC code page is valid. Default conversion takes place only if the conversion is from ASCII to EBCDIC, or EBCDIC to ASCII. Otherwise, data is passed without conversion.

A value of 0 means no default conversion.

Convert EBCDIC newline
This value is used only when converting EBCDIC to ASCII. Valid values are:

L: EBCDIC NL is converted to ASCII LF. This is the default behaviour and how all V5.0 MQSeries products behave.

T: EBCDIC NL is converted to whatever value is specified in the supplied conversion table.

I: EBCDIC NL is converted to whatever value is specified inthe supplied conversion table. If the source is an ISO code page, the conversion is the same as L (NL to LF).

See the *MQSeries Application Programming Reference*, SC33-1673, for more details regarding conversion of EBCDIC newline characters.

Create a user-defined code page

Selecting option 4 on the configuration menu also allows you to create user-defined code pages.

To add a new user-defined code page, select option 4 on the configuration menu to display the Code Page Definition screen (see Figure 26 on page 67), then press PF5.

The screen shown in Figure 27 on page 69 is displayed.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
10:42:50                 User Code Page Definition                  CIC1
MQMMCPG                                                             A001




 Code Page Number . . . . . : 1234
 Description Line 1 . . . . : Special ASCII code page
 Description Line 2 . . . . :

 Type . . . . . : S      S=SBCS, D=DBCS, M=MIXED
 Encoding . . . . . : A      E=EBCDIC, A=ASCII, I=ISO,
                             U=UCS2, T=UTF, C=EUC



Record being added   - Press ADD key again.

PF2=Data Conv   PF3 = Quit PF4/ENTER = Read   PF5 = Add          PF6 = Update
                PF9 = List                                      PF12= Delete
```

Figure 27. User code page definition

On this screen, the data entry fields are:

Code Page Number
Four digit number that uniquely identifies the user-defined code page. You cannot redefine a system-defined code page that already exists in LE/VSE.

Description lines 1 & 2
Text fields for operator use only. They may each be up to 32 characters.

Type
S: Single Byte Character Set (SBCS)

D: Double Byte Character Set (DBCS)

M: Mixed SBCS/DBCS

Encoding
E: EBCDIC

A: ASCII

I: ISO

U: UCS-2 (Unicode)

T: UTF-8 (Unicode)

C: EUC

For more information on these types and encodings, see the IBM manual *Character Data Representation Architecture*, SC09-1390.

For a user code page to work, the underlying LE/VSE code converter must exist as a CICS phase. MQSeries for VSE/ESA uses LE/VSE for application message data conversion. See Chapter 7, “Message data conversion” on page 117 for more details on message data conversion.

Modifying and deleting user-defined code pages

Selecting option 4 on the configuration menu also allows you to modify or delete user code page definitions.

Note: You use the same primary screens for both modifying and deleting a user code page definition.

Additionally, you can use the PF9 function key (List) from either the Code Page Definition screen, or the User Code Page Definition screen.

PF9 displays the code page Object List screen shown in Figure 28.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBTDS
04:14:06                   Object List Screen                       CIC1
MQMMCPG                                                             A001


S Object                                          TYPE
  1123                                            SBCS Codepage
  1208                                            Mixed Codepage
  1308                                            SBCS Codepage
  3254                                            SBCS Codepage
  3722                                            SBCS Codepage
  4355                                            Mixed Codepage
  4545                                            SBCS Codepage
  4567                                            SBCS Codepage
  5657                                            SBCS Codepage
  6775                                            SBCS Codepage
...More



Records Found - Select one Object Name

PF2 =Data Conv  PF3 = Quit  PF4/Enter = Read
                PF7 = Backward  PF8 = Forward
```

Figure 28. Code page object list screen

Modifying an existing code page definition

From the displayed list, type an S next to the code page number you want to modify, or position the cursor on the entry, then press Enter.

When the required code page definition is displayed, you can edit modifiable fields and update the entry using PF6.

Deleting an existing code page definition.

From the displayed list, type an S next to the code page number you want to delete, or position the cursor on the entry, then press Enter.

When the required code page definition is displayed, use PF12 to delete the entry.

You are asked to confirm that you want to delete the definition. You must press the PF12 key again to delete the code page definition.

Global system definition display

Selecting 5 on the main menu allows you to view the attributes defined for the local queue manager, and all system-wide parameters, through the screen shown in Figure 29, which is display only:

```
 07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1           MQBTS
 09:52:57                 Global System Definition                    CIC1
 MQMMSYS                 Queue Manager Information                    A001
  Queue Manager . . . . . . .: VSE.QM1
  Description Line 1. . . . .:
  Description Line 2. . . . .:
                          Queue System Values
  Maximum Number of Tasks . .: 00000100      System Wait Interval : 0000030
  Maximum Concurrent Queues .: 00000100      Max. Recovery Tasks  : 0000
  Allow TDQ Write on Errors  : Y   CSMT      Allow Internal Dump  : Y
                          Queue Maximum Values
  Maximum Q Depth . . . . . .: 00100000      Maximum Global Locks.: 0000100
  Maximum Message Size. . . .: 00004096      Maximum Local Locks .: 0000100
  Maximum Single Q Access . .: 00000100      Checkpoint Threshold : 1000
                          Global QUEUE /File Names
  Local Code Page . . : 01047                TCP/IP Listener Port :  01414
  Configuration File. : MQFCNFG              Licensed Clients . . :  00000
  LOG Queue Name. . . : SYSTEM.LOG
  Dead Letter Name. . : SYSTEM.DEAD.LETTER.QUEUE
  Monitor Queue Name. : SYSTEM.MONITOR

Requested record displayed.
 PF2 = Main Config    PF3 = Quit     PF4/ENTER = Read
```

Figure 29. Global system definition display

To return to the configuration main menu, press the PF2 key.

Queue definition display

Selecting 6 on the main menu allows you to view existing queue definitions.

Note: This function allows you to see the queue definition, not the current queue status. To see the current queue information, see “Monitor queues” on page 81.

This operation is identical to the modify queue and delete queue operations (as described in “Modifying and deleting queue definitions” on page 62), except that the maintenance function keys PF5 (Add), PF6 (Update), and PF12 (Delete), are not available.

Channel definition display

Selecting 7 on the main menu allows you to view existing channel definitions.

Note: This function allows you to see the channel definition, not the current channel status. To see the current channel information, see “Monitor channel” on page 83.

This operation is identical to the modify channel and delete channel operations (as described in “Modifying and deleting channel definitions” on page 65), except that the maintenance function keys PF6 (Update) and PF12 (Delete), are not available.

Code page definition display

Selecting 8 on the configuration menu allows you to view existing code page defaults and user-defined code page definitions.

This operation is identical to the modify and delete code page operations, as available using option 4 of the configuration menu, except that the maintenance function keys PF6 (Update) and PF12 (Delete) are not available.

Operations functions

Selecting option 2 (Operations) from the master terminal main menu (see Figure 13 on page 47) displays the following screen:

```
07/07/2000        IBM MQSeries for VSE/ESA Version 2.1.1            MQBDTS
16:09:36              *** Operations Main Menu ***                  CIC1
MQMMOPR                                                             A001
                             SYSTEM IS ACTIVE

                          1. Start / Stop Queue(s)

                          2. Open / Close Channel(s)

                          3. Reset Message Sequence Number

                          4. Initialization / Shutdown of System

                          5. Maintain Queue Message Records

                  Option:




Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
   ENTER = Process           PF2 = Main Menu             PF3 = Quit
```

Figure 30. Operations main menu

On this screen, selections correspond to available operator control functions.

Start/Stop queue

Selecting 1 on the operations menu allows you to start or stop processing for a queue.

This differs from setting the queue's Get Enabled or Put Enabled option to "No" in that the Start and Stop functions:

- Are dynamic, with immediate effects
- Apply universally to all processes attempting to access a local queue

The Get Enabled and Put Enabled functions are:

- Static configuration fields that take effect at system initialization time, or through the "Refresh from Config" option on the screen shown in Figure 31 on page 73.
- Can be selectively applied to aliases and remote queue definitions.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:18:02               Start / Stop Queue                           CIC1
MQMMSS                                                              A001

                         System Information
           System Status    : SYSTEM IS ACTIVE
           Queue Status     : Queuing System is active.
           Channel Status   : Channel System has been closed.
           Monitor Status   : Monitor is not active.
                        Single Queue Request
           Queue Name       : EMPLOYEE.DETAILS
           Function         : X      S=Start, X=Stop,  R=Refresh from Config
           Mode             : B      I=Inbound, O=Outbound, B=Both

           INBOUND Status   :                    DISABLED
           OUTBOUND Status  :                    DISABLED

                        All Queues  Request
           Function         :        S=Start, X=Stop, or M=Monitor


QUEUE   STOPPED.
 ENTER=Display      PF2 = OPER MENU     PF3 = Exit           PF6 = Update
```

Figure 31. Start / Stop queue control screen

On the Start / Stop Queue screen shown in Figure 31, the fields are:

System Information

System Status

Reflects the status of the system. This is normally ACTIVE, unless the system has not been initialized, or has been shut down. When this occurs, the field reads SYSTEM IS SHUTDOWN.

Queue Status

Reflects the status of the queuing system. This is normally ACTIVE, unless the system has not yet been initialized or all the queues have been stopped. When this occurs, the field reads QUEUING SYSTEM IS STOPPED.

Channel Status

Reflects the status of the channels. This is normally ACTIVE, unless the system has not yet been initialized or all the channels have been closed. When this occurs, the field reads CHANNEL SYSTEM IS CLOSED.

Monitor Status

Reflects the status of the system monitor.

Single Queue Request

Queue Name

The name of a specific queue to start or stop

Function

The function to be performed, as follows:

S is to start:

- A stopped local queue
- The associated trigger mechanism
- Receiving messages if the channel is open

X is to stop a local queue and make it unavailable.

R is to refresh the run-time information for this queue from the configuration file, which was updated either by checkpoint requests or MQMT queue configuration. The configuration file (MQFCNFG) contains definitions of the queue manager, channels and queues.

Note: It is important to refresh a queue if the definition is changed, otherwise the change does not come into effect until the next initialization of the queue manager.

Mode

The queue process to be operated on, as indicated on screen.

INBOUND Status

Reflects the status of the specified queue. This is normally ACTIVE or IDLE unless the queue inbound has been stopped. If the queue is stopped, DISABLED is also displayed.

OUTBOUND Status

Reflects the status of the specified queue. This is normally ACTIVE or IDLE unless the queue outbound has been stopped. If the queue is stopped, DISABLED is also displayed.

All Queues Request

Function

The function to be performed, as follows:

S is to start the system queue manager without affecting system resources.

X is to stop the system queue manager without affecting system resources.

Note: When a queue manager is initiated or shut down, there are certain system functions that have to be performed to ensure that the contents of the disk files are in synchronization with the storage control blocks. However, when a system is started or stopped, the queue manager is simply enabled or disabled.

M toggles the monitor flag. This flag is used to log application requests and their results to the system monitor queue.

Notes:

1. Only local queues can be stopped or started. In order to stop or start a queue that is not local, the queue definition must be updated in the Put-Enabled or Get-Enabled fields. These configuration changes must then be “refreshed” to the run-time environment.
2. When a local queue is started, any associated triggers will also be started, if the queue depth reflects that messages are present.

   This does not happen when an “All Queues Request” function is performed. Additionally, any queues that were stopped before the “All Queues Request” stop function was performed, remain stopped when the corresponding start function is performed.

   Use the Monitor Queue function to check which local queues are stopped.
3. If the queue definition specifies a trigger and a sender channel, then starting a queue triggers the sender program to activate the channel and transmit messages.

Open / Close channel

Selecting 2 on the operations main menu (see Figure 30 on page 72) allows you to open or close communications on an existing channel.

Note: Opening or closing a channel is not the same as starting or stopping the MCA process. See "Communications process" on page 86 for further information.

Figure 32 shows the first screen to be displayed:

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:24:12               Open / Close Channel                         CIC1
MQMMSC                                                              A001

                          System Information
           System Status    : SYSTEM IS ACTIVE
           Queue Status     : QUEUING SYSTEM IS ACTIVE
           Channel System   : CHANNEL SYSTEM HAS BEEN CLOSED
                        Single Channel Request
           Channel Name     :

           Function         :        O=Open , C=Close , R=Refresh from Config

           Status           :



                          All Channels Request
           Function         :        O=Open , C=Close


Enter required information.
  ENTER= Display    PF2 = Oper Menu        PF3 = Exit        PF6 = Update
```

Figure 32. Open / Close Channel

On this screen, the fields are:

System Information

System Status

Reflects the status of the system. This is normally ACTIVE, unless the system has not been initialized, or has been shut down. When this occurs, the field reads SYSTEM IS SHUTDOWN.

Queue Status

Reflects the status of the queuing system. This is normally ACTIVE, unless the system has not yet been initialized or all the queues have been stopped. When this occurs, the field reads QUEUING SYSTEM IS STOPPED.

Channel System

Reflects the status of the channels. This is normally ACTIVE, unless the system has not yet been initialized or all the channels have been closed. When this occurs, the field reads CHANNEL SYSTEM IS CLOSED.

Single Channel Request

Channel Name

The name of a specific channel to start or stop

Function

The function to be performed:

- O is to open a closed channel.
- C is to close an open channel.
- R is to restore the run-time information from the configuration file. A channel must be refreshed if the definition was updated by MQMT channel configuration.

Status

Reflects the status of the specified channel. This is normally ACTIVE or IDLE unless the channel has been stopped. In this situation DISABLED is also displayed.

All Channels Request

Function

This either opens or closes the channel system.

Note: Opening a channel does not cause a trigger to activate. However, starting the channel's transmission queue does activate a trigger; see Step 3 on page 74.

Reset message sequence number

Selecting 3 on the operations main menu (see Figure 30 on page 72) allows you to reset the message sequence numbers on an existing channel by displaying the screen shown in Figure 33:

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:27:48               Reset Channel Message Sequence               CIC1
MQMMMSN                                                             A001

                        System Information
           System Status    : SYSTEM IS ACTIVE
           Queue Status     : QUEUING SYSTEM IS ACTIVE
           Channel Status   : CHANNEL SYSTEM HAS BEEN CLOSED
                        Reset Channel Info
           Channel Name     : VSE1_TO_NT1


           Status           : STOPPED

           Current Next-MSN : 00000001
           New     Next-MSN :




Information displayed.
PF2 = OPER MAIN MENU          PF3 = Cancel                  PF6 = Update
```

Figure 33. Reset channel message sequence

On this screen, the fields are:

System Information

System Status
Reflects the status of the system. This is normally ACTIVE, unless the system has not been initialized, or has been shut down. When this occurs, the field reads SYSTEM IS SHUTDOWN.

Queue Status
Reflects the status of the queuing system. This is normally ACTIVE, unless the system has not yet been initialized or all the queues have been stopped. When this occurs, the field reads QUEUING SYSTEM IS STOPPED.

Channel Status
Reflects the status of the channels. This is normally ACTIVE, unless the system has not yet been initialized or all the channels have been closed. When this occurs, the field reads CHANNEL SYSTEM IS CLOSED.

Reset Channel Info

Channel Name
The name of a specific channel.

Status
Reflects the status of the specified channel. This is normally ACTIVE or IDLE unless the channel has been stopped. In this situation DISABLED is also displayed.

Current Next-MSN
Displays the message sequence number to be used next.

New Next-MSN
Operator-entered value for message sequence number to be used next.

Note: In order for a channel message sequence number to be reset, the channel must be stopped.

Initialization of system

Selecting 4 on the operations menu allows you to initialize the queuing system by displaying the screen shown in Figure 34 on page 78.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:34:11         Initialization / Shutdown of System                CIC1
MQMMSI                                                              A001

                        System Information
           System Status    : SYSTEM IS ACTIVE
           Queue Status     : QUEUING SYSTEM IS ACTIVE
           Channel Status   : CHANNEL SYSTEM HAS BEEN CLOSED


           Function         :          I=Initialize, X=Shutdown


           Returned Results :


           System initialized on   07/07/2000 at 16:23:42



Please enter one of the options listed.

PF2 - Main Operation                  PF3  - Cancel          PF6 - Update
```

Figure 34. Initialization of system

On this screen, the fields are:

System Information

System Status

Reflects the status of the system. This is normally ACTIVE, unless the system has not been initialized, or has been shut down. When this occurs, the field reads SYSTEM IS SHUTDOWN.

Queue Status

Reflects the status of the queuing system. This is normally ACTIVE, unless the system has not yet been initialized or all the queues have been stopped. When this occurs, the field reads QUEUING SYSTEM IS STOPPED.

Channel Status

Reflects the status of the channels. This is normally ACTIVE, unless the system has not yet been initialized or all the channels have been closed. When this occurs, the field reads CHANNEL SYSTEM IS CLOSED.

Function

The function to be performed:

- I is to initialize the system. If the system is initialized, the queue manager is started and all channels and queues opened. Any trigger associated with queues just initialized is also activated if the queue depth is nonzero.
- X is to shut down the system. If the system is shut down, the queue manager is stopped and all the channels closed.

Returned Results

Pressing PF6 with an Initialize function (I) on this screen causes the static system configuration files to be loaded into the CICS/VSE® dynamic storage. Any error messages or progress messages are displayed in this field.

Note: All outstanding queue maintenance requests must have completed before you perform an initialize or shutdown operation.

Queue maintenance

Selecting 5 on the operations menu allows you either to reset deleted records or physically delete records, by displaying the screen shown in Figure 35.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:36:43            Maintain Queue Message Records                  CIC1
MQMMDEL                                                             A001

                          System Information
           System Status    : System is active.
           Queue  Status    : Queuing system is active.
           Channel System   : Channel system has been closed.
                       Queue Information
           Queue Name       :
           Function         :   A=Delete all, D=Delete to date/time exclusive
                                R=Reset from date/time inclusive
           Date (yyyymmdd)  :
           Time (hhmmss)    :

                       Results of Request
           Number Processed :
           Number of Bypass :
           New Last Read QSN:
           Process Time     :

Please enter a Queue name.
PF2 = Oper Main Menu         PF3 = Quit                 PF6 = Update
                                                        PF12= Retry
```

Figure 35. Maintain Queue Message Records

On this screen, the fields are:

System Information

System Status

Reflects the status of the system. This is normally ACTIVE, unless the system has not been initialized, or has been shut down. When this occurs, the field reads SYSTEM IS SHUTDOWN.

Queue Status

Reflects the status of the queuing system. This is normally ACTIVE, unless the system has not yet been initialized or all the queues have been stopped. When this occurs, the field reads QUEUING SYSTEM IS STOPPED.

Channel System

Reflects the status of the channels. This is normally ACTIVE, unless the system has not yet been initialized or all the channels have been closed. When this occurs, the field reads CHANNEL SYSTEM IS CLOSED.

Queue Information

Queue Name

The name of the local queue on which the function is to be performed.

Function

The function to be performed:

- D is to delete messages that have been logically deleted up to a specified "written" exclusive date and time. For example, given the date and time of 980227230000, specifying "D" deletes all records with a written time prior to 11:00:00 p.m.

Note: Specifying D does not actually reclaim VSAM space, because record keys are always created in ascending sequence. You are strongly recommended to read “VSAM file maintenance” on page 96 for information regarding the Delete All function in relation to VSAM files.

- A is to delete all records (logically deleted, or written) and reclaim VSAM space
- R is to reset all logically deleted records to written status from a specified “deleted” inclusive date and time. For example, given the date and time of 980227230000, specifying “R” resets all delivered messages with delivery time after 10:59:59 p.m.

Date
The last date up to which the selected function is to be performed, if applicable.

Time
The last time up to which the selected function is to be performed, if applicable.

Queue Information

Number Processed
Number of messages processed

Number of Bypass
Number of messages bypassed

New Last Read QSN
Last read queue sequence number

Process Time
Time to process the request

You use the PF6 (Update) function key to activate the requested function. The function itself is performed by another task, which signals the screen when it is complete. To display the signal, press the Enter key.

The PF12 (Retry) function key is used only if the delete task has ended before finishing the current request, and acts as a new PF6 request.

Notes:

1. A Delete or Reset Messages by Date and Time performs the requested function up to the selected date and time, but does not include records with that date and time.
2. If the queue is examined with the browse function, the put time of the last message to be reset should be the value for date and time.
3. The Delete All function purges all records, which include both logically deleted and nondeleted messages.

Once a queue maintenance task is in progress, the task flags the Queue Information entry and logically prevents any other task from accessing this queue. Any attempt to open this queue is rejected with the following message:

```
Queue has xxxx tasks attached. These must be purged.
```

The only action available at this point is to wait and try again later.

Monitoring functions

Selecting option 3 (Monitoring) from the master terminal main menu (see Figure 13 on page 47) displays the screen shown in Figure 36.

```
07/07/2000        IBM MQSeries for VSE/ESA Version 2.1.1            MQBDTS
16:40:53             *** Monitor Main Menu ***                      CIC1
MQMMMON                                                             A001
                           SYSTEM IS ACTIVE


                             1. Monitor Queue

                             2. Monitor Channel


                    Option:









Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
  ENTER = Process        PF2 = Main Menu          PF3 = Quit
```

Figure 36. Monitor Main Menu

Monitor queues

Selecting 1 on the monitor main menu allows you to monitor the current status of all existing local queues, using the screen shown in Figure 37.

```
07/07/2000            IBM MQSeries for VSE/ESA Version 2.1.1         IYBPZS01
09:03:11                   Monitor Queues                            VSE1
MQMMMOQ                                                              A005
                           QUEUING SYSTEM IS ACTIVE

QUEUE                        FILE     T INBOUND  OUTBOUND        LR     QDepth
ANYQ                         MQFI002  N STOPPED  STOPPED          0          0
BRET.LQ1                     MQFI002  N IDLE     IDLE            17          0
BRET.MVS.XQ1                 MQFI002  Y IDLE     IDLE             0          0
BRET.OS2.XQ1                 MQFI002  Y IDLE     IDLE             0          0
BRET.XQ1                     MQFI002  Y IDLE     IDLE             0          0
POP.BOTTLE                   MQFI002  N IDLE     IDLE             0          0
QL.VSEP                      MQFI002  N IDLE     IDLE             0         19
SYSTEM.EXCEPT                MQFI001  N IDLE     IDLE             0          0
SYSTEM.LOG                   MQFO001  N IDLE     IDLE             0        433
SYSTEM.MONITOR               MQFO001  N IDLE     IDLE             0          4
..More



Information displayed.
    ENTER = Refresh      PF2 = Main Monitor
    PF7 = Back   PF8 = Forward   PF9 = All   PF10 = Detail
```

Figure 37. Monitor queues

This screen displays the current status of all local queues. The displayed fields are:

Queue
Name of the queue.

File
CICS FCT DDNAME of a local queue definition.

T
Queue type.

N Normal local queue.
Y Transmission local queue.

When PF9 (All) option is selected, additional type values may be displayed. They are:

M Manager alias.
A Queue alias.
X Remote queue definition.

Inbound
Status of the inbound process.

ACTIVE	One or more users have the queue open for MQPUT operations.
IDLE	No user has the queue open for MQPUT operations.
STOPPED	Queue has been stopped.
MAX	At maximum QDepth.
FULL	No space.
RECOVERY	For dual queuing.

Outbound
Status of the outbound process.

ACTIVE	One or more users have the queue open for MQGET operations.
IDLE	No user has the queue open for MQGET operations.
STOPPED	Queue has been stopped.
RECOVERY	For dual queuing.

LR
Last Read: relative record number of the last record on the queue that has been read and processed.

Note: MQSeries messages are logically, rather than physically, deleted from the queue file. **LR** tells you which physical record is prior to the first active record.

QDepth
Estimated queue depth: The approximate number of records currently on the queue, remaining to be processed.

Notes:

1. The estimated queue depth is based on all MQPUT requests and on syncpointed MQGET requests.
2. Pressing the PF9 (All) function key displays an entire list of all queues (local, remote, and alias) together with their associated reference.

   If you press this key again, the display lists local queues only.
3. Pressing the PF10 (Detail) function key displays detailed information for this local queue entry.

Monitor queues - detail

Pressing PF10 (Detail) displays detailed information for a specific queue on the screen shown in Figure 38.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1           IYBPZS01
12:07:05                  Monitor Queues                             VSE2
MQMMMOQ                                                              0002
                          QUEUING SYSTEM IS ACTIVE

                          DETAIL QUEUE INFORMATION
MVS1_TQ
 INBOUND:   STATUS I  ENABLED Y   OPEN Q         0
            CHECKPOINT:            TAKEN         0THRESHOLD      1000
 OUTBOUND:  STATUS I  ENABLED Y   OPEN Q         0
            CHECKPOINT:            TAKEN         0THRESHOLD      1000

 BOTH:     FIQ         0    LIQ         4   GETS         0    QDEPTH        4
 TRIGGER:  MAX         1   USED         0   TRAN       PROG. MQPSEND
           CID VSE2_TO_MVS1




Information displayed.
    ENTER = Refresh      PF2 = Main Monitor
                                           PF10 = List
```

Figure 38. Monitor Queues - detail

Monitor channel

Selecting 2 on the monitor main menu (shown in Figure 36 on page 81) allows you to monitor the current status of existing local communications channels, using the screen shown in Figure 39 on page 84.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          IYBPZS01
09:28:33                   Monitor Channels                         VSE1
MQMMMOC                                                             A005
                           CHANNEL SYSTEM IS ACTIVE

CHANNEL              TYPE       MSN       QSN      QUEUE
BRET.CLIENT.TO.VSE   RECV         0         0 I
BRET.OS2.TO.VSE      RECV        98        10 I BRET.LQ1
BRET.VSE.TO.MVS      SEND         1         1 I BRET.MVS.XQ1
BRET.VSE.TO.OS2      SEND        54         2 I BRET.XQ1
SD01_LU62_VSEP       RECV        98         0 I
SD01_TCP_VSEP        RECV         2        23 I QL.VSEP
VSEP_LU62_SD01       SEND         0         0 I




Information displayed.
    ENTER = Refresh      PF2 = Main Monitor
    PF7 = Scroll Back    PF8 = Scroll Forward    PF10 = Detail
```

Figure 39. Monitor channel definitions

This screen displays the current status of local channels.

Channel
Name of the channel.

Type
Sender (SEND) or receiver (RECV).

MSN
Last channel message sequence number received or sent.

QSN
Queue message sequence number, of the queue name displayed in the **Queue** field.

QUEUE
Name of the queue associated with the channel. This field is preceded by a single character identifying the channel status:

I IDLE

B BUSY

C CLOSED (for example, DISABLED)

Note: If this is a receiver channel, the QUEUE field displays the last queue name for which a message has been received.

Monitor channel - detail

Pressing PF10 (Detail) displays detailed information for a specific channel shown in Figure 40 on page 85.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          IYBPZS01
12:10:39                  Monitor Channels                          VSE2
MQMMMOC                                                             0002
                         CHANNEL SYSTEM IS ACTIVE

                          DETAIL CHANNEL INFORMATION
VSE1_TO_VSE2
           COMMIT          MSN       QSN DATE/TIME
 RECEIVER    BEFORE          0         0 19970128102830

             AFTER           9         4 19970128102830
                    QL.DEVL.X









Information displayed.
    ENTER = Refresh      PF2 = Main Monitor
                                                 PF10 = List
```

Figure 40. Monitor channel definitions - detail

This screen displays the channel name, the channel type, and the name of the queue it accesses. The MSN, QSN and time stamp of the last commitment for the BEFORE and AFTER COMMIT fields are also shown.

Browse function

Selecting option 4 (Browse Queue Records) from the master terminal main menu (see Figure 13 on page 47) displays the screen shown in Figure 41.

```
07/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
16:48:57                  Browse Queue Records                      CIC1
MQMDISP                     SYSTEM IS ACTIVE                        A001

    Object Name: ANYQ
    QSN Number : 00000001       LR-       10, LW-       40, DD-MQFO0001
                      Queue Data Record
Record Status : Deleted         PUT date/time  : 20000627140526
Message Size  : 00000200        GET date/time  : 20000627141555
Queue line.
THIS IS A MESSAGE TEXT









Information displayed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process  PF2 = Main Menu    PF3 = Quit   PF4 = Next    PF5 = Prior
 PF7 = Up     PF8 = Down    PF9=Hex/Char   PF10=Txt/Head
```

Figure 41. Browse Queue Records

This screen shows the content of the message for the specified queue sequence number (QSN) of the chosen object name (queue name). Record status is shown as Written or Deleted along with the associated time stamps.

To browse the queue records, enter the local object name and the QSN of the message of interest. The message on the queue appears in the blank area of the screen, and the message can be manipulated using the function (PF) keys.

Pressing the PF9 (Hex/Char) key displays the message in hexadecimal or EBCDIC text code.

The PF10 (Txt/Head) key presents detailed MQSeries information for the selected record, and includes channel information if the queue is a transmission queue.

If you browse the System Log file, the PF12 (Help) key appears and can be used to display user action and system action for this message, provided that the system is active.

Notes:

1. If the file you are browsing is in the process of being updated by any other MQSeries tasks, this function waits until the completion of those tasks. There can be a delay in the response of the browse function.
2. The Browse utility also has the ability to browse from a queue when the queue manager is not active.

Communications process

MQSeries uses the message channel agent (MCA) and the MQSeries listener for its communications.

The MCA process:

- Runs as a separate CICS task connected to the remote MQSeries using APPC or TCP/IP protocol.
- Starts automatically in response to other system activity, or when a message is placed on a transmission queue.
- Starts the MQSeries server when initial client requests are received.
- Can be stopped from the operations main menu.

Select 2 from the operations main menu to control the channels. See “Open / Close channel” on page 75 for further information.

The MQSeries listener process:

- Establishes itself as a TCP/IP “listener” process by binding itself to a port number configured in the global system definition.
- Runs as a separate CICS task waiting for remote TCP/IP connection requests.
- Starts the receiver MCA when connection requests are received.
- Ends when MQSeries is shut down.

Viewing error logs

MQSeries error messages, and other system messages, are placed on the following queues:

SYSTEM.LOG
All MQSeries generated error messages are written to this queue. If SYSTEM.LOG is not defined, or if MQSeries cannot successfully write to it, the error messages are logged to CSMT and may be viewed using standard system utilities.[1]

SYSTEM.EXCEPT
Is the MQSeries dead letter queue. Messages that cannot be queued to their specified destination are queued here.

SYSTEM.MONITOR
API monitor queue used to log all application requests and their results. This is primarily for problem determination purposes.

Notes:

1. The names listed for these queues are the default names, but you can redefine the actual queue names through the global system definition screen.
2. You can view the messages written to these queues using the MQSeries browse queue function (see “Browse function” on page 85).

[1] This can be changed in the global system definition

Chapter 5. MQSeries for VSE/ESA utility functions

MQSeries for VSE/ESA is supplied with various utility functions, which are:

- The MQSeries System Administration Control Interface – see "System Administration Control Interface"
- Batch modules – see "Background batch modules" on page 92
- The batch interface – see "Using the batch interface" on page 94
- Utilities for reclaiming VSAM file space – see "VSAM file maintenance" on page 96

System Administration Control Interface

The MQSeries System Administration Control Interface allows a limited number of system administration functions to be performed using programs.

The System Administration Control Interface has:

- A transactional interface (MQCL)
- A programmable interface (MQPCMD)

Transactional interface (MQCL)

MQCL is the command-line interface to the MQPCMD program. It allows you selectively to open and close:

- Queues
- Inbound channels
- Outbound channels
- Channels in both directions

The format of the command is:

```
MQCL FF NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN
```

Where:

MQCL Command line transaction ID.

FF Function code. Valid codes are:

CR	Close receiver channel.
IDOR	Open receiver channel ID.
CS	Close sender channel.
IDOS	Open sender channel ID.
SB	Start queue both directions.
SI	Start queue inbound direction.
SO	Start queue outbound direction.
XI	Stop queue both directions.
XI	Stop queue inbound direction.
XO	Stop queue outbound direction.

NNNN The name of a queue or channel.

A message is sent to the activated terminal for every activation of this transaction. This message has an error code of MQM001000 for completed messages, or an

error code of MQM001090 for any that did not complete properly. The text that follows explains the exact results.

Note that error code MQM001090 indicates invalid syntax in the command line program, MQCL.

Programmable interface (MQPCMD)

The programmable interface uses an EXEC CICS LINK PROGRAM (MQPCMD). MQPCMD accepts a fixed format COMMAREA which specifies the type of request and a status response area.

The supplied copybook MQICMD.C describes this area.

```
*----------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQICMD    ***          - BEGIN - *
*----------------------------------------------------------------*
*----------------------------------------------------------------*
*  COMMAND LINE COPYBOOK                                         *
*----------------------------------------------------------------*

 01  MQI-COMMAND-LINE.
     02  MQI-CMD-PASSED-AREA.
        05  MQI-CMD-TRANS-ID         PIC  X(4) VALUE 'MQCL'.
        05  FILLER                   PIC  X   VALUE SPACE.
        05  MQI-CMD-FUNCTION         PIC  XX  VALUE SPACE.
             88 MQI-CMD-FUNCTION-OK    VALUE 'CR', 'OR',
                                           'CS', 'OS',
                                           'XB', 'XI', 'XO',
                                           'SB', 'SI', 'SO'.
             88 MQI-CMD-FUNC-STATION   VALUE 'CR', 'OR',
                                           'CS', 'OS'.
             88 MQI-CMD-CLOSE-STATION  VALUE 'CR', 'CS'.
             88 MQI-CMD-OPEN-STATION   VALUE 'OR', 'OS'.
             88 MQI-CMD-STATION-SEND   VALUE 'CS', 'OS'.
             88 MQI-CMD-STATION-RECVR  VALUE 'CR', 'OR'.


             88 MQI-CMD-FUNC-QUEUE      VALUE 'XB', 'XI', 'XO',
                                              'SB', 'SI', 'SO'.
             88 MQI-CMD-STOP-QUEUE      VALUE 'XB', 'XI', 'XO'.
             88 MQI-CMD-STOP-Q-INBOUND  VALUE 'XI'.
             88 MQI-CMD-STOP-Q-OUTBOUND VALUE 'XO'.
             88 MQI-CMD-STOP-Q-BOTH     VALUE 'XB'.

             88 MQI-CMD-START-QUEUE      VALUE 'SB', 'SI', 'SO'.
             88 MQI-CMD-START-Q-INBOUND  VALUE 'SI'.
             88 MQI-CMD-START-Q-OUTBOUND VALUE 'SO'.
             88 MQI-CMD-START-Q-BOTH     VALUE 'SB'.

             88 MQI-CMD-Q-IN             VALUE 'SI', 'XI'.
             88 MQI-CMD-Q-OUT            VALUE 'SO', 'XO'.
             88 MQI-CMD-Q-BOTH           VALUE 'SB', 'XB'.

        05  FILLER                   PIC  X   VALUE SPACE.
        05  MQI-CMD-QUEUE-NAME       PIC  X(48) VALUE SPACES.
        05  MQI-CMD-STATION-NAME    REDEFINES
             MQI-CMD-QUEUE-NAME      PIC  X(48).

*--RETURNED INFO ONLY ON CICS LINK
     02  MQI-CMD-RETURNED-AREA.
        05  MQI-CMD-RC               PIC S9(4) COMP VALUE ZERO.
         88 MQI-CMD-RC-OK                         VALUE ZERO.
```

```
         88 MQI-CMD-RC-DUPLICATE-FUNC              VALUE +4.
         88 MQI-CMD-RC-NAME-INVALID                VALUE +10.
         88 MQI-CMD-RC-SYS-NOT-ACTIVE              VALUE +80.
         88 MQI-CMD-RC-ERRORS                      VALUE +90.
         88 MQI-CMD-RC-HELP                        VALUE +99.

        05 MQI-CMD-ERROR-LINE.
          10  MQI-CMD-ERROR-PREFIX   PIC  XXX   VALUE 'MQM'.
          10  MQI-CMD-ERROR-CODE     PIC  X(6)  VALUE SPACES.
          10  FILLER                 PIC  X     VALUE SPACE.
          10  MQI-CMD-ERROR-TEXT     PIC  X(40) VALUE SPACES.
          10  FILLER                 PIC  X     VALUE SPACE.
          10  MQI-CMD-ERROR-NAME     PIC  X(48) VALUE SPACES.

*-----------------------------------------------------------------*
* - END -        ***  COPYBOOK: MQICMD    ***            - END - *
*-----------------------------------------------------------------*
```

The following sample program is an example of how to use MQICMD.C.

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID.    TESTCMD.
 AUTHOR.        IBM.

 DATE-COMPILED.
*
* SUMMARY CHANGES:
*-----------------------------------------------------------------*
*                                                                 *
* CHANGE  DATE       PGM   COMMENT                                *
*                                                                 *
*                                                                 *
*******************************************************************
 ENVIRONMENT DIVISION.
 CONFIGURATION SECTION.
 DATA DIVISION.

 WORKING-STORAGE SECTION.

*-----------------------------------------------------------------*
 01  WS-QCLOSED     PIC X(20) VALUE 'Queue closed OK.'.
 01  WS-QNCLOSED    PIC X(20) VALUE 'Queue not closed.'.
     COPY MQICMD.
*-----------------------------------------------------------------*
 LINKAGE SECTION.
*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
 PROCEDURE DIVISION.
*-----------------------------------------------------------------*

 0000-MAIN-LINE.
     MOVE 'QL.VSEP' TO MQI-CMD-QUEUE-NAME
     SET MQI-CMD-STOP-Q-BOTH TO TRUE
     EXEC CICS LINK
               PROGRAM('MQPCMD')
               COMMAREA(MQI-COMMAND-LINE)
               LENGTH(LENGTH OF MQI-COMMAND-LINE)
     END-EXEC
     EVALUATE TRUE
        WHEN  MQI-CMD-RC-OK
              EXEC CICS WRITE OPERATOR
                        TEXT(WS-QCLOSED)
```

```
                    TEXTLENGTH(LENGTH OF WS-QCLOSED)
              END-EXEC
         WHEN OTHER
              EXEC CICS WRITE OPERATOR
                    TEXT(WS-QNCLOSED)
                    TEXTLENGTH(LENGTH OF WS-QNCLOSED)
              END-EXEC
     END-EVALUATE
     .
*---------------------------------------------------------------*
 0000-RETURN.
     EXEC CICS RETURN
     END-EXEC
     .
     GOBACK.
```

Background batch modules

The PRD2.MQSERIES library contains all the sample code and JCL, including the MQJUTILY.Z example background batch job.

MQJUTILY.Z contains the MQPUTIL program, which performs the following functions:

- Prints the system, queue, and channel definitions from a configuration file.
- Prints the SYSTEM.LOG file in a formatted report.
- Updates all channels with a new starting MSN.
- Updates a configuration file for dual queues. It makes all dual queues into a primary queue.
- Prints new Help Facility error information.

The MQPUTIL program uses the CONFIG DLBL for the MQSeries configuration VSAM file, if the PRINT LOG command is used. The MQPUTIL program uses the following general syntax:

Table 7. MQPUTIL program general syntax

Column	Content
1 to 5	Command name
6	Space
7 to 18	Subcommand
19	Space
20...	Arguments

MQPUTIL program

The supplied MQPUTIL program has three commands, which are:

- PRINT
- RESET
- DUALQ

Note: You must run the MQPUTIL program once for each command that you require.

PRINT

PRINT has three options:

CONFIG
Prints the full MQSeries configuration using the sample DLBL provided.

LOG
Prints the system log in a formatted report using the sample DLBL provided.

MESSAGES
Prints a Help Facility resolution report.

RESET

RESET has two options:

MSN nnnnnnnn
Resets all channel numbers to nnnnnnnn

CHECKPOINT
Resets all channel checkpoint values to zero.

RESET CHECKPOINT causes the channel records to be updated with a new checkpoint value. This causes the current MSN values to be maintained when MQSeries is started.

MQSeries compares the latest checkpoint value for a channel against that of the updated channel date and time for a queue record. If the queue record has a higher value, the MSN in the queue record is used. Therefore, whichever checkpoint value was taken last becomes the current MSN when MQSeries is started.

If the MQPUTIL program is used to perform the RESET CHECKPOINT function, no queue scan is performed.

DUALQ

DUALQ has the following option:

TAKEOVER dual_queue_name
Allows the dual queue specified to become the primary queue, using the following process:

1. The configuration file points to the cluster hosting the dual queue instead of to the cluster hosting the primary queue.
2. All message headers in the dual queue are modified to contain the name of the primary queue instead of the name of the dual queue.

This command may be used when a local queue becomes unavailable, for example, when input or output errors occur, and a dual queue has been defined.

Note: You are recommended to backup the configuration file, using the VSAM REPRO command, before using this command, because the file will be changed. The configuration file can be restored when you have repaired the failure.

Using the batch interface

Unlike MQSeries for other platforms, MQSeries for VSE/ESA is implemented as a CICS subsystem. This means that access to MQSeries objects using the message queue interface (MQI) is restricted to CICS applications. To avoid this limitation, MQSeries for VSE/ESA provides an interface for batch programs.

The batch interface is designed to standardize the programming style of CICS and batch programs. From a programming point of view, batch programs use calls exactly the same way as CICS programs, that is, MQSeries batch programs issue calls such as MQCONN, MQOPEN, and MQPUT to access MQSeries objects.

Because MQSeries objects are ultimately under the control of the CICS subsystem, calls issued by batch programs are passed to the CICS partition for processing. This is achieved using cross partition communication calls (XPCC). Batch programs are not concerned with XPCC, because all relevant logic is built into MQI calls.

MQSeries for VSE/ESA provides a special CICS transaction, MQBI, that must be running to process MQI calls issued by batch programs. This transaction must be running for the batch interface to be available. MQBI waits for MQCONN calls issued by batch programs. When these are received, MQBI starts a second transaction, MQBX, which issues all MQI calls on behalf of the batch program. There is one MQBX instance for each active batch connection.

The MQBX transaction runs for the duration of the logical MQSeries connection, that is, it runs until the batch program issues an MQDISC. If a batch program issues a second MQCONN call, the batch interface starts a second MQBX transaction for the duration of that MQSeries connection. This design allows batch programs to create logical units of work. It also means that multiple batch programs (including multiple VSE subtasks) can establish concurrent connections to the MQSeries queue manager.

Normally, the MQSeries for VSE/ESA message queue interface does not provide the MQCMIT and MQBACK calls, because CICS programs can issue SYNCPOINT and SYNCPOINT ROLLBACK, respectively. However, for the batch interface, MQCMIT and MQBACK are meaningful, and therefore these calls are available as part of the MQI for batch programs.

Note: Using the batch interface adds a performance overhead, because MQI calls issued from batch programs are transferred to mirror CICS transactions.

There are two notable limitations when using the batch interface:

- The interface only supports message lengths of up to 250k.
- You can run only one batch interface per host, even if there are multiple queue managers on a single VSE machine.

Starting the batch interface

The batch interface is started by running the MQBI transaction. This can be done in native CICS, or by configuring CICS to run the batch interface start program (MQPSTBI) during post initialization. MQBI is a long-running CICS transaction that coordinates multiple simultaneous batch connections to the MQSeries queue manager.

Stopping the batch interface

The batch interface can be stopped normally in one of three ways:

- in native CICS
- from a batch program
- during CICS system shutdown

The batch interface can be stopped abnormally by shutting down CICS with the immediate option, or by purging or forcing the MQBI transaction. The MQBISTOP sample program provides an example of stopping the interface from a batch program.

How to use the batch interface

1. Issue MQSeries functions in your batch program, just as you do in CICS programs. For example:

```
CALL 'MQCONN'  USING
     QM-NAME-AREA
     HCONN-ADDR-AREA
     CCODE-ADDR-AREA
     RCODE-ADDR-AREA.
```

2. Link-edit your program by including module MQBIBTCH. For example:

```
 // JOB GEGETST
// OPTION CATAL
PHASE MYPROG,*
// EXEC IGYCRCTL,....
    your program here
/*
INCLUDE MQBIBTCH
// EXEC LNKEDT
/&
```

3. Start the CICS interface, using the transaction MQBI.
4. Run your batch program.

Data integrity

To test for data integrity the following functions are used:

- MQCMIT commits all changes. This forces a CICS SYNCPOINT to be issued by the mirror transaction.
- MQBACK rolls back all changes. The CICS mirror transaction issues `EXEC CICS SYNCPOINT ROLLBACK`.

For both functions the syntax is as follows:

```
CALL 'funct' USING
    HCONN-ADDR-AREA
    CCODE-ADDR-AREA
    RCODE-ADDR-AREA.
```

Notes:

1. None of the passed parameters is actually tested or used.
2. Under CICS, updates are not automatically committed. However, if a batch program issues the MQDISC call while there are uncommitted requests, an implicit syncpoint occurs.

Verifying the batch interface

The batch program MQBICALL has been provided for this purpose. You can use the following job as a test:

```
// JOB CALLER
// LIBDEF *,SEARCH=(PRD2.MQMSERIES,PRD2.SCEEBASE)
* Put 5 messages into queue: GEGE
// EXEC MQBICALL
PUT 005 GEGE
/*
/. END
/&
```

Restrictions on using the batch interface.

1. Only one instance of the interface can be running on a VSE host, regardless of the number of MQSeries queue managers. The last activated instance is the current instance.
2. Message lengths are restricted to 250k.
3. The MQINQ and MQSET MQI calls are limited as follows:
   - A maximum of 10 selectors.
   - A maximum of 10 integer attributes.
   - 500 characters for character attribute buffer.

VSAM file maintenance

All files used by MQSeries are VSAM clusters. Most of these contain queues and need to be reorganized from time to time.

A queue is an ordered suite of VSAM records in a KSDS organization. Each record key is 56 bytes long, 48 being for the queue name, and eight for the Queue Sequence Number (QSN) and other information. This QSN is assigned sequentially, resulting in all keys being created in ascending order.

Even when a queue record is physically deleted from a queue, the space it occupies is not reclaimed due to the way VSAM works. Therefore, unless you reclaim the space used by these records, there is the possibility that you will obtain a VSAM “space full” condition.

The queue dump facility allows you to rebuild an MQSeries VSAM queue file. This eliminates processed messages and fully regains VSAM freespace.

There are three ways to reclaim the space of deleted messages :

1. Use the MQPREORG utility.

2. Perform a VSAM DELETE and DEFINE to recreate the VSAM dataset. Only do this if your queue is empty. If you have multiple queues in a single VSAM file (not recommended), all queues should be empty.
3. Use the automatic reorganization feature available with your queue definition. Automatic reorganization is available only for single queues defined in a single VSAM file.

Delete all function

On the Maintain Queue Records screen (see “Queue maintenance” on page 79), there is a function called “Delete All”. This function physically deletes all messages, and resets the QSN to one, in order to reclaim freed space.

This is a useful tool to maintain the system log file for MQSeries. The advantage of this function is that it is an online function requiring no other manual operation.

Attention: Note that this function deletes all messages and should not be used on queue files that contain undelivered messages.

Operation

1. On the Start/Stop Queue Control screen, stop the desired queue; see Figure 31 on page 73.
2. If the desired queue is a transmission queue, stop only the inbound direction first. When the queue depth reaches zero, stop the outbound direction and close the associated sender channel.
3. If the desired queue is a destination queue with trigger capability, close the associated receiver channel.
4. On the Maintain Queue Records screen enter the queue name, together with a function of A, and press the PF6 (Update) function key; see Figure 35 on page 79.
5. Press the Enter key to display the result.
6. After “Queue Processing Finished” is displayed, start the reorganized queue on the Start/Stop Queue control screen.

MQPREORG function

MQSeries includes a batch program utility called MQPREORG, and sample JCL to run MQPREORG.

This utility can be used as a nightly, or weekly, queue maintenance facility on any number of queue files. You can also specify a date and time to carry out the procedure. The utility accepts the queue name from SYSIPT and the name of the VSAM file from DLBL.

All messages are ignored, except those marked as “Written” (to be delivered after a specified date and time) on the specified queue. The retained messages are resequenced and placed in a work file.

After the VSAM cluster is deleted and redefined, the retained and resequenced messages are copied back into it. If none of the written messages is to be retained, you can use a “delete-and-define” IDCAMS JCL to do the job.

Multiple queues sharing a VSAM cluster

Attention: Although it is possible for MQSeries for VSE/ESA queues to share the same VSAM file cluster, this is **not** advised. To give maximum independence to data, each queue should be assigned a unique VSAM file cluster.

This is particularly important if the queue is defined for automatic reorganization. See “Creating local queues” on page 53.

If there is more than one queue defined in a VSAM cluster, all queues have to be processed before deleting and recreating this cluster. Otherwise, records from unprocessed queues will be lost.

To help you reorganize all queues, you may use the “ALL” option instead of the queue name, as follows:

```
// EXEC MQPREORG
ALL
/*
```

To reorganize a specific queue, enter one of the following commands:

```
// EXEC MQPREORG
LQ.INVOICE
/*
```

or

```
// EXEC MQPREORG
LQ.INVOICE YYYYNNDDHHMMSS
/*
```

where:

YYYY	Is the year
NN	Is the month
DD	Is the day
HH	Is the hour
MM	Is the minute
SS	Is the second

Reorganizing queue files

This procedure is to be used only when the queue manager is not running.

1. If CICS is running, use CEMT to shut down and close the VSAM files you are going to process.
2. Modify the sample JCL to include your system parameters and reorganization requirements.
3. Process the job to run the batch program utility, MQPREORG, to reorganize the VSAM files and reclaim all freed space.
4. If you performed step 1, use CEMT to open and enable the processed VSAM files.

Sample JCL to run MQPREORG

```
* ** JOB JNM=MQJREORG,DISP=D,CLASS=0
* ** LST DISP=H,CLASS=Q,PRI=3
// JOB MQJREORG - Re-Organize MQ/Series for VSE/ESA queues.
* ------------------------------------------------------------------*
*      I M P O R T A N T   I M P O R T A N T  I M P O R T A N T    *
*                                                                   *
*   Please change :                                                 *
*                 "*  ** JOB" to  "* $$ JOB"                        *
*                 "*  ** LST" to  "* $$ LST"                        *
*                 "*  ** EOJ" to  "* $$ EOJ"                        *
*                                                                   *
*   Fields filed with ?volid? have also to be modified to suit the  *
*  user specifications.                                             *
*                                                                   *
* ------------------------------------------------------------------*
*                                                                   *
*   This job deletes delivered messages from an MQSeries queue in   *
*   order to reclaim the DASD freed space.                          *
*                                                                   *
*   INPUT to MQPREORG :                                             *
*   (only one statement is allowed, delimited by one or more spaces)*
*                                                                   *
*     1. Any QUEUE name delimited by one or more spaces             *
*        (In this JCL, only queue OS2_LOCAL is to be processed)     *
*        If there are any other queues in the same cluster,         *
*        they will be echoed into OUTPUTQ.                          *
*     2. If you want to process EVERY queue in a cluster,           *
*        please key in "ALL ".                                      *
*                                                                   *
*   This sample assumes we want to reorganize queues defined to the *
*   VSAM cluster MQIF002. Changes must be made for other clusters.  *
* ------------------------------------------------------------------*
* Licensed Materials - Property of IBM                              *
*                                                                   *
* 5686-A06                                                          *
* (C) Copyright IBM Corp. 1998                                      *
*                                                                   *
* US Government Users Restricted Rights - Use, duplication or       *
* disclosure restricted by GSA ADP Schedule Contract with IBM Corp. *
* ------------------------------------------------------------------*
// DLBL INPUTQ,'MQSERIES.MQFI002',,VSAM,CAT=MQMCAT
// DLBL OUTPUTQ,'MQSERIES.WORK.QUEUE',,VSAM,CAT=MQMCAT
// EXEC IDCAMS,SIZE=AUTO
 /*                                                              */
 /*                  VERIFY VSAM FILE                            */
 /*                                                              */
          VERIFY FILE(INPUTQ)
          IF MAXCC > 0 THEN CANCEL   /* This means Cluster in use  */

          DELETE   (MQSERIES.WORK.QUEUE)                    -
                    CL ERASE PURGE CAT(?CAT?)
          SET MAXCC = 0
          DEFINE CLUSTER                                    -
                   (NAME (MQSERIES.WORK.QUEUE)              -
                    CYLINDERS (10 10)                       -
                    VOLUMES (?volid?)                       -
                    NONINDEXED)                             -
                 DATA                                       -
                   (NAME (MQSERIES.WORK.QUEUE.DATA)         -
                    RECORDSIZE (2048 32048)                 -
                    CISZ (8096))                            -
```

```
                  CAT (?CAT?)
/*
// IF $MRC GT 0 THEN
// GOTO WRAPUP
// LIBDEF PHASE,SEARCH=(PRD2.MQSERIES,PRD2.SCEEBASE)
// EXEC MQPREORG,SIZE=AUTO
OS2_LOCAL
/*
// IF $MRC GT 0 THEN
// GOTO WRAPUP
// EXEC IDCAMS,SIZE=AUTO
          DELETE   (MQSERIES.MQFI002)                              -
                    CLUSTER NOERASE PURGE CATALOG (?CAT?)
     SET MAXCC = 0
 /*                                                                */
          DEF CLUSTER(NAME(MQSERIES.MQFI002)                       -
              FILE(MQFI002)                                        -
              VOL(?volid?)                                         -
              RECORDS (3000 100)                                   -
              RECORDSIZE (200 4089)                                -
              INDEXED                                              -
              KEYS(52 0)                                           -
              SHR(2))                                              -
              DATA (NAME (MQSERIES.MQFI002.DATA) CISZ(4096))       -
              INDEX (NAME (MQSERIES.MQFI002.INDEX) CISZ(1024))     -
              CATALOG(?CAT?)
          IF LASTCC > 0 THEN  CANCEL
  /*                                                              */
  /*         Execute REPRO only of the define  was OK.            */
  /*                                                              */
         REPRO INFILE(OUTPUTQ) OUTFILE(INPUTQ)
         IF LASTCC > 0 THEN  CANCEL
  /*                                                              */
  /*             Delete only if REPRO was OK.                     */
  /*                                                              */
         DELETE   (MQSERIES.WORK.QUEUE)                      -
                    CL ERASE PURGE CAT(?CAT?)
/*
/. WRAPUP
/&
* ** EOJ
```

Chapter 6. Problem determination

This chapter suggests reasons for some of the problems you may have using MQSeries for VSE/ESA. The process of problem determination is that you start with the symptoms and trace them back to their cause.

Not all problems can be solved immediately, for example, performance problems caused by the limitations of your hardware. Also, if you think that the cause of the problem is in the MQSeries code, contact your IBM Support Center.

The cause of your problem could be in:

- MQSeries setup and local queue operation
- The network
- The application
- Other areas of investigation

The sections that follow raise some fundamental questions that you need to consider. Work through the questions, making a note of anything that might be relevant to the problem.

MQSeries setup and local queue operation

You should ensure that MQSeries for VSE/ESA is installed correctly and working with local queues before you investigate any other problems.

Has MQSeries run successfully before?

If MQSeries has not run successfully before, it is likely that you have not yet set it up correctly. See “MQSeries installation verification test” on page 21 to check that you have carried out all the steps correctly, and set up a SYSTEM.LOG queue as follows:

1. Define a queue name as SYSTEM.LOG using:
   a. A physical file name MQFLOG using the file name from the file control table
   b. A maximum queue depth of 1 000 000

   See step 3d on page 20 and step 3f on page 20 in “MQSeries installation verification test” on page 21 for information about defining a queue.
2. Enter SYSTEM.LOG as the object name with a valid QSN number.

You can browse the log queue by selecting 4, Browse Queue Records, on the Master Terminal Main Menu, as described in “Browse function” on page 85.

See “Global system definition” on page 48 for more information.

Is local queue operation working?

This may require the creation of a local queue definition as described in “MQSeries initialization” on page 18. In addition, check that the VSAM files referenced in the queue definition are open and correctly enabled.

Use:

```
CEMT INQUIRE FILE (filename)
```

to ensure that the VSAM file associated with the queue is accessible.

Use the instructions described in “Local queue verification test” on page 22 to test a local queue. Ensure that you can:

- Put and get messages to the local queue, using the supplied test transaction TST2.
- Browse the queue correctly using the MQMT System Administration Browse function.

Network problems

Before MQSeries for VSE/ESA can use an inbound or outbound channel connection to an SNA-connected MQSeries platform, a connection must already be established between CICS/VSE and the remote platform.

The person responsible for the VTAM and CICS definitions in your enterprise should perform the following investigations.

Investigating SNA problems

If an attempt to start a channel fails, it may be the result of a session failure. If it is not possible to establish a session between CICS and the LU for the remote channel endpoint, either before or during the channel attempting to start, the connection fails.

Enter the following command if you suspect that a session failure is causing the problem:

```
D NET,ID=<remote lu name>,E
```

This gives details of the LU which should be in session with CICS, and also lists any sessions it currently has.

Notes:

1. Look at the session limit for the LU. If it is shown as one for an independent LU, there is a problem with the SNA definitions.
2. See if <minor node name> is listed amongst the sessions. If it is, there is a session between the LU and CICS. This indicates that the problem may not be at the network level, or that there are insufficient sessions between the two LUs to support a new channel request.

   Enter the command again, to see whether for this session, the send and receive counts have changed, indicating the session is in use.

If the command returns “PARAMETER VALUE INVALID”, this means that VTAM does not know the <remote lu name>. Either you entered the name incorrectly, or VTAM cannot locate it. Try defining the name again and attempt to start the channel.

If VTAM is able to display <remote lu name>, try the following command in CICS:

```
CEMT I CONN(<remote conn>)
```

This shows the status of the connection from CICS to the remote system. Next to the entry is an indication showing it to be INService or OUTservice and ACQuired or RELeased. The status needs to be Inservice and Acquired.

```
CEMT I MODE CONN(<remote conn>)
```

This command displays the status of the mode names associated with the connection. For connections supporting parallel sessions, there will be at least two mode names, SNASVCMG and <logmode 1>, showing the number of active sessions for each.

If the SNASVCMG group has no sessions active, the connection is in a RELeased state, rather than an ACQuired state.

These sessions are SNA services manager sessions, and not used by MQSeries channels. However, at least one of the two needs to be active for the connection to be usable.

If the remote LU has been incorrectly defined, so that it has a session limit of one, it is possible that one SNASVSMG session is active, but that no other sessions can be established, including those required by the MQSeries channel.

The <logmode 1> sessions may be used by MQSeries channels.

For single session connections, one mode name, <logmode 2>, is shown with just one session in the group.

The MQSeries channel must have been set up to use the logon mode <logmode 1>, or <logmode 2>, as appropriate.

Investigating TCP/IP problems

Is TCP/IP able dynamically to establish a session between modes in the network? Use the following instruction to test a connection to a remote TCP/IP node:

```
[ping.nodename]
```

If you are unable to “ping” the remote TCP/IP node successfully, inform your VSE/ESA systems programmer who installed TCP/IP.

Does the problem affect specific parts of the network?

You might be able to identify specific parts of the network that are affected by the problem (remote queues, for example). If the link to a remote message queue manager is not working, the messages cannot flow to a remote queue.

Check that the connection between the two systems is available, and that the intercommunication component of MQSeries has been started.

Check that messages are reaching the transmission queue, and check the local queue definition of the transmission queue and any remote queues.

Have you made any network-related changes, or changed any MQSeries definitions, that might account for the problem?

Applications

The errors in the following list illustrate the most common causes of problems encountered while running MQSeries programs. You should consider the possibility that the problem with your MQSeries system could be caused by one or more of these errors:

- Assuming that queues can be shared, when they are in fact exclusive.
- Passing incorrect parameters in an MQI call.
- Passing insufficient parameters in an MQI call. This may mean that MQI cannot set up completion and reason codes for your application to process.
- Failing to check return codes from MQI requests.
- Passing variables with incorrect lengths specified.
- Passing parameters in the wrong order.
- Failing to initialize *MsgId* and *CorrelId* correctly.

Are there any error messages?

MQSeries uses the system log to capture messages concerning the operation of MQSeries itself, the queue manager, and error data coming from the channels that are in use. Check the system log to see if any messages have been recorded that are associated with your problem.

See “System log” on page 114 for information about the contents of the system log.

Are there any return codes explaining the problem?

If your application gets a return code indicating that a Message Queue Interface (MQI) call has failed, refer to the *MQSeries Application Programming Reference* manual for a description of that return code.

Can you reproduce the problem?

If you can reproduce the problem, consider the conditions under which it is reproduced:

- Is it caused by a command or an equivalent administration request?

  Does the operation work if it is entered by another method? If the command works if it is entered on the command line, but not otherwise, check that the command server has not stopped.

- Is it caused by a program? Does it fail on all MQSeries systems and all queue managers, or only on some?
- Can you identify any application that always seems to be running in the system when the problem occurs? If so, examine the application to see if it is in error.

Have any changes been made since the last successful run?

When you are considering changes that might recently have been made, think about the MQSeries system, and also about the other programs it interfaces with, the hardware, and any new applications. Consider also the possibility that a new application that you are not aware of might have been run on the system.

- Have you changed, added, or deleted any queue definitions?
- Have you changed or added any channel definitions? Changes may have been made to either MQSeries channel definitions or any underlying communications definitions required by your application.
- Do your applications deal with return codes that they might get as a result of any changes you have made?

Has the application run successfully before?

If the problem appears to involve one particular application, consider whether the application has run successfully before.

Before you answer **Yes** to this question, consider the following:

- Have any changes been made to the application since it last ran successfully?

  If so, it is likely that the error lies somewhere in the new or modified part of the application. Take a look at the changes and see if you can find an obvious reason for the problem. Is it possible to retry using a back level of the application?

- Have all the functions of the application been fully exercised before?

  Could it be that the problem occurred when part of the application that had never been invoked before was used for the first time? If so, it is likely that the error lies in that part of the application. Try to find out what the application was doing when it failed, and check the source code in that part of the program for errors.

  If a program has been run successfully on many previous occasions, check the current queue status, and the files that were being processed when the error occurred. It is possible that they contain some unusual data value that causes a rarely used path in the program to be invoked.

- Does the application check all return codes?

  Has your MQSeries system been changed, perhaps in a minor way, such that your application does not check the return codes it receives as a result of the change. For example, does your application assume that the queues it accesses can be shared? If a queue has been redefined as exclusive, can your application deal with return codes indicating that it can no longer access that queue?

- Does the application run on other MQSeries systems?

  Could it be that there is something different about the way that this MQSeries system is set up which is causing the problem? For example, have the queues been defined with the same message length or priority?

If the application has not run successfully before

If your application has not yet run successfully, you need to examine it carefully to see if you can find any errors.

Before you look at the code, and depending upon which programming language the code is written in, examine the output from the translator, or the compiler and linker, if applicable, to see if any errors have been reported.

If your application fails to translate, compile, or link, it will also fail to run if you attempt to invoke it.

If the documentation shows that each of these steps was accomplished without error, you should consider the coding logic of the application. Do the symptoms of the problem indicate the function that is failing and, therefore, the piece of code in error? See “Applications” on page 104 for some examples of common errors that cause problems with MQSeries applications.

Using the MQSeries API monitor

By selectively using the MQSeries API monitor, you can:

- Track precisely which MQSeries API issues an application
- Establish which return codes are passed

The MQSeries API monitor is started and stopped using the MQMT system administration transaction option 2.1, which is used to toggle the API monitor on and off.

```
08/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1          IYBPZS01
10:31:09               Start / Stop Queue                           VSE1
MQMMSS                                                              A004

                          System Information
           System Status    : SYSTEM IS ACTIVE
           Queue Status     : Queuing System is active.
           Channel Status   : Channel System is active.
           Monitor Status   : Monitor is not active.
                         Single Queue Request
           Queue Name       :
           Function         :        S=Start, X=Stop,  R=Refresh from Config
           Mode             :        I=Inbound, O=Outbound, B=Both

           INBOUND Status   :
           OUTBOUND Status  :

                          All Queues  Request
           Function         : M      S=Start, X=Stop, or M=Monitor


MONITOR STARTED.
 ENTER=Display      PF2 = Oper Menu     PF3 = Exit           PF6 = Update
```

Figure 42. API monitor

Once the API monitor is started, the application to be tested can be processed, and the API monitor stopped.

Note: The API monitor should be started for limited periods only. It traces the processing of all running applications, and consequently makes heavy usage of system resources.

After the API monitor is toggled off, the SYSTEM.MONITOR queue can be browsed using the MQMT system administration browse facility. Each message in the queue represents the result of an MQSeries API call.

```
08/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1           IYBPZS01
11:16:43                  Browse Queue Records                       VSE1
MQMDISP                     SYSTEM IS ACTIVE                         A005

    Object Name: SYSTEM.MONITOR
    QSN Number : 00000006       LR-        0, LW-        8, DD-MQFO001
                     Queue Data Record
Record Status : Written.        PUT date/time  : 19980812110156
Message Size  : 00000428        GET date/time  :
Queue line.
TSTPA004....            01              OPEN    ....e.......e...........
     VSEP                                            QL.VSEP
                     QL.VSEP









Information displayed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000  All Rights Reserved.
 ENTER = Process  PF2 = Main Menu    PF3 = Quit   PF4 = Next    PF5 = Prior
 PF7 = Up     PF8 = Down    PF9=Hex/Char   PF10=Txt/Head        PF12 = Monito
```

Figure 43. API monitor - browse

An MQOPEN request is displayed in Figure 43. However, for more information, display the text in hexadecimal format, as shown in Figure 44.

```
08/07/2000          IBM MQSeries for VSE/ESA Version 2.1.1           IYBPZS01
11:16:02                  Browse Queue Records                       VSE1
MQMDISP                     SYSTEM IS ACTIVE                         A005

    Object Name: SYSTEM.MONITOR
    QSN Number : 00000006       LR-        0, LW-        8, DD-MQFO001
                     Queue Data Record
Record Status : Written.        PUT date/time  : 19980812110156
Message Size  : 00000428        GET date/time  :
Queue line.
TSTPA004....            01              OPEN    ....e.......e...........  0000
EEEDCFFF000B444444444444FF4444444444444DDCD4444031981000319820000000000
3237100400780000000000000010000000000000067550000011056 6C0110550C00000000
          VSEP                                                 QL.VSEP       0048
444444444444EECD444444444444444444444444444444444444444444DD4EECD44444
000000000000525700000000000000000000000000000000000000083B525700000
                                    QL.VSEP                                  0090
4444444444444444444444444444444444444DD4EECD444444444444444444444444444444
00000000000000000000000000000000000083B525700000000000000000000000000000

Information displayed.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000  All Rights Reserved.
 ENTER = Process  PF2 = Main Menu    PF3 = Quit   PF4 = Next    PF5 = Prior
 PF7 = Up     PF8 = Down    PF9=Hex/Char   PF10=Txt/Head        PF12 = Monitor
```

Figure 44. API monitor - hexadecimal format

The layout of the displayed message is as follows:

```
01  MQ-MONITOR-RECORD.
   05  MQ-MON-TRAN-ID          PIC  X(4)  VALUE SPACES.
   05  MQ-MON-TERM-ID          PIC  X(4)  VALUE SPACES.
   05  MQ-MON-CICS-TASKN       PIC S9(8)  COMP VALUE ZERO.
   05  FILLER                  PIC  X(12) VALUE SPACES.

   05  MQ-MON-SYSTEM-NUM       PIC  99    VALUE 01.
   05  FILLER                  PIC  X(14) VALUE SPACES.
   05  MQ-MON-FUNCTION         PIC  X(4)  VALUE SPACES.
      88 MQ-MON-CONNECT                VALUE 'CONN', 'CONI'
                                          'MCCO'.
      88 MQ-MON-CONNECT-VIA-APPL      VALUE 'CONN', 'CONI'.
      88 MQ-MON-CONNECT-VIA-INTERFACE VALUE 'CONI'.
      88 MQ-MON-MCP-CONNECT           VALUE 'MCCO'.
      88 MQ-MON-OPEN                  VALUE 'OPEN'.
      88 MQ-MON-PUT                   VALUE 'PUT '.
      88 MQ-MON-INQ                   VALUE 'INQ '.
      88 MQ-MON-GET                   VALUE 'GET '.
      88 MQ-MON-CLOSE                 VALUE 'CLOS'.
      88 MQ-MON-DISCONNECT            VALUE 'DISC'.

   05  FILLER                  PIC  X(4)   VALUE SPACE.
   05  MQ-MON-START-ABSTIME    PIC S9(15) COMP-3 VALUE ZERO.
   05  MQ-MON-END-ABSTIME      PIC S9(15) COMP-3 VALUE ZERO.
   05  MQ-MON-RESULTS.
       10  MQ-MON-CCODE        PIC S9(8)  COMP VALUE ZERO.
       10  MQ-MON-RCODE        PIC S9(8)  COMP VALUE ZERO.

   05  FILLER                  PIC  X(12) VALUE SPACES.
   05  MQ-MON-FUNCTION-DEP-INFO  VALUE SPACES.
       10  MQ-MON-QM-NAME      PIC  X(48).
       10  MQ-MON-Q-NAME       PIC  X(48).
       10  MQ-MON-RESOLVED-Q   PIC  X(48).
       10  FILLER              PIC  X(200).
```

It is possible to follow the flow of MQSeries API calls using a specific application. The application is identified by its CICS transaction code, terminal identifier, and CICS task number.

The specific MQSeries API calls are identified, together with the queue manager name, queue name, and condition and return codes.

Ensure that you toggle the MQSeries API monitor **off** after use.

Other areas of investigation

Perhaps the preliminary checks have enabled you to find the cause of the problem. If so, you should now be able to resolve it, possibly with the help of other books in the MQSeries library (see “Bibliography” on page 263) and in the libraries of other licensed programs.

If you have not yet found the cause, you must start to look at the problem in greater detail.

The purpose of this section is to help you identify the cause of your problem if the preliminary checks have not enabled you to find it.

When you have established that no changes have been made to your system, and that there are no problems with your application programs, choose the option that best describes the symptoms of your problem.

If none of these symptoms describe your problem, consider whether it might have been caused by another component of your system.

Have you obtained incorrect output?

In this book, “incorrect output” refers to your application:

- Not receiving a message that it was expecting
- Receiving a message containing unexpected or corrupted information
- Receiving a message that it was not expecting, for example, one that was destined for a different application

In all cases, check that any queue or queue manager aliases that your applications are using are correctly specified and accommodate any changes that have been made to your network.

If an MQSeries error message is generated, all of which are prefixed with the letters “MQI,” you should look in the system log. See “System log” on page 114 for further information.

Does the problem occur at specific times of the day?

If the problem occurs at specific times of day, it could be that it is dependent on system loading. Typically, peak system loading is at mid-morning and mid-afternoon, so these are the times when load-dependent problems are most likely to occur. (If your MQSeries network extends across more than one time zone, peak system loading might seem to occur at some other time of day.)

Is the problem intermittent?

An intermittent problem could be caused by failing to take into account the fact that processes can run independently of each other. For example, a program may issue an MQGET call, without specifying a wait option, before an earlier process has completed. An intermittent problem may also be seen if your application tries to get a message from a queue while the call that put the message is in-doubt (that is, before it has been committed or backed out).

Have you applied any service updates?

If a service update has been applied to MQSeries, check that the update action completed successfully and that no error message was produced.

- Did the update have any special instructions?
- Was any test run to verify that the update had been applied correctly and completely?
- Does the problem still exist if MQSeries is restored to the previous service level?
- If the installation was successful, check with the IBM Support Center for any patch error.

- If a patch has been applied to any other program, consider the effect it might have on the way MQSeries interfaces with it.

Does the problem affect only remote queues?

If the problem affects only remote queues, check the following:

- Check that required channels have been started and are triggerable.
- Check that the programs that should be putting messages to the remote queues have not reported problems.
- If you use triggering to start the distributed queuing process, check that the transmission queue has triggering set on.
- Check the system log and VSE console for messages indicating channel errors or problems.

See the *MQSeries Intercommunication* book for information about how to define channels.

Is your application or MQSeries for VSE/ESA running slowly?

MQSeries for VSE/ESA runs as a subsystem, with a CICS partition, on the VSE operating system. The VSE operating system itself may be a second-level client on a VM machine. This complexity means that a performance problem can exist in any of these components.

MQSeries for VSE/ESA is sensitive to the CICS environment and availability of CICS resources. CICS performance problems are a specialized area requiring detailed analysis. Investigate these problems with the assistance of your CICS systems programmer.

MQSeries for VSE/ESA utilizes VSAM files under VSE. After prolonged use these files tend to fragment into several VSAM extents. This can be viewed with the VSE ICCF File and Catalog Management facility. Any files that show multiple extents should be reallocated with IDCAMS as soon as it is convenient to do so.

If your application is running slowly, this could indicate that it is in a loop, or waiting for a resource that is not available.

This could also be caused by a performance problem. Perhaps it is because your system is operating near the limits of its capacity.

Operating system performance problems, for both VSE/ESA and VM, are a specialized area requiring detailed analysis. Investigate these problems with the assistance of your VSE/ESA or VM systems programmer.

A performance problem may be caused by a limitation of your hardware.

If you find that performance degradation is not dependent on system loading, but happens sometimes when the system is lightly loaded, a poorly designed application program is probably to blame. This could manifest itself as a problem that occurs only when specific queues are accessed.

The following symptoms might indicate that MQSeries is running slowly:

- Your system is slow to respond to MQSeries commands.

- Repeated displays of the queue depth indicate that the queue is being processed slowly for an application with which you would expect a large amount of queue activity.

If the performance of your system is still degraded after reviewing the above possible causes, the problem may lie with MQSeries for VSE/ESA itself. If you suspect this, you need to contact your IBM Support Center for assistance.

Application design considerations

There are a number of ways in which poor program design can affect performance. These can be difficult to detect because the program can appear to perform well, while impacting the performance of other tasks. Several problems specific to programs making MQSeries calls are discussed in the following sections.

For more information about application design, see the *MQSeries Application Programming Guide*.

Effect of message length

Although MQSeries allows messages to hold up to 4 MB of data, the amount of data in a message affects the performance of the application that processes the message. To achieve the best performance from your application, you should send only the essential data in a message; for example, in a request to debit a bank account, the only information that may need to be passed from the client to the server application is the account number and the amount of the debit.

Searching for a particular message

The MQGET call usually retrieves the first message from a queue. If you use the message and correlation identifiers (*MsgId* and *CorrelId*) in the message descriptor to specify a particular message, the queue manager has to search the queue until it finds that message. Using the MQGET call in this way affects the performance of your application.

Queues that contain messages of different lengths

If the messages on a queue are of different lengths, to determine the size of a message, your application could use the MQGET call with the *BufferLength* field set to zero so that, even though the call fails, it returns the size of the message data. The application could then repeat the call, specifying the identifier of the message it measured in its first call and a buffer of the correct size. However, if there are other applications serving the same queue, you might find that the performance of your application is reduced because its second MQGET call spends time searching for a message that another application has retrieved in the time between your two calls.

If your application cannot use messages of a fixed length, another solution to this problem is to use the MQINQ call to find the maximum size of messages that the queue can accept, then use this value in your MQGET call. The maximum size of messages for a queue is stored in the *MaxMsgLength* attribute of the queue. This method could use large amounts of storage, however, because the value of this queue attribute could be as high as 4 MB, the maximum allowed by MQSeries for VSE/ESA.

Use of the MQPUT1 call

Use the MQPUT1 call only if you have a single message to put on a queue. If you want to put more than one message, use the MQOPEN call, followed by a series of MQPUT calls and a single MQCLOSE call.

Incorrect output

The term “incorrect output” can be interpreted in many different ways. For the purpose of problem determination within this book, the meaning is explained in “Have you obtained incorrect output?” on page 109.

Two types of incorrect output are discussed in this section:

- Messages that do not appear when you are expecting them
- Messages that contain the wrong information, or information that has been corrupted

Additional problems that you might find if your application includes the use of distributed queues are also discussed.

Messages that do not appear on the queue

If messages do not appear when you are expecting them, check for the following:

- Has the message been put on the queue successfully?
  - Has the queue been defined correctly. For example, are the queue and maximum message length sufficiently large?
  - Is the queue enabled for putting?
  - Is the queue already full? This could mean that an application was unable to put the required message on the queue.
- Are you able to get any messages from the queue?
  - Do you need to take a syncpoint?

    If messages are being put or retrieved within syncpoint, they are not available to other tasks until the unit of recovery has been committed.
  - Is your wait interval long enough?

    You can set the wait interval as an option for the MQGET call. You should ensure that you are waiting long enough for a response.
  - Are you waiting for a specific message that is identified by a message or correlation identifier (*MsgId* or *CorrelId*)?

    Check that you are waiting for a message with the correct *MsgId* or *CorrelId*. A successful MQGET call sets both these values to that of the message retrieved, so you may need to reset these values in order to get another message successfully.

    Also, check whether you can get other messages from the queue.
  - Can other applications get messages from the queue?
  - Has another application got exclusive access to the queue?

If you are unable to find anything wrong with the queue, and MQSeries is running, make the following checks on the process that you expected to put the message on to the queue:

- Did the application get started?

  If it should have been triggered, check that the correct trigger options were specified.

- Did the application stop?
- Did the application complete correctly?

  Look for evidence of an abnormal end on the system log and VSE/ESA console.

- Did the application commit its changes, or were they backed out?

If multiple transactions are serving the queue, they can conflict with one another. For example, suppose one transaction issues an MQGET call with a buffer length of zero to find out the length of the message, and then issues a specific MQGET call specifying the *MsgId* of that message. However, in the meantime, another transaction issues a successful MQGET call for that message, so the first application receives a reason code of MQRC_NO_MSG_AVAILABLE. Applications that are expected to run in a multi-server environment must be designed to cope with this situation.

Consider that the message could have been received, but that your application failed to process it in some way. For example, did an error in the expected format of the message cause your program to reject it? If this is the case, refer to "Messages that contain unexpected or corrupted information."

Messages that contain unexpected or corrupted information

If the information contained in the message is not what your application was expecting, or has been corrupted in some way, consider the following points:

- Has your application, or the application that put the message onto the queue, changed?

  Ensure that all changes are simultaneously reflected on all systems that need to be aware of the change.

  For example, the format of the message data may have been changed, in which case both applications must be recompiled to pick up the changes. If one application has not been recompiled, the data will appear corrupt to the other.

- Is an application sending messages to the wrong queue?

  Check that the messages your application is receiving are not really intended for an application servicing a different queue.

  If your application has used an alias queue, check that the alias points to the correct queue.

- Has the trigger information been specified correctly for this queue?

  Check that your application should have been started; or should a different application have been started?

If these checks do not enable you to solve the problem, you should check your application logic, both for the program sending the message, and for the program receiving it.

Problems with incorrect output when using distributed queues

If your application uses distributed queues, you should also consider the following points:

- Has MQSeries been correctly installed on both the sending and receiving systems, and correctly configured for distributed queuing?
- Are the links available between the two systems?

  Check that both systems are available, and connected to MQSeries. Check that the connection between the two systems, and the channels between the two queue managers, are active.
- Is triggering set on in the sending system?
- Is the message you are waiting for a reply message from a remote system?

  Check that triggering is activated in the remote system.
- Is the queue already full?

  This could mean that an application was unable to put the required message onto the queue. If this is so, check if the message has been put onto the dead-letter queue.

  The dead-letter queue header contains a reason or feedback code explaining why the message could not be put onto the target queue. See the *MQSeries Application Programming Reference* manual for information about the dead-letter queue header structure.
- Is there a mismatch between the sending and receiving queue managers?

  For example, the message length could be longer than the receiving queue manager can handle.
- Are the channel definitions of the sending and receiving channels compatible?

  For example, a mismatch in sequence number wrap stops the distributed queuing component. See the *MQSeries Intercommunication* book for more information about distributed queuing.

System log

MQSeries uses the SYSTEM.LOG queue defined in the global system definition as its primary message log and additional informational messages are output to the VSE/ESA console. Typically, these detail starting, stopping, and initializing MQSeries for VSE/ESA

If the SYSTEM.LOG queue is unavailable, the messages are directed to the CICS CSMT log. These messages should always be reviewed carefully for any error messages.

Dead-letter queues

Messages that cannot be delivered for some reason are placed on the dead-letter queue. You can check whether the queue contains any messages by using the MQMT transaction. If the queue contains messages, you can use the browse facility to browse messages on the queue using the MQGET call.

You must decide how to dispose of any messages found on the dead-letter queue, depending on the reasons for the messages being put on the queue.

Problems may occur if you do not have a dead-letter queue on each queue manager you are using.

Using MQSeries trace

MQSeries uses the CICS auxiliary trace facility. This should only be used with the advice of IBM Service Personnel.

Problem determination with clients

An MQI client application receives MQRC_* reason codes in the same way as non-client MQI applications. However, there are now additional reason codes for error conditions associated with clients. For example:

- Remote machine not responding
- Communications line error
- Invalid machine address

The most common time for errors to occur is when an application issues an MQCONN and receives the response MQRC_Q_MQR_NOT_AVAILABLE. An error message, written to the client log file, explains the cause of the error. Messages may also be logged at the server depending on the nature of the failure.

Terminating clients

Even though a client has terminated it is still possible for the process at the server to be holding its queues open. Normally, this will only be for a short time until the communications layer detects that the partner has gone.

Error messages with clients

When an error occurs with a client system, error messages are put into the error files associated with the server, if possible. If an error cannot be placed there, the client code attempts to place the error message in an error log in the root directory of the client machine.

OS/2 and UNIX systems clients

Error messages for OS/2® and UNIX systems clients are placed in the error logs on their respective MQSeries server systems. Typically, these files appear in the QMGRS\@SYSTEM\ERRORS directory.

DOS and Windows clients

The location of the log file AMQERR01.LOG is set by the MQDATA environment variable. The default location, if not overridden by MQDATA, is:

```
C:\
```

Working in the DOS environment involves the environment variable MQDATA.

This is the default library used by the client code to store trace and error information; it also holds the directory name in which the qm.ini file is stored. (needed for NetBIOS setup). If not specified, it defaults to the C drive.

The names of the default files held in this library are:

AMQERR01.LOG For error messages.

AMQERR01.FDC For First Failure Data Capture messages.

Chapter 7. Message data conversion

Application data is converted within an application program when the MQGMO-CONVERT option is specified in the Options field of the MQGMO structure passed to an MQGET call, and all of the following are true:

- The code page or encoding fields set in the MQMD structure associated with the message on the queue differ from the code page or encoding fields set in the MQMD structure specified on the MQGET call.
- The format field in the MQMD structure associated with the message is not MQFMT-NONE.
- The buffer length specified on the MQGET call is not zero.
- The message data length is not zero.
- The queue manager supports conversion between the code page and encoding fields specified in the MQMD structures associated with the message and the MQGET call. LE/VSE is used for application data conversion and must have the appropriate code converters available. See “Using LE/VSE for conversion” on page 118 for more information.

The queue manager supports conversion of a number of data formats. If the format field of the MQMD structure associated with the message is one of the built-in formats, the queue manager can convert the message. If the format is not one of the built-in formats, you must write a data conversion exit program to convert the message.

When you move messages between systems, sometimes it is necessary to convert the application data into the character set and encoding required by the receiving system. Conversion can be done either from within application programs on the receiving system, or by the Message Channel Agents (MCAs) on the sending system. If data conversion is supported on the receiving system, we recommend that you use application programs to convert the application data, rather than depending on the data already being converted at the sending system.

If the sending MCA is to convert the data, the 'Convert Msgs' field must be set to Y on the definition of each sender channel for which conversion is required. If conversion fails on the sender channel, the message remains on the transmission queue and the channel is shut down, with a GET error shown on the system log.

The following built-in formats are converted by MQSeries for VSE/ESA:

MQFMT_STRING
MQFMT_DEAD_LETTER_HEADER
MQFMT_TRIGGER
MQFMT_ADMIN
MQFMT_EVENT
MQFMT_PCF
MQFMT_REF_MSG_HEADER
MQFMT_IMS
MQFMT_IMS_VAR_STRING
MQFMT_COMMAND_1
MQFMT_COMMAND_2
MQFMT_SAP

MQFMT_RF_HEADER
MQFMT_CICS
MQFMT_DIST_HEADER

See Appendix D of the *MQSeries Application Programming Reference* manual for more details regarding data conversion.

Data conversion exit programs

For application defined formats that do not conform to the built-in formats, conversion can be performed by an exit program.

The name of the exit program must be the same as your data format name. For example, if a message has the format (FMT_TEST), the exit program must be called FMT_TEST. MQSeries checks that the format is not one of the built-in formats, then, if it is not, calls the exit program.

To build a user exit program for your own format:

1. Start with the supplied source skeleton DCHFMT4.
2. Follow the instructions in the prolog of DCHFMT4, ensuring that the correct macros are called to convert your structure.
3. Rename the program to your data format name.
4. CICS translate, compile, and link-edit your program.
5. Place your exit program in a CICS application program library. Define the program to CICS in the usual way.

See Chapter 11 of the *MQSeries Application Programming Guide* for more details regarding data conversion exit programs.

Using LE/VSE for conversion

For application message code page conversion, MQSeries for VSE/ESA uses the Language Environment® (LE) code set conversion facilities in a similar manner to the MQSeries server. LE/VSE provides a number of supplied code converters, and facilities to build code converters that are not provided.

If you need code conversion for pages that are not provided by LE/VSE, you can edit the appropriate source code modules and build the converters. You also need to inform MQSeries for VSE/ESA of the type number and the encoding of the user-defined code page.

Selecting 4 on the configuration menu allows you to add user-defined code pages, and their type and encoding.

As well as the MQServer SBCS conversion, support is provided for:

- DBCS code pages
- Mixed code pages
- EUC code pages
- ISO code page

- Unicode (UCS-2 and UTF-8) code pages

See “Client code-page conversion tables” on page 224 for more details on LE/VSE code pages. The same LE code set conversion facilities are used for application data conversion.

We also strongly recommended that you read the section on code page conversion in the *C Run-time Programming Guide*.

Note: The following LE code pages have the equivalent numerics on MQSeries for VSE/ESA.

ISO8859-1 - 819

IOS8859-7 - 813

ISO8859-9 - 920

IBM-eucJP - 33722

Building a conversion exit program

MQSeries for VSE/ESA is shipped with a sample exit program (DCHFMT4). This sample provides conversion for standard data types recognized by supplied conversion macros. The following data structure encapsulates these supported data types:

```
struct testall
{
  MQBYTE  byte2[2];
  short   short2;
  MQLONG  long4;
  MQCHAR  char5[5];
  MQCHAR  charV;
};
```

This contains all the types of data (char, variable char, byte, long and short) that can be converted.

The following code in DCHFMT4 converts the structure shown earlier.

```
ConvertByte(2);     /* 3 byte binary data              */

AlignShort();
ConvertShort(1);    /* 2 byte integer                  */

AlignLong();
ConvertLong(1);     /* 4 byte integer                  */

ConvertChar(5);     /* 5 byte character data           */

ConvertVarChar();   /* Variable length character data  */
```

Note the use of AlignShort/Long before ConvertShort/Long. In VSE, there is no CRTMQCVX utility to create this code fragment for you.

These functions are defined using the following include files (see the DCHFMT4 source for a full listing):

```
#include <cmqc2.h>            /* For MQI datatypes
#include <cmqxc.h>            /* For MQI exit-related definitions
#include <mqidatcv.h>         /* For sample macro definitions
```

The following linkage parameters are required to build a conversion exit program:

```
PHASE DCHFMT4,*
INCLUDE DCHFMT4
INCLUDE MQPDATCU
INCLUDE MQPDATCV
INCLUDE DFHELII
```

Because the exit program runs under CICS, a PPT entry is required in CICS for the program. For example:

```
DEFINE  PROGRAM(DCHFMT4) GROUP(MQM) LANGUAGE(C)
```

Note: The user exit program must be contained in the same CICS region as MQSeries — it cannot be placed in a separate region for dynamic routing.

Chapter 8. Security

This chapter describes the features of security control in MQSeries for VSE/ESA and how you can implement and manage this control.

Note: Examples in this chapter uses CA-Top Secret® as an external security manager (ESM). If you are using a different ESM, you should modify the techniques described.

Where profile names are shown, replace the subsystem identifier (ssid) in the profile name with the name of the MQSeries subsystem you are using. As a general rule, you can use your queue manager name as your subsystem identifier.

Why you need to protect MQSeries resources

Because MQSeries handles the transfer of information that is potentially valuable, you need the safeguard of a security system. This ensures that the resources that MQSeries owns and manages are protected from unauthorized access, which could lead to the loss or disclosure of the information. In a secure system, it is essential that none of the following are accessed or changed by any unauthorized user or process:

- Connections to MQSeries
- MQSeries objects such as queue managers and queues
- MQSeries transmission links
- MQSeries system control commands
- MQSeries messages
- Context information associated with messages

To provide the necessary security, MQSeries uses the VSE system authorization facility (SAF) to route authorization requests to an ESM, for example, CA-Top Secret.

The decision to allow access to an object is made by the ESM, and MQSeries follows that decision. If the ESM cannot make a decision, MQSeries prevents access to the object by default. However, by default, if the CICS system running MQSeries is configured without security, MQSeries will not restrict access to its resources.

Implementing MQSeries security

It is easier to set up and administer your security if first you decide on a set of naming conventions for your MQSeries objects.

To implement a security strategy for your MQSeries subsystem, you must decide:

- How security is to be used and implemented.
- Who is going to use the MQSeries system and resources.

To use the CA-Top Secret examples, as shown in this manual, you must be a suitably authorized user, for example, the MSCA user. You can enter the

commands either from CICS or via a batch job, using the TSS transaction or the TSSCMNDB program, respectively.

Resources you can protect

When MQSeries starts, or when it is instructed by an operator command, MQSeries determines which resources you want to protect. You can control which security checks are performed for each individual queue manager. For example, you could implement a number of security checks on a production queue manager, but none on a test queue manager.

Objects protected by MQSeries for VSE/ESA include:

- connections
- queues
- messages

This chapter also explains how you might protect:

- MQSeries datasets
- MQSeries commands

Connection security

Connection security checking occurs either when an application program tries to connect to a queue manager by issuing an MQCONN request, or when MQSeries itself issues a connection request. You can turn connection security checking off for a particular MQSeries subsystem, but if you do, any user can connect to that subsystem.

MQSeries itself issues a connection request when it attempts to log messages to the system log. The logging mechanism writes messages to a transient data queue (MQER) that triggers a transaction to write the message to the system log queue. This transaction (MQER) runs as the CICS default user, or a user specified in the DCT entry for the transient data queue. At installation, you must decide whether to use the default user or a specific user to connect and write messages to the system log.

Queue and message security

Resources are checked when an application opens an object with an MQOPEN or an MQPUT1 call. The access needed to open an object depends on which open options are specified when the queue is opened.

A security check is performed when the queue manager object is opened. In this situation, the queue manager is protected in the same way as a queue object, that is, a user must have permission to access `ssid.qmname`, where `qmname` is the name of your queue manager.

Queue security controls who is allowed to open which queue, and what options they are allowed to open it with. For example, a user might be allowed to open a queue called PAYROLL.INCREASE.SALARY to browse the messages on the queue (via the MQOO_BROWSE option), but not to remove messages from the queue (via one of the MQOO_INPUT_* options). If you turn checking for queues

off, any user can open any queue with any valid open option (that is, any valid MQOO_* option on an MQOPEN or MQPUT1 call).

Dataset security

MQSeries for VSE/ESA queues are implemented as VSAM KSDS datasets, and MQSeries configuration is also stored in VSAM datasets. Therefore, it is important that these datasets are protected against unauthorized access under VSE generally.

Check your ESM documentation for specific details on protecting datasets. MQSeries assumes that users with authorization to specific queues, with specific access permissions, are also authorized to the datasets that contain queue data, with the same permissions. This assumption relies on the security administrator correlating the correct permissions for queues and datasets.

See Appendix I, “Security implementation” on page 243 for more details on how to protect your datasets.

Command security

Protecting the creation, deletion, and modification of MQSeries definitions and settings is a separate issue to the protection of connections, queues and messages. Protection of the commands that manipulate MQSeries objects is not available on a command level basis.

Such commands are available using the MQSeries Master Terminal transaction (MQMT). This transaction is a system administration tool that provides an interface to create, delete, and modify MQSeries definitions and settings.

Therefore, to protect your MQSeries system from unauthorized command use, you should restrict access to the MQMT transaction and other associated transactions. Check your ESM documentation for details on how to restrict access to specific transactions.

See Appendix I, “Security implementation” on page 243 for more details on how to protect your transactions.

Using security classes and resources

CA-Top Secret classes are used to hold the resources required for MQSeries security checking. Each class holds one or more resources used at some point in the checking sequence.

Table 8. Classes used by MQSeries

Member class	Description
MQADMIN	Used mainly for holding resources for administration-type functions. For example, profiles for MQSeries security switches.
MQCONN	Profiles used for connection security.
MQQUEUE	Profiles used in queue resource security.

Depending on your External Security Manager, these classes may be predefined. For CA-Top Secret, these are predefined Prefixed resources. To activate such resources, ensure that the the following setting exists in your CA-Top Secret parameter file:

```
FACILITY(CICSPROD=RES)
```

Notes:

1. CICSPROD should be replaced by the facility you are using for your MQSeries CICS region, if it is different.
2. After you change the parameter file, you need to restart your ESM.

Resources

All resources used by MQSeries are prefixed with the name of the subsystem that they are to be used by. For example, if queue manager VSE.QM1 has a queue called QUEUE_FOR_LOST_CARD_LIST, the appropriate profile would be defined to the ESM in class MQQUEUE as:

VSE.QM1.QUEUE_FOR_LOST_CARD_LIST

This means that different MQSeries subsystems sharing the same ESM database can have different security options. The subsystem identifier for the resource cannot be generic.

Switch resources

To control the security checking performed by MQSeries, you must define switch profiles. A switch profile is a normal resource that has a special meaning to MQSeries. If you do not want to control security checking, that is, allow MQSeries to check authority for all MQSeries resources, you do not need to define switch profiles.

Each switch profile that MQSeries detects turns off the checking for that type of resource. Switch profiles are activated during startup of the queue manager. If you change the switch profiles while the queue manager is running, the changes will not be recognized until MQSeries is stopped and restarted.

The switch resources must always be defined in the MQADMIN class. The following table shows the valid switch profiles and the security type they control.

Note: In the descriptions that follow, the part of each resource name shown in upper case must be entered exactly as shown. The lower case 'ssid' part must be replaced by the queue manager name for the MQSeries subsystem you are setting up.

Table 9. Switch Resources

Switch Resource Name	Description
ssid.NO.SUBSYS.SECURITY	Subsystem security
ssid.NO.CONNECT.CHECKS	Connection security
ssid.NO.QUEUE.CHECKS	Queue security

If you intended to use the security switches, you can create them and grant access as follows:

```
TSS ADD(mqowner) MQADMIN(ssid.NO.CONNECT.CHECKS)
TSS PER(mqstart) MQADMIN(ssid.NO.CONNECT.CHECKS) ACC(READ)
```

In this example, the resource is owned by user `mqowner`, and the `mqstart` user is granted read access to the resource. Note that access to security switch resources is only relevant to the MQSeries for VSE/ESA startup user (that is, the user who starts MQSeries for VSE/ESA using MQSE, MQIT, or MQMT).

In the preceding example, security checks for connecting to the MQSeries for VSE/ESA queue manager would be disabled.

How switches work

MQSeries maintains an internal set of switches, which is associated with each of the switch resources shown in Table 9 on page 124. When a security switch is set on, the security checks associated with the switch are performed. When a security switch is set off, the security checks associated with that switch are bypassed.

When a queue manager is started, first it checks the status of the resource switches. The queue manager sets its subsystem security switch off only if the switch resources exist and are readable by the user associated with MQSeries startup. In all other situations, the switches are set on. Note that switches are only applicable when MQSeries is installed with security active.

If the ssid.NO.SUBSYS.SECURITY resource is detected during startup, connection, queue, and message security is bypassed, regardless of other switch settings. This means it is possible to completely disable MQSeries object security by creating the NO.SUBSYS.SECURITY resource, making it readable to the startup user, and restarting MQSeries.

Take care with generic resources. Some ESMs automatically grant access to resources if the prefix of the resource is owned, or accessible to, a user. For example, if the resource ssid is created and owned by user MQM, and that resource is generic, some ESMs may automatically grant read access to ssid.* to user MQM. The result is that when MQSeries is started up by user MQM, MQSeries will assume all of the switches exist, and all object security will be disabled.

Protecting MQSeries resources

As well as optionally defining switch resources, ESM resources must be defined to protect the MQSeries objects.

If you do not have a resource profile defined for a particular security check and a user issues a request that would involve making that check, MQSeries denies access.

You do not need to define profiles for security types relating to any security switch profiles that you have deactivated.

Resource definitions for connection security

If connection security is active, you must define profiles in the MQCONN class, and permit the necessary groups or user IDs access to those profiles, so that they can connect to MQSeries subsystems.

To enable a connection to be made, you must grant users READ access to the appropriate profile.

Resource names for checking connections to MQSeries for VSE/ESA take the form:

ssid.CICS

This applies to CICS applications, batch programs using the batch interface, and remote clients. This is because all connections to MQSeries for VSE/ESA are effectively maintained within CICS.

For example, to grant user JOHNS connection authority to queue manager VSE.QM1, you must first define the resource and grant ownership:

```
TSS ADD(MQOWNER) MQCONN(VSE.QM1.CICS)
```

You can then grant connection authority as follows:

```
TSS PER(JOHNS) MQCONN(VSE.QM1.CICS) ACC(READ)
```

Depending on your ESM, the owner of a resource may by default have full authority. This would mean that user MQOWNER, in this example, would automatically be granted connection authority to queue manager VSE.QM1.

Batch connections

Security for batch connections is a special case. Batch programs connect to MQSeries for VSE/ESA running under CICS via the MQSeries for VSE/ESA batch interface.

Programs executed from a batch partition should use the // ID statement to identify their user and password. Security for batch programs should be established to verify the user and password identified on the // ID card.

A sample batch job might appear as follows:

```
// JOB MQBATCH
// ID USER=JOHNS,PWD=JOHNSPWD
// EXEC MYMQPROG
/*
/&
```

The MQ/VSE batch interface uses the user name identified in the // ID card and passes it to an interface transaction running under CICS. The interface transaction must be started by, and running as, a user identified to your ESM as a SURROGATE for the user identified on the // ID card.

To identify a user as a surrogate for another, you can use a command similar to:

```
TSS ADD(MQBATCH) SURROGAT(JOHNS)
```

where MQBATCH is the user that starts the batch interface transaction (MQBI) in CICS.

When the MQSeries batch program attempts to connect to the queue manager, a check for the surrogate rights of the interface user is issued. If this is successful, a partner transaction (MQBX) is started as the user identified on the // ID card. Therefore, the user identified on the // ID card should be known to CICS.

Once the partner transaction is started, it functions on behalf of the MQSeries batch program. This means that all MQI calls are executed as the user identified on the // ID card. For connection security, this user must be granted READ access to the ssid.CICS resource.

Client connections

Security for client connections is also a special case. For client connections, the client program runs on a remote system. Security for the execution of such programs remains the responsibility of the remote system.

For client programs, the MQSeries for VSE/ESA server program effectively performs MQSeries API requests on behalf of the client program. The server program runs under CICS and is executed as the MQSeries for VSE/ESA startup user. The startup user is the user who starts MQSeries for VSE/ESA using the MQSE, MQIT or MQMT transactions.

The MQSeries for VSE/ESA server program identifies the client user when the client connection is initiated with the MQCONN call. For authentication, the environment of the client program must include the MQ_USER_ID and MQ_PASSWORD environment variables. The values of these variables are passed to the MQSeries for VSE/ESA server program when the connection begins. These variables should contain a valid user id and password, respectively, that are known to the VSE ESM.

The MQSeries for VSE/ESA server program, having identified and verified the client user and password, then performs all security checks for that user, not the MQSeries for VSE/ESA startup user.

This means that the client user must have the appropriate access to the required ESM resources. This is the same access that would be required for a normal CICS transaction user.

For example, for a client program that identifies itself as user JANED, and intends to connect to MQSeries for VSE/ESA and browse queue EMPLOYEE.DETAILS on VSE queue manager VSE.QM1, you would need to define and grant access to the following resources:

```
TSS PER(JANED) MQCONN(VSE.QM1.CICS) ACC(READ)
TSS PER(JANED) MQQUEUE(VSE.QM1.EMPLOYEE.DETAILS) ACC(READ)
```

Because authentication is possible only for client programs that identify themselves using the MQ_USER_ID and MQ_PASSWORD environment variables, MQSeries for VSE/ESA security for client programs is possible only for remote systems that support this protocol.

Another consideration, which may affect Java program clients, is access permission to the queue manager object. Some existing MQSeries Java classes open the queue manager object when they establish an initial connection. This means that users using MQSeries Java classes should be granted READ access to the MQSeries queue manager object.

For example:

```
TSS PER(cliuser) MQQUEUE(ssid.ssid) ACC(READ)
```

Resource definitions for queue security

If queue security is active, you must define resources in the MQQUEUE class, and permit the necessary groups or user IDs access to these resources, so that they can issue MQSeries API requests that use queues.

Resource names for queue security take the form:

ssid.queuename

where queuename is the name of the queue being opened, as specified in the object descriptor on the MQOPEN or MQPUT1 call. It may also be the name of the queue manager.

The ESM access required to open a queue depends on the MQOPEN or MQPUT1 options specified. If more than one of the MQOO_* options is coded, the queue security check is performed for the highest ESM authority required.

Table 10. Access levels for queue security

MQOPEN or MQPUT1 option	ESM access level required to access ssid.queuename
MQOO_BROWSE	READ
MQOO_INQUIRE	READ
MQOO_INPUT_*	UPDATE
MQOO_OUTPUT or MQPUT1	UPDATE
MQOO_SET	ALTER

For example, to grant user JOHNS authority to browse queue PAY.LIST on queue manager VSE.QM1:

```
TSS ADD(MQOWNER) MQQUEUE(VSE.QM1.PAY.LIST)
TSS PER(JOHNS) MQQUEUE(VSE.QM1.PAY.LIST) ACC(READ)
```

Alternatively, to grant user JOHNS authority to get and put messages to queue PAY.LIST on VSE.QM1:

```
TSS PER(JOHNS) MQQUEUE(VSE.QM1.PAY.LIST) ACC(READ,UPDATE)
```

Note that the resource only needs to be created, and ownership applied, once. Therefore, the TSS ADD command is issued only once for each queue resource defined to class MQQUEUE.

Considerations for alias queues

When you issue an MQOPEN or MQPUT1 call for an alias queue, MQSeries makes a resource check against the queue name specified in the object descriptor (MQOD) on the call. It does not check whether the user is allowed access to the target queue name.

For example, an alias queue called PAYROLL.REQUEST resolves to a target queue of PAY.REQUEST. If queue security is active, a user only needs

authorization to access the queue PAYROLL.REQUEST. There is no check whether that user is authorized to access the queue PAY.REQUEST.

Using alias queues with MQGET and MQPUT

The range of MQI calls available in one access level can cause a problem if you want to restrict access to a queue to allow only the MQPUT call, or only the MQGET call. You can protect a queue by defining two aliases that resolve to that queue:

- One that enables applications to get message from the queue.
- One that enables applications to put messages on the queue.

The following text is an example of defining your queue to MQSeries (these definitions are based on OS/2 formats, and you should use the MQSeries for VSE/ESA Master Terminal transaction to create appropriate definitions):

```
DEFINE QLOCAL(USE_ALIAS_TO_ACCESS) GET(ENABLED)
       PUT(ENABLED)

DEFINE QALIAS(USE_FOR_GETS) GET(ENABLED)
       PUT(DISABLED) TARGQ(USE_ALIAS_TO_ACCESS)

DEFINE QALIAS(USE_FOR_PUTS) GET(DISABLED)
       PUT(ENABLED) TARGQ(USE_ALIAS_TO_ACCESS)
```

You must also make the following ESM definitions:

```
TSS ADD(MQOWNER) MQQUEUE(ssid.USE_ALIAS_TO_ACCESS)
TSS ADD(MQOWNER) MQQUEUE(ssid.USE_FOR_GETS)
TSS ADD(MQOWNER) MQQUEUE(ssid.USE_FOR_PUTS)
```

Then, you must ensure that no users have access to the queue ssid.USE_ALIAS_TO_ACCESS, and give the appropriate users access to the alias. You can do this using the following ESM commands:

```
TSS PER(JOHNS) MQQUEUE(ssid.USE_FOR_GETS) ACC(READ, UPDATE)
TSS PER(JANED) MQQUEUE(ssid.USE_FOR_PUTS) ACC(READ, UPDATE)
```

This means that user JOHNS is only allowed to get messages from the USE_ALIAS_TO_ACCESS queue through the alias USE_FOR_GETS, and user JANED is only allowed to put messages through the alias queue USE_FOR_PUTS.

If you want to use a technique like this, you must inform the application developers, so that they can design their programs appropriately.

Security and remote queues

When a message is put on a remote queue, a security check is performed against the name of the remote queue. There is no check against the transmission queue identified by the remote queue definition.

This means that users accessing a remote queue need at least UPDATE authority to the resource, because it is not possible to to browse a remote queue.

For example, you could define a remote queue as follows (this definition is based on OS/2 formats, and you should use the MQSeries for VSE/ESA Master Terminal transaction to create appropriate definitions):

```
DEFINE QREMOTE(BANK7.CREDIT.REFERENCE)
       RNAME(CREDIT.SCORING.REQUEST)
       RQMNAME(BNK7)
       XMITQ(BANK1.TO.BANK7)
```

For user JOHNS to put a message to the remote queue, you would need to grant the following access:

```
TSS PER(JOHNS) MQQUEUE(VSE.QM1.BANK7.CREDIT.REFERENCE) ACC(UPDATE)
```

where VSE.QM1 is the local MQSeries for VSE/ESA queue manager name.

Dead-letter queue security

Undelivered messages can be put on a special queue called the dead-letter queue. If you have sensitive data that could possibly be put on this queue, you must consider the security implications of this, because you do not want unauthorized users to be able to retrieve this data.

The only application able to retrieve messages from the dead-letter queue should be a 'special' application that processes the undelivered messages. You can grant access to the dead-letter queue in the same way as any other queue.

The MQSeries for VSE/ESA Receiver and Sender MCAs user also requires UPDATE authority to the dead-letter queue. The MCAs run as the MQSeries for VSE/ESA startup user (that is, the user who starts MQSeries for VSE/ESA using MQSE, MQIT or MQMT). If a message cannot be delivered by either MCA, depending on the channel definition, the MCA may attempt to put the message to the dead-letter queue. Therefore, the MCA user must have UPDATE authority. For example:

```
TSS PER(MQSTART) MQQUEUE(VSE.QM1.DEAD.LETTER.QUEUE) ACC(UPDATE)
```

where VSE.QM1 is the local queue manager name.

If you want to use application programs that can put messages to, or get messages from, the dead-letter queue (or do both), you might consider using aliases, as described in “Using alias queues with MQGET and MQPUT” on page 129.

System queue security

System queues are accessed by the ancillary parts of the queue manager. System queues, in addition to the dead-letter queue, include:

- System log
- System monitor

Messages are put to the system log by the MQER transaction. This transaction runs as either the CICS default user identified by the CICS SIT parameter, or the user specified in the MQER DCT entry (see Chapter 2, “Installation” on page 9 for more details). Therefore, whichever of these users is configured to put messages to the system log should be granted connection, and also UPDATE authority, to the queue resource.

For example:

```
TSS PER(MQSYS) MQCONN(VSE.QM1.CICS) ACC(READ)
TSS PER(MQSYS) MQQUEUE(VSE.QM1.SYSTEM.LOG) ACC(UPDATE)
```

For performance reasons, messages written to the system monitor are handled internally to MQSeries for VSE/ESA. This means that no explicit authority is required for any particular user to put messages to the system monitor queue via normal MQSeries for VSE/ESA monitoring. If an application needs to explicitly put messages to the system monitor, the application user must have UPDATE authority to the queue resource.

If an application needs to get messages from the system monitor, the application user must have READ or UPDATE authority to the queue resource. For example:

```
TSS PER(JOHNS) MQQUEUE(ssid.SYSTEM.MONITOR) ACC(UPDATE)
```

Reply queue security

MQSeries for VSE/ESA supports messages with report types of Confirm-On-Arrival (COA) and Confirm-On-Delivery (COD). In either of these cases, a report message is generated by MQSeries for VSE/ESA. The required user authority varies, depending on whether the report message is for COA or COD, and how the ReplyToQ and ReplyToQMgr fields in the MQMD are used.

User authority for COA

When the ReplyToQ of the object message is a local queue to the VSE queue manager, the application user that puts the object message must have UPDATE authority to the ReplyToQ.

When the ReplyToQ of the object message is a remote queue name of the VSE queue manager, the application user that puts the object message must have UPDATE authority to the ReplyToQ.

When the ReplyToQ identifies a local queue on a remote queue manager, and the ReplyToQMgr identifies a remote queue manager, the application user that puts the object message must have UPDATE authority to the remote queue name that resolves the remote local queue and remote queue manager.

User authority for COD

When the ReplyToQ of the object message is a local queue to the VSE queue manager, the application user that gets the object message must have UPDATE authority to the ReplyToQ.

When the ReplyToQ of the object message is a remote queue name of the VSE queue manager, the application user that gets the object message must have UPDATE authority to the ReplyToQ.

When the ReplyToQ identifies a local queue on a remote queue manager, and the ReplyToQMgr identifies a remote queue manager, the application user that gets the object message must have UPDATE authority to the remote queue name that resolves the remote local queue and remote queue manager.

Security implementation checklist

This section contains a step-by-step procedure you can use to work out and define the security implementation for each of your MQSeries subsystems. Refer to other sections for details, in particular “Using security classes and resources” on page 123.

If you require security checking to be implemented on at least one of your MQSeries subsystems, you must first activate the MQADMIN class. Then, for each MQSeries subsystem, you must decide whether you need security checking on that subsystem. If you do not require security checking, you must define an ssid.NO.SUBSYS.SECURITY profile in the MQADMIN class.

If you do require security checking, use the following checklist to implement it:

- Do you need connection security?

  Yes: Define appropriate connection profiles in the MQCONN class and permit the appropriate users or groups access to these profiles.

  No: Define an ssid.NO.CONNECT.CHECKS resource in the MQADMIN class and grant your MQSeries for VSE/ESA startup user READ access to the resource.

- Do you need security checking on commands?

  Yes: MQSeries for VSE/ESA Version 2.1.1 does not provide command level security. To protect your system for unauthorized command use, you must restrict access to the MQMT and associated command interface transactions.

  No: Do not restrict access to MQMT and associate command interface transactions.

- Do you need queue security?

  Yes: Activate the MQQUEUE class. Define appropriate queue resources in the MQQUEUE class and permit the appropriate user access to these profiles.

  Also, ensure that your MQSeries VSAM datasets are protected against unauthorized access.

  No: Define an ssid.NO.QUEUE.CHECKS profile in the MQADMIN class and grant read authority to your MQSeries for VSE/ESA startup user.

- Do you plan to have remote client connections?

  Yes: Ensure that your remote clients use the MQ_USER_ID and MQ_PASSWORD environment variables, and ensure that such users are defined to your ESM.

For a detailed example of resource definitions and access authorities for MQSeries for VSE/ESA, refer to Appendix I, “Security implementation” on page 243.

Appendix A. MQSeries for VSE/ESA at a glance

Program number

- 5686-A06 MQSeries for VSE/ESA Version 2 Release 1.1 (Europe, the Middle East and Africa only).

Hardware requirements

- MQSeries Servers:

  Any IBM System/370® or System/390® machine

  Minimum system memory – normal memory supplied with machine
  Minimum DASD = VSE library requirements + size of queues
  VSE library requirements:
  3380 = 3 cylinders
  3390 = 2 cylinders
  FBA (Fixed Block Architecture) = 4500 blocks

Software requirements

Minimum supported levels are shown. Later levels, if any, will be supported unless otherwise stated. Note that the latest maintenance for these requirements is strongly recommended.

- VSE/ESA 2.3 (5690-VSE)

  If VSE/ESA 2.4, with APAR/PTF:

  DY45475/UD51504

- CICS/VSE 2.3 (5686-026) or CICS TS 1.1 (5648-054)
- VTAM for VSE/ESA 4.2 (5666-363)

  or

  TCP/IP for VSE/ESA 1.3 (5686-A04)

  If VSE/ESA 2.3 or VSE/ESA 2.4, with APAR/PTF:

  PQ16251/UQ18646
  PQ29053/UQ44071
  PQ39048/UQ44312
  PQ39540/UQ44757

- LE/VSE 1.4 Runtime library (5696-067)

  If VSE/ESA 2.3 or VSE/ESA 2.4, with APAR/PTF:

  PQ34038/UQ40116
  PQ36618/UQ44201

- MQSeries clients:

  MQSeries for VSE/ESA supports clients that can be connected using TCP/IP.

- Data conversion:

  For default data conversion, ensure that LE APAR/PTF PQ37337/UQ43201 is applied.

For Unicode UTF-8 conversion, you require VSE 2.5, because this has LE/VSE at the correct level.

Connectivity

Network protocols supported are SNA LU6.2 and TCP/IP.

- For SNA connectivity – VTAM for VSE/ESA V4.2
- For TCP/IP connectivity – TCP/IP for VSE/ESA V1.3

Compilers supported for MQSeries for VSE/ESA applications

- Programs can be written using C, COBOL or PL/I
- C programs can use the C for VSE V1.1 compiler (5686-A01)
- COBOL programs can use the COBOL for VSE compiler V1.1 (5686-068)
- PL/I programs can use the PL/I for VSE compiler V1.1 (5696-069)

Delivery

MQSeries for VSE/ESA is available on:

- 3480 cartridge
- 4mm DAT tape
- 9-track 6250 bpi tape

Appendix B. CICS control table definitions

This appendix contains various sample entries for the CICS control tables.

Sample file control table entries

```
*-------------------------------------------------------------------*
* Licensed Materials - Property of IBM                              *
* 5686-A06                                                          *
* (C) Copyright IBM Corp. 1998                                      *
*                                                                   *
* US Government Users Restricted Rights - Use, duplication or       *
* disclosure restricted by GSA ADP Schedule Contract with IBM Corp. *
*-------------------------------------------------------------------*
*
*-------------------------------------------------------------------*
*         Start of  MQSeries VSAM cluster definitions               *
*                                                                   *
*  For performance reasons entries may be modified to add LSRPOOL   *
*  explicit specifications.                                         *
*-------------------------------------------------------------------*
*
* system setup file
MQFSSET  DFHFCT TYPE=DATASET,DATASET=MQFSSET,                        *
               ACCMETH=VSAM,                                        *
               SERVREQ=(READ,BROWSE),                               *
               LOG=NO,                                              *
               RSL=PUBLIC,                                          *
               STRNO=5,                                             *
               RECFORM=(FIXED,BLOCKED)
* configuration file
MQFCNFG  DFHFCT TYPE=DATASET,DATASET=MQFCNFG,                        *
               ACCMETH=VSAM,                                        *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),             *
               LOG=YES,                                             *
               RSL=PUBLIC,                                          *
               STRNO=20,                                            *
               RECFORM=(FIXED,BLOCKED)
*--reorganization file
MQFREOR  DFHFCT TYPE=DATASET,DATASET=MQFREOR,                        *
               ACCMETH=VSAM,                                        *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),             *
               RSL=PUBLIC,                                          *
               LOG=NO,                                              *
               STRNO=16,                                            *
               RECFORM=(VARIABLE,BLOCKED)
*--example of queues (input followed by output)
MQFI001  DFHFCT TYPE=DATASET,DATASET=MQFI001,                        *
               ACCMETH=VSAM,                                        *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),             *
               RSL=PUBLIC,                                          *
               LOG=YES,                                             *
               STRNO=16,                                            *
               RECFORM=(VARIABLE,BLOCKED)
MQFO001  DFHFCT TYPE=DATASET,DATASET=MQFO001,                        *
               ACCMETH=VSAM,                                        *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),             *
               LOG=YES,                                             *
               RSL=PUBLIC,                                          *
               STRNO=16,                                            *
```

```
               RECFORM=(VARIABLE,BLOCKED)
MQFI002  DFHFCT TYPE=DATASET,DATASET=MQFI002,                          *
               ACCMETH=VSAM,                                           *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),                *
               RSL=PUBLIC,                                             *
               LOG=YES,                                                *
               STRNO=16,                                               *
               RECFORM=(VARIABLE,BLOCKED)
MQFO002  DFHFCT TYPE=DATASET,DATASET=MQFO002,                          *
               ACCMETH=VSAM,                                           *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),                *
               LOG=YES,                                                *
               RSL=PUBLIC,                                             *
               STRNO=16,                                               *
               RECFORM=(VARIABLE,BLOCKED)
MQFI003  DFHFCT TYPE=DATASET,DATASET=MQFI003,                          *
               ACCMETH=VSAM,                                           *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),                *
               LOG=YES,                                                *
               RSL=PUBLIC,                                             *
               STRNO=16,                                               *
               RECFORM=(VARIABLE,BLOCKED)
MQFO003  DFHFCT TYPE=DATASET,DATASET=MQFO003,                          *
               ACCMETH=VSAM,                                           *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),                *
               LOG=YES,                                                *
               RSL=PUBLIC,                                             *
               STRNO=16,                                               *
               RECFORM=(VARIABLE,BLOCKED)
*--SYSTEM DEFINITIONS
MQFLOG   DFHFCT TYPE=DATASET,DATASET=MQFLOG,                           *
               ACCMETH=VSAM,                                           *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),                *
               LOG=YES,                                                *
               RSL=PUBLIC,                                             *
               STRNO=16,                                               *
               RECFORM=(VARIABLE,BLOCKED)
MQFERR   DFHFCT TYPE=DATASET,DATASET=MQFERR,                           *
               ACCMETH=VSAM,                                           *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),                *
               LOG=YES,                                                *
               RSL=PUBLIC,                                             *
               STRNO=16,                                               *
               RECFORM=(VARIABLE,BLOCKED)
MQFMON   DFHFCT TYPE=DATASET,DATASET=MQFMON,                           *
               ACCMETH=VSAM,                                           *
               SERVREQ=(READ,UPDATE,ADD,BROWSE,DELETE),                *
               LOG=NO,                                                 *
               RSL=PUBLIC,                                             *
               STRNO=16,                                               *
               RECFORM=(VARIABLE,BLOCKED)
*-----------------------------------------------------------------------*
*             End  of MQSeries VSAM cluster definitions              *
*-----------------------------------------------------------------------*
```

Sample destination control table entry

Note: Entry MQER is required in order for MQSeries System error messages to be logged to the SYSTEM.LOG queue.

```
*--------------------------------------------------------------------*
* Licensed Materials - Property of IBM                               *
* 5686-A06                                                           *
* (C) Copyright IBM Corp. 1998                                       *
*                                                                    *
* US Government Users Restricted Rights - Use, duplication or        *
* disclosure restricted by GSA ADP Schedule Contract with IBM Corp.  *
*--------------------------------------------------------------------*
*
*--------------------------------------------------------------------*
*   START  OF MQSERIES  DCT ENTRIES
*--------------------------------------------------------------------*
MQER     DFHDCT TYPE=INTRA,                                          *
               RSL=PUBLIC,                                           *
               DESTID=MQER,                                          *
               DESTFAC=FILE,                                         *
               TRANSID=MQER,                                         *
               TRIGLEV=1
*--------------------------------------------------------------------*
*   END  OF MQSERIES DCT ENTRIES
*--------------------------------------------------------------------*
```

Sample JCL to process MQPUTIL

```
* ** JOB JNM=MQJUTILY,DISP=D,CLASS=A
* ** LST DISP=H,CLASS=Q,PRI=3
// JOB MQJUTILY - Execute VSE/ESA MQ/Series Batch Utility Program.
* --------------------------------------------------------------------*
*      I M P O R T A N T    I M P O R T A N T  I M P O R T A N T    *
*                                                                     *
*   Please change :                                                   *
*                 "*  ** JOB" to  "* $$ JOB"                        *
*                 "*  ** LST" to  "* $$ LST"                        *
*                 "*  ** EOJ" to  "* $$ EOJ"                        *
*                                                                     *
* --------------------------------------------------------------------*
*   This job executes MQPUTIL to access the CONFIGURATION file       *
*                                                                     *
*   This file is a sample and needs modification to suit the         *
*   users environment.                                                *
*                                                                     *
* --------------------------------------------------------------------*
* Licensed Materials - Property of IBM                                *
* 5686-A06                                                            *
* (C) Copyright IBM Corp. 1998                                        *
*                                                                     *
* US Government Users Restricted Rights - Use, duplication or        *
* disclosure restricted by GSA ADP Schedule Contract with IBM Corp. *
* --------------------------------------------------------------------*
// DLBL CONFIG,'MQSERIES.MQFCNFG',,VSAM,CAT=MQMCAT
// EXEC IDCAMS,SIZE=AUTO
 /*                                              */
 /*       VERIFY VSAM FILE                       */
 /*                                              */
          VERIFY FILE(CONFIG)
/*
// LIBDEF PHASE,SEARCH=(PRD2.MQSERIES,PRD2.SCEEBASE)
// ASSGN SYS004,SYSIPT
```

```
// ASSGN SYS005,SYSLST
// EXEC MQPUTIL,SIZE=AUTO
*RESET MSN          00000002
*RESET CHECKPOINT   00000002
*PRINT RESOLUTIONS
*PRINT CONFIG
*PRINT LOG
/*
/&
* ** EOJ
```

Sample JCL file definition for CICS deck

```
*--------------------------------------------------------------------*
* Licensed Materials - Property of IBM                               *
* 5686-A06                                                           *
* (C) Copyright IBM Corp. 1998                                       *
*                                                                    *
* US Government Users Restricted Rights - Use, duplication or        *
* disclosure restricted by GSA ADP Schedule Contract with IBM Corp. *
*--------------------------------------------------------------------*
*   Sample JCL file definition for CICS deck                         *
*   The DLBL statements in this JCL correspond to entries in CICSFCT*
*   therefore if there are any new file ids to be added in here,     *
*   it must also be added into the corresponding JCL                 *
*                                                                    *
*   Fields marked with ?volid? and ?cat-name? must be changed to     *
*   suit customer own site specifications.                           *
*--------------------------------------------------------------------*
// DLBL MQFSSET,'MQSERIES.MQFSSET',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFCNFG,'MQSERIES.MQFCNFG',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFREOR,'MQSERIES.MQFREOR',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFI001,'MQSERIES.MQFI001',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFI002,'MQSERIES.MQFI002',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFI003,'MQSERIES.MQFI003',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFO001,'MQSERIES.MQFO001',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFO002,'MQSERIES.MQFO002',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFO003,'MQSERIES.MQFO003',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFERR,'MQSERIES.MQFERR',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFLOG,'MQSERIES.MQFLOG',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
// DLBL MQFMON,'MQSERIES.MQFMON',0,VSAM,CAT=?cat-name?
// EXTENT ,?volid?
*--------------------------------------------------------------------*
*   End of sample jcl file definition for cics deck                  *
*--------------------------------------------------------------------*
```

Sample JCL to create CICS CSD group

```
* ** JOB JNM=MQJCSD,CLASS=0,DISP=D
* ** LST DISP=H,CLASS=Q,PRI=3
// JOB MQJCSD DEFINE RESOURCES FOR MQ/SERIES FOR VSE/ESA TO CICS CSD.
* ------------------------------------------------------------------*
*   Please change :                                                 *
*                 "*  ** JOB" to  "* $$ JOB"                        *
*                 "*  ** LST" to  "* $$ LST"                        *
*                 "*  ** EOJ" to  "* $$ EOJ"                        *
* ------------------------------------------------------------------*
*       Create CICS CSD group for MQ/Series VSE/ESA                 *
*                                                                   *
*   This file is a sample and may need modifications to suit the    *
*   users environment (eg. Group name, or list name).               *
* ------------------------------------------------------------------*
* Licensed Materials - Property of IBM                              *
*                                                                   *
* 5686-A06                                                          *
* (C) Copyright IBM Corp. 1998, 2000                                *
*                                                                   *
* US Government Users Restricted Rights - Use, duplication or       *
* disclosure restricted by GSA ADP Schedule Contract with IBM Corp. *
* ------------------------------------------------------------------*
// EXEC DFHCSDUP
*-------------------------------------------------------------------*
*            Definitions for MQ/Series VSE/ESA                      *
*-------------------------------------------------------------------*
*
DELETE GROUP(MQM)
*
*--                      Definitions of MQ/Series Programs
*
 DEFINE  PROGRAM(MQPSTBI ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSPBI ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQBICIRH) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQBICITK) GROUP(MQM) LANGUAGE(ASSEMBLER) RSL(PUBLIC)  *
         RESIDENT(YES)
 DEFINE  PROGRAM(MQPMTP  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMCFG ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMMON ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMOPR ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPDISP ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMSYS ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMQUE ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMCHN ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMSS  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMSC  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMMSN ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMSI  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMDEL ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMMOQ ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMMOC ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPMCPG ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPXQC  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
*-- NON-ADMINISTRATOR
 DEFINE  PROGRAM(MQPAIP0 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPAIP1 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPAIP2 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSEND ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPRECV ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPRPRT ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPCCKPT) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPQUE1 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
```

```
 DEFINE  PROGRAM(MQPQUE2 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPECHO ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPINIT1) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPINIT2) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSSQ  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSCHK ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPERR  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPEXT1 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPFINDQ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPQDEL ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSTOP ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSTART) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSREC ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPQREC ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSMAP ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSSET ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPSENV ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPCMD  ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPVSAM ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(MQPTCPLN) GROUP(MQM) LANGUAGE(C)         RSL(PUBLIC)
 DEFINE  PROGRAM(MQPTCPSV) GROUP(MQM) LANGUAGE(C)         RSL(PUBLIC)
 DEFINE  PROGRAM(MQPCABND) GROUP(MQM) LANGUAGE(C)         RSL(PUBLIC)
 DEFINE  PROGRAM(MQPX0)    GROUP(MQM) LANGUAGE(ASSEMBLER) RSL(PUBLIC)
 DEFINE  PROGRAM(MQPX1)    GROUP(MQM) LANGUAGE(ASSEMBLER) RSL(PUBLIC)
 DEFINE  PROGRAM(MQPIDCMS) GROUP(MQM) LANGUAGE(ASSEMBLER)
 DEFINE  PROGRAM(DCHFMT4) GROUP(MQM) LANGUAGE(C)
*-- MAPS
 DEFINE  MAPSET(MQMMTP  ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMCFG ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMMON ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMOPR ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMDISP ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMSYS ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMQUE ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMCHN ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMSS  ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMSC  ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMMSN ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMSI  ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMDEL ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMMOQ ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMMOC ) GROUP(MQM) RSL(PUBLIC)
 DEFINE  MAPSET(MQMMCPG ) GROUP(MQM) RSL(PUBLIC)
*-- TEST PROGRAMS
 DEFINE  PROGRAM(TTPTST1 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(TTPTST2 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  PROGRAM(TTPTST3 ) GROUP(MQM) LANGUAGE(COBOL)     RSL(PUBLIC)
 DEFINE  MAPSET(TTMTST3 ) GROUP(MQM) RSL(PUBLIC)
*
*--                     Definitions of MQ/Series Transactions
*
 DEFINE TRANSACTION(MQBI)  GROUP(MQM) PROGRAM(MQBICITK)
 DEFINE TRANSACTION(MQBX)  GROUP(MQM) PROGRAM(MQBICIRH)
 DEFINE TRANSACTION(MQMT)  GROUP(MQM) PROGRAM(MQPMTP)
 DEFINE TRANSACTION(MQMC)  GROUP(MQM) PROGRAM(MQPMCFG)
 DEFINE TRANSACTION(MQMO)  GROUP(MQM) PROGRAM(MQPMOPR)
 DEFINE TRANSACTION(MQMM)  GROUP(MQM) PROGRAM(MQPMMON)
 DEFINE TRANSACTION(MQBQ)  GROUP(MQM) PROGRAM(MQPDISP)
 DEFINE TRANSACTION(MQMS)  GROUP(MQM) PROGRAM(MQPMSYS)
 DEFINE TRANSACTION(MQDS)  GROUP(MQM) PROGRAM(MQPMSYS)
 DEFINE TRANSACTION(MQMQ)  GROUP(MQM) PROGRAM(MQPMQUE)
 DEFINE TRANSACTION(MQDQ)  GROUP(MQM) PROGRAM(MQPMQUE)
 DEFINE TRANSACTION(MQMH)  GROUP(MQM) PROGRAM(MQPMCHN)
 DEFINE TRANSACTION(MQDH)  GROUP(MQM) PROGRAM(MQPMCHN)
```

```
 DEFINE TRANSACTION(MQMA)  GROUP(MQM) PROGRAM(MQPMSS)
 DEFINE TRANSACTION(MQMB)  GROUP(MQM) PROGRAM(MQPMSC)
 DEFINE TRANSACTION(MQMR)  GROUP(MQM) PROGRAM(MQPMMSN)
 DEFINE TRANSACTION(MQMI)  GROUP(MQM) PROGRAM(MQPMSI)
 DEFINE TRANSACTION(MQMD)  GROUP(MQM) PROGRAM(MQPMDEL)
 DEFINE TRANSACTION(MQQM)  GROUP(MQM) PROGRAM(MQPMMOQ)
 DEFINE TRANSACTION(MQCM)  GROUP(MQM) PROGRAM(MQPMMOC)
 DEFINE TRANSACTION(MQIT)  GROUP(MQM) PROGRAM(MQPINIT1)
 DEFINE TRANSACTION(MQ02)  GROUP(MQM) PROGRAM(MQPAIP2)
 DEFINE TRANSACTION(MQ01)  GROUP(MQM) PROGRAM(MQPRECV) TWASIZE(8)
 DEFINE TRANSACTION(MQ03)  GROUP(MQM) PROGRAM(MQPSEND)
 DEFINE TRANSACTION(MQSS)  GROUP(MQM) PROGRAM(MQPSSQ)
 DEFINE TRANSACTION(MQSM)  GROUP(MQM) PROGRAM(MQPSCHK)
 DEFINE TRANSACTION(MQER)  GROUP(MQM) PROGRAM(MQPERR)
 DEFINE TRANSACTION(MQQD)  GROUP(MQM) PROGRAM(MQPQDEL)
 DEFINE TRANSACTION(MQQA)  GROUP(MQM) PROGRAM(MQPQDEL)
 DEFINE TRANSACTION(MQST)  GROUP(MQM) PROGRAM(MQPSTOP)
 DEFINE TRANSACTION(MQSU)  GROUP(MQM) PROGRAM(MQPSSET)
 DEFINE TRANSACTION(MQSE)  GROUP(MQM) PROGRAM(MQPSENV)
 DEFINE TRANSACTION(MQSR)  GROUP(MQM) PROGRAM(MQPSREC)
 DEFINE TRANSACTION(MQSQ)  GROUP(MQM) PROGRAM(MQPQREC)
 DEFINE TRANSACTION(MQTL)  GROUP(MQM) PROGRAM(MQPTCPLN) TWASIZE(8)
 DEFINE TRANSACTION(MQRG)  GROUP(MQM) PROGRAM(MQPVSAM)
 DEFINE TRANSACTION(MQMP)  GROUP(MQM) PROGRAM(MQPMCPG)
 DEFINE TRANSACTION(MQDP)  GROUP(MQM) PROGRAM(MQPMCPG)
*-- Test Transactions
 DEFINE TRANSACTION(TST1)  GROUP(MQM) PROGRAM(TTPTST1)
 DEFINE TRANSACTION(TST2)  GROUP(MQM) PROGRAM(TTPTST2)
 DEFINE TRANSACTION(TST3)  GROUP(MQM) PROGRAM(TTPTST3)
 DEFINE TRANSACTION(MQCL)  GROUP(MQM) PROGRAM(MQPCMD)
*-- Add MQ/Series group to the standard VSE/ESA list.
 ADD GROUP(MQM) LIST(VSELIST)
/*
/&
* ** EOJ
```

Appendix C. Application Programming Reference

This appendix should be used in conjunction with the *MQSeries Application Programming Reference* manual.

Structure data types

The following structure data types are supported by MQSeries for VSE/ESA V2.1:

MQDLH	Dead letter header
MQGMO	Get message options
MQMD	Message descriptor
MQOD	Object descriptor
MQPMO	Put message options
MQTM	Trigger message 2

The declarations of these structures are as described in the *MQSeries Application Programming Reference*, with the following exceptions.

MQDLH – Dead-letter header

Fields

Version (MQLONG)
Structure version number.

The value must be:

MQDLH_VERSION_1
Version number for dead-letter header structure.

Reason (MQLONG)
Reason message arrived on dead-letter (undelivered-message) queue.

This identifies the reason why the message was placed on the dead-letter queue instead of on the original destination queue. It should be one of the MQRC_⋆ values (for example, MQRC_Q_FULL).

The initial value of this field is MQRC_NONE.

PutApplType (MQLONG)
Type of application that put message on dead-letter (undelivered-message) queue.

This field has the same meaning as the *PutApplType* field in the message descriptor MQMD.

The value used by MQSeries for VSE/ESA is MQAT_CICS_VSE.

PutApplName (MQCHAR28)
Name of application that put message on dead-letter (undelivered-message) queue.

The format of the name is an eight character applid, followed by a four character tranid.

MQGMO – Get message options

The fields in the Version 1 structure only are supported.

Fields

Version (MQLONG)
Structure version number.

The value must be:

MQGMO_VERSION_1
Version-1 get-message options structure.

Options (MQLONG)
Options that control the action of MQGET.

The following options are supported:

MQGMO_WAIT
MQGMO_NO_WAIT
MQGMO_SYNCPOINT
MQGMO_BROWSE_FIRST
MQGMO_BROWSE_NEXT
MQGMO_ACCEPT_TRUNCATED_MSG
MQGMO_MSG_UNDER_CURSOR
MQGMO_LOCK
MQGMO_UNLOCK
MQGMO_CONVERT

Signal1 (MQLONG)
Signal.

This is a reserved field; its value is not significant.

Signal2 (MQLONG)
Signal identifier.

This is a reserved field; its value is not significant.

MQMD – Message descriptor

The fields in the Version 1 structure only are supported.

Fields

Version (MQLONG)
Structure version number.

The value must be:

MQMD_VERSION_1
Version-1 message descriptor structure.

Report (MQLONG)
Options for report messages.

This field identifies the required report options associated with the message.

The value must be one of the following:

MQRO_NONE
No report options required.

MQRO_COA
Confirm on arrival.

MQRO_COA_WITH_DATA
Confirm on arrival with 100 bytes of data.

MQRO_COA_WITH_FULL_DATA
Confirm on arrival with full message data.

MQRO_COD
Confirm on delivery.

MQRO_COD_WITH_DATA
Confirm on delivery with 100 bytes of data.

MQRO_COD_WITH_FULL_DATA
Confirm on delivery with full message data.

MQRO_COPY_MSG_ID_TO_CORREL_ID
Use MSG ID of message for CORREL ID of message.

MQRO_NEW_MSG_ID
Generate a new MSG ID for report message.

MQRO_PASS_CORREL_ID
Use CORREL ID of message for remort message.

MQRO_PASS_MSG_ID
Use MSG ID of message for report message.

MsgType (MQLONG)
Message type.

This indicates the type of the message. The value must be one of the following:

MQMT_DATAGRAM
Message not requiring a reply.

MQMT_REQUEST
Message requiring a reply.

MQMT_REPLY
Reply to an earlier request message.

MQMT_REPORT
Report message.

There are no application-defined values.

Expiry (MQLONG)
Message lifetime.

This is a reserved field. The value must be –1.

Feedback (MQLONG)
Feedback or reason code.

Feedback codes are grouped as follows:

MQFB_NONE
No feedback provided.

MQFB_SYSTEM_FIRST
Lowest value for system-generated feedback.

MQFB_SYSTEM_LAST
Highest value for system-generated feedback.

MQFB_APPL_FIRST
Lowest value for application-generated feedback.

MQFB_APPL_LAST
Highest value for application-generated feedback.

Applications that generate report messages should not use feedback codes in the system range (other than MQFB_QUIT), unless they wish to simulate report messages generated by the queue manager or message channel agent.

A special feedback code is:

MQFB_QUIT
Application should end.

CodedCharSetId (MQLONG)
Coded character set identifier.

The following value only is defined:

MQCCSI_Q_MGR
Queue manager's coded character set identifier.

Format (MQCHAR8)
Format name.

The queue manager built-in formats are:

MQFMT_NONE
No format name.

MQFMT_ADMIN
Command server request/reply message.

MQFMT_CICS
CICS information header.

| MQFMT_COMMAND_1
| Type 1 command reply message.

| MQFMT_COMMAND_2
| Type 2 command reply message.

MQFMT_DEAD_LETTER_HEADER
Dead-letter header.

| MQFMT_DIST_HEADER
| Distribution-list header.

MQFMT_EVENT
Event mesaage.

MQFMT_IMS
IMS information header.

MQFMT_IMS_VAR_STRING
IMS variable string.

MQFMT_PCF
User-defined message in programmable command format (PCF).

MQFMT_REF_MSG_HEADER
Reference message header.

MQFMT_RF_HEADER
Reference header.

MQFMT_SAP
SAP information header.

MQFMT_STRING
String.

MQFMT_TRIGGER
Trigger.

Priority (MQLONG)
Message priority.

There is no special value for this field.

Persistence (MQLONG)
Message persistence.

For the MQPUT and MQPUT1 calls, the value must be one of the following:

MQPER_PERSISTENT
Message is persistent.

MQPER_NOT_PERSISTENT
Message is not persistent.

CorrelId (MQBYTE24)
Correlation identifier.

The following special value may be used:

MQCI_NONE
No correlation identifier is specified.

BackoutCount (MQLONG)
Backout counter.

This is a reserved field.

UserIdentifier (MQCHAR12)
User identifier.

This is a reserved field.

AccountingToken (MQBYTE32)
Accounting token.

This is a reserved field.

ApplIdentityData (MQCHAR32)
Application data relating to identity.

This is a reserved field.

PutApplType (MQLONG)
Type of application that put the message.

This is a reserved field.

PutApplName (MQCHAR28)
Name of application that put the message.

This is a reserved field.

PutDate (MQCHAR8)
Date when message was put.

This is a reserved field.

PutTime (MQCHAR8)
Time when message was put.

This is a reserved field.

ApplOriginData (MQCHAR4)
Application data relating to origin.

This is a reserved field.

MQOD – Object descriptor

The MQOD structure is used to specify a queue object. The fields in the Version 1 structure only are supported.

Fields

Version (MQLONG)
Structure version number.

The value must be:

MQOD_VERSION_1
Version-1 object descriptor structure.

ObjectType (MQLONG)
Object type.

Type of object being named in *ObjectName*. The value must be:

MQOT_Q
Queue.

DynamicQName (MQCHAR48)
Dynamic queue name.

This is a reserved field.

AlternateUserId (MQCHAR12)
Alternate user identifier.

This is a reserved field.

MQPMO – Put message options

The fields in the Version 1 structure only are supported.

Fields

Version (MQLONG)
Structure version number.

The value must be:

MQPMO_VERSION_1
Version-1 put-message options structure.

Options (MQLONG)
Options that control the action of MQPUT and MQPUT1.

The following option only is supported:

MQPMO_SYNCPOINT

Context (MQHOBJ)
Object handle of input queue.

This is a reserved field.

KnownDestCount (MQLONG)
Number of messages sent successfully to local queues.

This is a reserved field.

UnknownDestCount (MQLONG)
Number of messages sent successfully to remote queues.

This is a reserved field.

InvalidDestCount (MQLONG)
Number of messages that could not be sent.

This is a reserved field.

ResolvedQName (MQCHAR48)
Resolved name of destination queue.

This is a reserved field.

MQTM – Trigger message

On the MQSeries for VSE/ESA platform, triggers are invoked by the queue manager using either the transaction ID code, or program ID code, in the queue definition.

The transaction ID, or program ID, determines if the trigger is invoked using an EXEC CICS START, or EXEC CICS LINK, program respectively.

Trigger programs using the START mechanism can use the EXEC CICS RETRIEVE program to retrieve the trigger data structure. Programs invoked by the LINK mechanism can retrieve the MQTM structure in the DFHCOMMAREA.

Fields

Version (MQLONG)
Structure version number.

The value must be:

MQTM_VERSION_1
Version number for trigger message structure.

ProcessName (MQCHAR48)
Name of process object.

This is a reserved field.

TriggerData (MQCHAR64)
Trigger data.

On MQSeries for VSE/ESA this is a 13-byte field, consisting of:

4-byte transaction ID code
8-byte program ID code
1-byte trigger-event flag

ApplType (MQLONG)
Application type.

On MQSeries for VSE/ESA *ApplType* has the following standard value:

MQAT_CICS_VSE
MQSeries for VSE/ESA application.

The initial value of this field is `0`.

ApplId (MQCHAR256)
Application identifier.

On MQSeries for VSE/ESA *ApplId* is:

- A CICS transaction ID (for MQAT_CICS_VSE applications).

EnvData (MQCHAR128)
Environment data.

This is a reserved field.

UserData (MQCHAR128)
User data.

Contains user-defined data configured in the queue definition of the queue that initiates the trigger instance.

MQI calls

This section identifies the MQI calls supported by MQSeries for VSE/ESA, which are:

MQCLOSE	Close object
MQCONN	Connect queue manager
MQDISC	Disconnect queue manager
MQGET	Get message
MQINQ	Inquire about object attributes
MQOPEN	Open object
MQPUT	Put message
MQPUT1	Put one message
MQSET	Set object attributes

These calls work as described in the *MQSeries Application Programming Reference* manual, except as described in the remainder of this section.

MQCLOSE – Close object

Parameters

Options (MQLONG) – input

Options that control the action of MQCLOSE.

The *Options* parameter controls how the object is closed.

The following option only is supported, and must be specified:

MQCO_NONE
: No optional close processing required.

Reason (MQLONG) – output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_FAILED:

MQRC_CONNECTION_BROKEN
: (2009, X'7D9') Connection to queue manager lost.

MQRC_HCONN_ERROR
: (2018, X'7E2') Connection handle not valid.

MQRC_HOBJ_ERROR
: (2019, X'7E3') Object handle not valid.

MQRC_OPTIONS_ERROR
: (2046, X'7FE') Options not valid or not consistent.

MQRC_STORAGE_NOT_AVAILABLE
: (2071, X'817') Insufficient storage available.

MQCONN – Connect queue manager

The name specified must be the name of a local queue manager. No substitution through an alias queue manager can be used.

Parameters

QMgrName (MQCHAR48) – input
Name of queue manager.

The name specified must be the name of a local queue manager. In MQSeries for VSE/ESA there is only one queue manager in a CICS partition.

Reason (MQLONG) – output
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_FAILED:

MQRC_MAX_CONNS_LIMIT_REACHED
(2025, X'7E9') Maximum number of connections reached.
MQRC_Q_MGR_NAME_ERROR
(2058, X'80A') Queue manager name not valid or not known.
MQRC_Q_MGR_NOT_AVAILABLE
(2059, X'80B') Queue manager not available for connection.
MQRC_STORAGE_NOT_AVAILABLE
(2071, X'817') Insufficient storage available.
MQRC_UNEXPECTED_ERROR
(2195, X'893') Unexpected error occurred.

MQDISC – Disconnect queue manager

Parameters

CompCode (MQLONG) – output
Completion code.

It is one of the following:

MQCC_OK
Successful completion.
MQCC_FAILED
Call failed.

Reason (MQLONG) – output
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_FAILED:

MQRC_ADAPTER_DISC_LOAD_ERROR
(2138, X'85A') Unable to load adapter disconnection module.
MQRC_CONNECTION_BROKEN
(2009, X'7D9') Connection to queue manager lost.
MQRC_HCONN_ERROR
(2018, X'7E2') Connection handle not valid.
MQRC_STORAGE_NOT_AVAILABLE
(2071, X'817') Insufficient storage available.
MQRC_UNEXPECTED_ERROR
(2195, X'893') Unexpected error occurred.

MQGET – Get message

Parameters

Hobj (MQHOBJ) – input
Object handle.

The queue must have been opened with one or more of the following options:

MQOO_INPUT_SHARED
MQOO_INPUT_EXCLUSIVE
MQOO_BROWSE

Reason (MQLONG) – output
Reason code qualifying *CompCode*.

The reason codes listed below are the ones that the queue manager can return for the *Reason* parameter.

If *CompCode* is MQCC_WARNING:

MQRC_TRUNCATED_MSG_ACCEPTED
(2079, X'81F') Truncated message returned (processing completed).
MQRC_TRUNCATED_MSG_FAILED
(2080, X'820') Truncated message returned (processing not completed).

If *CompCode* is MQCC_FAILED:

MQRC_BUFFER_LENGTH_ERROR
(2005, X'7D5') Buffer length parameter not valid.
MQRC_CONNECTION_BROKEN
(2009, X'7D9') Connection to queue manager lost.
MQRC_CONVERTED_MSG_TOO_BIG
(2120, X'848') Converted data too big for buffer.
MQRC_DBCS_ERROR
(2150, X'866') DBCS string not valid.
MQRC_FILE_SYSTEM_ERROR
(2216, X'8A8') Queuer received file error.
MQRC_FORMAT_ERROR
(2110, X'83E') Format field not valid.
MQRC_GET_INHIBITED
(2016, X'7E0') Gets inhibited for the queue.
MQRC_GMO_ERROR
(2186, X'88A') Get-message options structure not valid.
MQRC_HCONN_ERROR
(2018, X'7E2') Connection handle not valid.
MQRC_HOBJ_ERROR
(2019, X'7E3') Object handle not valid.
MQRC_MD_ERROR
(2026, X'7EA') Message descriptor not valid.
MQRC_NO_MSG_AVAILABLE
(2033, X'7F1') No message available.
MQRC_NO_MSG_UNDER_CURSOR
(2034, X'7F2') Browse cursor not positioned on message.

MQRC_NOT_CONVERTED
(2119, X'847') Application message data not converted.
MQRC_NOT_OPEN_FOR_BROWSE
(2036, X'7F4') Queue not open for browse.
MQRC_NOT_OPEN_FOR_INPUT
(2037, X'7F5') Queue not open for input.
MQRC_OPTIONS_ERROR
(2046, X'7FE') Options not valid or not consistent.
MQRC_SOURCE_CCSID_ERROR
(2111, X'83F') Source coded character set identifier not valid.
MQRC_SOURCE_DECIMAL_ENC_ERROR
(2113, X'841') Packed-decimal encoding in message not recognized.
MQRC_SOURCE_FLOAT_ENC_ERROR
(2114, X'842') Floating-point encoding in message not recognized.
MQRC_SOURCE_INTEGER_ENC_ERROR
(2112, X'840') Source integer encoding not recognized.
MQRC_SOURCE_LENGTH_ERROR
(2143, X'85F') Source length parameter not valid.
MQRC_STORAGE_NOT_AVAILABLE
(2071, X'817') Insufficient storage available.
MQRC_TARGET_CCSID_ERROR
(2115, X'843') Target coded character set identifier not valid.
MQRC_TARGET_DECIMAL_ENC_ERROR
(2117, X'845') Packed-decimal encoding specified by receiver not recognized.
MQRC_TARGET_FLOAT_ENC_ERROR
(2118, X'846') Floating-point encoding specified by receiver not recognized.
MQRC_TARGET_INTEGER_ENC_ERROR
(2116, X'844') Target integer encoding not recognized.
MQRC_TARGET_LENGTH_ERROR
(2144, X'860') Target length parameter not valid.
MQRC_WAIT_INTERVAL_ERROR
(2090, X'82A') Wait interval in MQGMO not valid.

MQINQ – Inquire about object attributes

Parameters

Selectors (MQLONG×*SelectorCount*) – input
Array of attribute selectors.

MQSeries for VSE/ESA supports only the following selectors:

Selectors for queue managers

MQCA_Q_MGR_NAME
Local queue manager name.
MQCA_DEAD_LETTER_Q_NAME
Local dead letter queue name.
MQCA_Q_MGR_DESC
Local queue manager description.
MQIA_CODED_CHAR_SET_ID
Local code page for queue manager.

MQIA_MAX_HANDLES
: Maximum number of concurrent connections.

MQIA_MAX_MSG_LENGTH
: Default message length for queue definitions.

MQIA_MAX_UNCOMMITTED_MSGS
: System checkpoint threshold.

Selectors for all types of queue

MQIA_DEF_PERSISTENCE
: Default message persistence.

MQIA_INHIBIT_PUT
: Whether put operations are allowed.

MQIA_Q_DESC
: Queue description.

MQIA_Q_NAME
: Queue name.

MQIA_Q_TYPE
: Queue type.

Selectors for local queues

MQCA_CREATION_DATE
: Queue creation date (MQ_CREATION_DATE_LENGTH).

MQCA_CREATION_TIME
: Queue creation time (MQ_CREATION_TIME_LENGTH).

MQCA_INITIATION_Q_NAME
: Initiation queue name (MQ_Q_NAME_LENGTH).

MQIA_CURRENT_Q_DEPTH
: Number of messages on queue.

MQIA_DEFINITION_TYPE
: Queue definition type.

MQIA_INHIBIT_GET
: Whether get operations are allowed.

MQIA_MAX_MSG_LENGTH
: Maximum message length.

MQIA_MAX_Q_DEPTH
: Maximum number of messages allowed on queue.

MQIA_OPEN_INPUT_COUNT
: Number of MQOPEN calls that have the queue open for input.

MQIA_OPEN_OUTPUT_COUNT
: Number of MQOPEN calls that have the queue open for output.

MQIA_TRIGGER_CONTROL
: Trigger control.

MQIA_TRIGGER_TYPE
: Trigger type.

MQIA_USAGE
: Usage.

Selectors for local definitions of remote queues

MQCA_REMOTE_Q_MGR_NAME
: Name of remote queue manager (MQ_Q_MGR_NAME_LENGTH).

MQCA_REMOTE_Q_NAME
: Name of remote queue as known on remote queue manager (MQ_Q_NAME_LENGTH).

MQCA_XMIT_Q_NAME
Name of local transmission queue.

Selectors for alias queues

MQCA_BASE_Q_NAME
Name of queue that alias resolves to (MQ_Q_NAME_LENGTH).
MQIA_INHIBIT_GET
Whether get operations are allowed.

Reason (MQLONG) – output
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_FAILED:

MQRC_CHAR_ATTR_LENGTH_ERROR
(2006, X'7D6') Length of character attributes not valid.
MQRC_CHAR_ATTRS_ERROR
(2007, X'7D7') Character attributes string not valid.
MQRC_CONNECTION_BROKEN
(2009, X'7D9') Connection to queue manager lost.
MQRC_HCONN_ERROR
(2018, X'7E2') Connection handle not valid.
MQRC_HOBJ_ERROR
(2019, X'7E3') Object handle not valid.
MQRC_INT_ATTR_COUNT_ERROR
(2021, X'7E5') Count of integer attributes not valid.
MQRC_INT_ATTRS_ARRAY_ERROR
(2023, X'7E7') Integer attributes array not valid.
MQRC_NOT_OPEN_FOR_INQUIRE
(2038, X'7F6') Queue not open for inquire.
MQRC_SELECTOR_COUNT_ERROR
(2065, X'811') Count of selectors not valid.
MQRC_SELECTOR_ERROR
(2067, X'813') Attribute selector not valid.
MQRC_SELECTOR_LIMIT_EXCEEDED
(2066, X'812') Count of selectors too big.
MQRC_STORAGE_NOT_AVAILABLE
(2071, X'817') Insufficient storage available.
MQRC_UNEXPECTED_ERROR
(2195, X'893') Unexpected error occurred.

MQOPEN – Open object

The MQOPEN call establishes access to an object. The following types of object are valid:

- Queue
- Queue manager

Parameters

Options (MQLONG) – input

Options that control the action of MQOPEN.

The following options apply and you must specify at least one of these. However, you cannot specify the two input options together.

MQOO_BROWSE
MQOO_INPUT_SHARED
MQOO_INPUT_EXCLUSIVE
MQOO_INQUIRE
MQOO_OUTPUT

The options are valid for alias, local, and remote queues, as described in the *MQSeries Application Programming Reference* manual.

CompCode (MQLONG) – output

Completion code.

It is one of the following:

MQCC_OK
: Successful completion.

MQCC_FAILED
: Call failed.

Reason (MQLONG) – output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_FAILED:

MQRC_ALIAS_BASE_Q_TYPE_ERROR
: (2001, X'7D1') Alias base queue not a valid type.

MQRC_CONNECTION_BROKEN
: (2009, X'7D9') Connection to queue manager lost.

MQRC_HANDLE_NOT_AVAILABLE
: (2017, X'7E1') No more handles available.

MQRC_HCONN_ERROR
: (2018, X'7E2') Connection handle not valid.

MQRC_OBJECT_IN_USE
: (2042, X'7FA') Object already open with conflicting options.

MQRC_OBJECT_TYPE_ERROR
: (2043, X'7FB') Object type not valid.

MQRC_OD_ERROR
: (2044, X'7FC') Object descriptor structure not valid.

MQRC_OPTION_NOT_VALID_FOR_TYPE
: (2045, X'7FD') Option not valid for object type.

MQRC_OPTIONS_ERROR
: (2046, X'7FE') Options not valid or not consistent.

MQRC_STORAGE_NOT_AVAILABLE
: (2071, X'817') Insufficient storage available.

MQRC_UNEXPECTED_ERROR
: (2195, X'893') Unexpected error occurred.

MQRC_UNKNOWN_ALIAS_BASE_Q
: (2082, X'822') Unknown alias base queue.

MQRC_UNKNOWN_OBJECT_NAME
: (2085, X'825') Unknown object name.

MQRC_UNKNOWN_OBJECT_Q_MGR
(2086, X'826') Unknown object queue manager.
MQRC_UNKNOWN_REMOTE_Q_MGR
(2087, X'827') Unknown remote queue manager.

MQPUT – Put message

Parameters

Reason (MQLONG) – output
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_WARNING:

MQRC_PRIORITY_EXCEEDS_MAXIMUM
(2049, X'801') Message Priority exceeds maximum value supported.

If *CompCode* is MQCC_FAILED:

MQRC_BUFFER_LENGTH_ERROR
(2005, X'7D5') Buffer length parameter not valid.
MQRC_CONNECTION_BROKEN
(2009, X'7D9') Connection to queue manager lost.
| MQRC_CONVERTED_MSG_TOO_BIG
| (2120, X'848') Converted data too big for buffer.
| MQRC_DBCS_ERROR
| (2150, X'866') DBCS string not valid.
MQRC_EXPIRY_ERROR
(2013, X'7DD') Expiry time not valid.
MQRC_FEEDBACK_ERROR
(2014, X'7DE') Feedback code not valid.
| MQRC_FORMAT_ERROR
| (2110, X'83E') Format field not valid.
MQRC_HCONN_ERROR
(2018, X'7E2') Connection handle not valid.
MQRC_HOBJ_ERROR
(2019, X'7E3') Object handle not valid.
MQRC_MD_ERROR
(2026, X'7EA') Message descriptor not valid.
MQRC_MISSING_REPLY_TO_Q
(2027, X'7EB') Missing reply-to queue.
MQRC_MSG_TOO_BIG_FOR_Q
(2030, X'7EE') Message length greater than maximum for queue.
MQRC_MSG_TYPE_ERROR
(2029, X'7ED') Message type in message descriptor not valid.
| MQRC_NOT_CONVERTED
| (2119, X'847') Application message data not converted.
MQRC_NOT_OPEN_FOR_OUTPUT
(2039, X'7F7') Queue not open for output.
MQRC_OPTIONS_ERROR
(2046, X'7FE') Options not valid or not consistent.
MQRC_PERSISTENCE_ERROR
(2047, X'7FF') Persistence not valid.
MQRC_PMO_ERROR
(2173, X'87D') Put-message options structure not valid.

MQRC_PRIORITY_ERROR
(2050, X'802') Message priority not valid.
MQRC_PUT_INHIBITED
(2051, X'803') Put calls inhibited for the queue.
MQRC_Q_FULL
(2053, X'805') Queue already contains maximum number of messages.
MQRC_Q_SPACE_NOT_AVAILABLE
(2056, X'808') No space available on disk for queue.
MQRC_REPORT_OPTIONS_ERROR
(2061, X'80D') Report options in message descriptor not valid.
MQRC_SOURCE_CCSID_ERROR
(2111, X'83F') Source coded character set identifier not valid.
MQRC_SOURCE_DECIMAL_ENC_ERROR
(2113, X'841') Packed-decimal encoding in message not recognized.
MQRC_SOURCE_FLOAT_ENC_ERROR
(2114, X'842') Floating-point encoding in message not recognized.
MQRC_SOURCE_INTEGER_ENC_ERROR
(2112, X'840') Source integer encoding not recognized.
MQRC_SOURCE_LENGTH_ERROR
(2143, X'85F') Source length parameter not valid.
MQRC_STORAGE_NOT_AVAILABLE
(2071, X'817') Insufficient storage available.
MQRC_TARGET_CCSID_ERROR
(2115, X'843') Target coded character set identifier not valid.
MQRC_TARGET_DECIMAL_ENC_ERROR
(2117, X'845') Packed-decimal encoding specified by receiver not recognized.
MQRC_TARGET_FLOAT_ENC_ERROR
(2118, X'846') Floating-point encoding specified by receiver not recognized.
MQRC_TARGET_INTEGER_ENC_ERROR
(2116, X'844') Target integer encoding not recognized.
MQRC_TARGET_LENGTH_ERROR
(2144, X'860') Target length parameter not valid.
MQRC_UNEXPECTED_ERROR
(2195, X'893') Unexpected error occurred.
MQRC_UNKNOWN_CCSID
(2115, X'843') Unknown CCSID.

MQPUT1 – Put one message

Parameters

Reason (MQLONG) – output
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_WARNING:

MQRC_PRIORITY_EXCEEDS_MAXIMUM
(2049, X'801') Message Priority exceeds maximum value supported.

If *CompCode* is MQCC_FAILED:

MQRC_ALIAS_BASE_Q_TYPE_ERROR
(2001, X'7D1') Alias base queue not a valid type.
MQRC_BUFFER_LENGTH_ERROR
(2005, X'7D5') Buffer length parameter not valid.
MQRC_CONNECTION_BROKEN
(2009, X'7D9') Connection to queue manager lost.
MQRC_CONVERTED_MSG_TOO_BIG
(2120, X'848') Converted data too big for buffer.
MQRC_DBCS_ERROR
(2150, X'866') DBCS string not valid.
MQRC_EXPIRY_ERROR
(2013, X'7DD') Expiry time not valid.
MQRC_FEEDBACK_ERROR
(2014, X'7DE') Feedback code not valid.
MQRC_FORMAT_ERROR
(2110, X'83E') Format field not valid.
MQRC_HANDLE_NOT_AVAILABLE
(2017, X'7E1') No more handles available.
MQRC_HCONN_ERROR
(2018, X'7E2') Connection handle not valid.
MQRC_MD_ERROR
(2026, X'7EA') Message descriptor not valid.
MQRC_MISSING_REPLY_TO_Q
(2027, X'7EB') Missing reply-to queue.
MQRC_MSG_TOO_BIG_FOR_Q
(2030, X'7EE') Message length greater than maximum for queue.
MQRC_MSG_TYPE_ERROR
(2029, X'7ED') Message type in message descriptor not valid.
MQRC_NOT_CONVERTED
(2119, X'847') Application message data not converted.
MQRC_OBJECT_TYPE_ERROR
(2043, X'7FB') Object type not valid.
MQRC_OD_ERROR
(2044, X'7FC') Object descriptor structure not valid.
MQRC_OPTIONS_ERROR
(2046, X'7FE') Options not valid or not consistent.
MQRC_PERSISTENCE_ERROR
(2047, X'7FF') Persistence not valid.
MQRC_PMO_ERROR
(2173, X'87D') Put-message options structure not valid.
MQRC_PRIORITY_ERROR
(2050, X'802') Message priority not valid.
MQRC_PUT_INHIBITED
(2051, X'803') Put calls inhibited for the queue.
MQRC_Q_FULL
(2053, X'805') Queue already contains maximum number of messages.
MQRC_Q_SPACE_NOT_AVAILABLE
(2056, X'808') No space available on disk for queue.
MQRC_REPORT_OPTIONS_ERROR
(2061, X'80D') Report options in message descriptor not valid.

MQRC_SOURCE_CCSID_ERROR
(2111, X'83F') Source coded character set identifier not valid.
MQRC_SOURCE_DECIMAL_ENC_ERROR
(2113, X'841') Packed-decimal encoding in message not recognized.
MQRC_SOURCE_FLOAT_ENC_ERROR
(2114, X'842') Floating-point encoding in message not recognized.
MQRC_SOURCE_INTEGER_ENC_ERROR
(2112, X'840') Source integer encoding not recognized.
MQRC_SOURCE_LENGTH_ERROR
(2143, X'85F') Source length parameter not valid.
MQRC_STORAGE_NOT_AVAILABLE
(2071, X'817') Insufficient storage available.
MQRC_TARGET_CCSID_ERROR
(2115, X'843') Target coded character set identifier not valid.
MQRC_TARGET_DECIMAL_ENC_ERROR
(2117, X'845') Packed-decimal encoding specified by receiver not recognized.
MQRC_TARGET_FLOAT_ENC_ERROR
(2118, X'846') Floating-point encoding specified by receiver not recognized. :
MQRC_TARGET_INTEGER_ENC_ERROR
(2116, X'844') Target integer encoding not recognized.
MQRC_TARGET_LENGTH_ERROR
(2144, X'860') Target length parameter not valid.
MQRC_UNEXPECTED_ERROR
(2195, X'893') Unexpected error occurred.
MQRC_UNKNOWN_ALIAS_BASE_Q
(2082, X'822') Unknown alias base queue.
MQRC_UNKNOWN_OBJECT_NAME
(2085, X'825') Unknown object name.
MQRC_UNKNOWN_OBJECT_Q_MGR
(2086, X'826') Unknown object queue manager.
MQRC_UNKNOWN_REMOTE_Q_MGR
(2087, X'827') Unknown remote queue manager.
MQRC_UNKNOWN_CCSID
(2115, X'843') Unknown CCSID.

MQSET – Set object attributes

Parameters

Hconn (MQHCONN) – input
Connection handle.

The value of *Hconn* was returned by a previous MQCONN call.

Selectors (MQLONG×*SelectorCount*) – input
Array of attribute selectors.

MQSeries for VSE/ESA supports only the following selectors.

Selectors for all types of queue

MQIA_INHIBIT_PUT
Whether put operations are allowed.

Selectors for local queues

MQIA_INHIBIT_GET
Whether get operations are allowed.

Selectors for alias queues

MQIA_INHIBIT_GET
Whether get operations are allowed.

Reason (MQLONG) – output
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_FAILED:

MQRC_CHAR_ATTR_LENGTH_ERROR
(2006, X'7D6') Length of character attributes not valid.
MQRC_CHAR_ATTRS_ERROR
(2007, X'7D7') Character attributes string not valid.
MQRC_CICS_WAIT_FAILED
(2140, X'85C') Wait request rejected by CICS.
MQRC_CONNECTION_BROKEN
(2009, X'7D9') Connection to queue manager lost.
MQRC_HCONN_ERROR
(2018, X'7E2') Connection handle not valid.
MQRC_HOBJ_ERROR
(2019, X'7E3') Object handle not valid.
MQRC_INHIBIT_VALUE_ERROR
(2020, X'7E4') Value for inhibit-get or inhibit-put queue attribute not valid.
MQRC_INT_ATTR_COUNT_ERROR
(2021, X'7E5') Count of integer attributes not valid.
MQRC_INT_ATTRS_ARRAY_ERROR
(2023, X'7E7') Integer attributes array not valid.
MQRC_NOT_OPEN_FOR_SET
(2040, X'7F8') Queue not open for set.
MQRC_OBJECT_CHANGED
(2041, X'7F9') Object definition changed since opened.
MQRC_Q_MGR_NAME_ERROR
(2058, X'80A') Queue manager name not valid or not known.
MQRC_Q_MGR_NOT_AVAILABLE
(2059, X'80B') Queue manager not available for connection.
MQRC_SELECTOR_COUNT_ERROR
(2065, X'811') Count of selectors not valid.
MQRC_SELECTOR_ERROR
(2067, X'813') Attribute selector not valid.
MQRC_SELECTOR_LIMIT_EXCEEDED
(2066, X'812') Count of selectors too big.
MQRC_STORAGE_NOT_AVAILABLE
(2071, X'817') Insufficient storage available.
MQRC_UNEXPECTED_ERROR
(2195, X'893') Unexpected error occurred.

Attributes of MQSeries objects

In MQSeries for VSE/ESA, the attributes of all objects are as described in the *MQSeries Application Programming Reference* manual, with the following exception:

- Attributes of process definitions do not apply

The platform constant MQAT_CICS_VSE applies, value 10L.

Reason codes

In MQSeries for VSE/ESA, reason codes (MQRC_) are as described in the *MQSeries Application Programming Reference* manual.

Appendix D. Application Programming Guidance

This appendix describes:

- Application program support
- Samples
- Syncpointing
- Triggers

Supporting application programs that use the MQI

MQSeries application programs need specific objects before they can run successfully. For example, Figure 45 shows an application that removes messages from a queue, processes them, and then sends some results to another queue on the same queue manager.

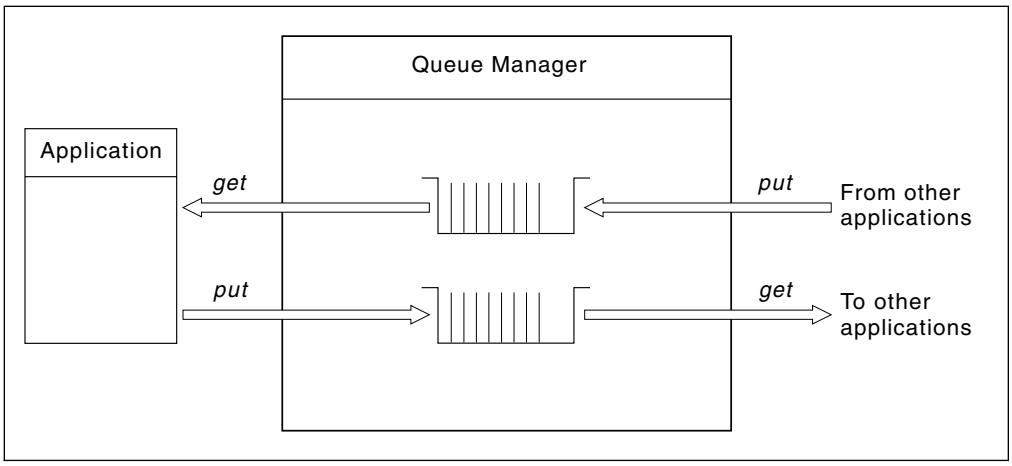

Figure 45. Queues, messages, and applications

Whereas applications can put (using MQPUT) messages on local or remote queues, they can only get (using MQGET) messages directly from local queues.

Before this application can run, these conditions must be satisfied:

- The queue manager must exist and be running.
- The first application queue, from which the messages are to be removed, must be defined.
- The second queue, on which the application puts the messages, must also be defined.
- The application must be able to connect to the queue manager. To do this the queue manager must be linked to the product code.
- The applications that put the messages on the first queue must also connect to a queue manager. If they are remote, they must also be set up with transmission queues and channels. This part of the system is not shown in Figure 45.

Sample source code provided

One COBOL-language sample trigger program, MQPECHO is provided with MQSeries for VSE/ESA. The source code for this program is shown in “Sample program MQPECHO.Z” on page 198, or it can be listed directly from the distribution files. Within the source code for MQPECHO, you can find examples that illustrate the use of the MQI calls in a trigger program.

In addition there are three sample programs, TTPTST1, TTPTST2, and TTPTST3. COBOL language copybook files are provided with the distribution file in the PRD2.MQSERIES library. These files provide examples of all of the MQI calls.

Compiling your application program

The MQI calls are provided in the library PRD2.MQSERIES.

Compilation

Ensure that you include the PRD2.MQSERIES library as part of the application phase step.

Developing applications in the C and PL/I programming languages

For CICS, COBOL is the language in which the MQSeries interface is written. Applications written in COBOL for VSE have been thoroughly tested with MQSeries. Sample programs and copybooks are provided in COBOL for VSE.

However, for a variety of reasons, you may need to write in another programming language. In these cases, you must meet the requirements of the COBOL language interface.

There are no sample programs provided in any other language, however, there are equivalents to the COBOL copybooks to enable applications to be built in other languages.

For the PL/I programming language, there are two include files:

CMQEPP.P Declares the MQI calls and structures
CMQP.P Declares the MQI constants

For the C programming language, there is the one include file CMQC.H, which declares everything required.

Application design guidelines

One of the key benefits provided by MQSeries is the ability for a distributed application to be developed that is totally independent of the underlying network. This network independence means that there is no need for an application to be aware of:

- The lower levels of the communication protocols, or
- The physical location of other applications on the network.

In order to take full advantage of this network independence, you must choose the queue names used by the application with care.

In particular, you are recommended to use a single logical name only, in your application programs, to refer to each MQSeries queue. For the MQSeries calls, this means only the Queue_Name field is used to identify queues. The use of the queue's fully qualified name (which includes both the Queue_Name field and the Queue_Manager_Name field) is not recommended.

The same is true when addressing MQSeries queues. As the Queue_Manager_Name is typically associated with a particular system, its use implies knowledge of the physical network.

Note: You are strongly recommended to use the Queue_Name field as the only logical queue name. This usage maximizes application flexibility and network independence. The mapping of the queue name in this form to the proper network destination then becomes a configuration issue to be handled by the MQSeries system administrator.

Syncpoints and triggers

This section describes syncpoints and triggers.

- Syncpoints allow an application to perform a series of changes, where the changes are treated as though they were a single change. They are described in "Syncpoint considerations."
- Triggers allow applications to be started automatically when messages arrive. They are described in "Triggers" on page 169.

Syncpoint considerations

Most applications need to access resources of one form or another, and a common requirement is to be able to make a coordinated set of changes to two or more resources.

"Coordinated" means that either all of the changes made to the resources take effect, or none of the changes takes effect. For some applications, queues need to be coordinated. Applications need to be able to get and put messages (and possibly update other resources, for example, databases), and know that either all of the operations take effect, or that none of the operations takes effect.

This set of coordinated operations is called a unit of work. An example of a unit of work is a debit and credit for a funds transfer in a financial application. Both operations must complete, or neither operation must complete, for a valid financial transaction to be completed.

Units of work: A unit of work starts when the first recoverable resource is affected. For message queuing, a unit of works starts when a message get or put occurs under syncpoint control.

The unit of work ends when either the application ends, or when the application declares a syncpoint.

If the unit of work is ended by an application ending, another unit of work can start. One instance of an application can be involved with several sequential units of work.

When a syncpoint is declared, any party (applications and the queue manager) that has interest in the unit of work can vote “yes” to commit the work, or “no”, to back out of the unit of work.

Applications declare syncpoints, and register their votes, by issuing an environment-dependent call. It is advisable that an application should process CICS SYNCPOINT prior to invoking an MQCLOSE call.

Participation of the MQGET, MQPUT, and MQPUT1 calls in the current unit of work is determined by the environment.

Distributed units of work (involving more than one queue manager) are not supported. A unit of work can contain queuing operations at only one instance of the queue manager.

If a message is put to a remote queue (that is, one on another queuing system), the action of the put request can be within the unit of work on the the system that puts the message but the arrival of the message on the target (remote) queue is outside its scope.

The get request for the message on the remote queue can be within the scope of work on that system, but the two units of work are not related by the queue manager.

Putting messages within a unit of work: If an MQPUT or MQPUT1 call participates in the current unit of work, the message is not available for retrieval from the target queue, between the completion of the MQPUT call and the successful completion of the unit of work. The only exception to this rule is if the target queue is within the same unit of work as the one within which it was put.

Only when, and if, the unit of work is committed successfully does the message become generally available.

Any errors detected by the queue manager when the message is put are returned to the application immediately, by means of the completion code and reason code parameters. Errors that can be detected in this way include:

- Message too large for queue
- Queue full
- Put requests inhibited for queue

Failure to put the message does not affect the status of the unit of work, because that message is not part of the unit of work. The application can still commit or backout of the unit of work as required.

However, should an application fail after a message was put successfully within a unit of work, the transaction is backed out.

Getting messages within a unit of work: If an MQGET call participates in the current unit of work, between the completion of the MQGET call and the successful completion of the unit of work, the message remains on the queue but becomes invisible.

Neither the application that retrieved the message, nor any other application serving the queue, can see or obtain the message again. If the unit of work is committed

successfully, the message is deleted from the queue. However, if the unit of work is backed out, the message is reinstated in the queue in its original position, and becomes available to the same or another application to retrieve.

Syncpoint and persistence: Only persistent messaging is supported. Persistent messages do not get deleted if the queue manager is restarted. Therefore, they are fully recovered when the queue manager is restarted. Syncpointing by the application causes these records to be in a logical unit of work. Any records that were syncpointed are still recovered if the queue manager is shutdown and restarted.

Syncpoint Rollback

If your application wants to undo what has been done since the beginning of the current logical unit of work, it has to issue the following command:

```
EXEC CICS SYNCPOINT ROLLBACK
```

This can have the following, non-desired, results:

- Monitoring shows incorrect queue depth values, because the queue manager is not aware of rollbacks. This value is correctly reset when stopping and restarting the queue manager.
- The queue depth and the last sequence number are not the same anymore. Even if a message has been rolled back, its message sequence number (MSN) is never used again. This is because other applications may have also put messages into the same queue. For example:

  ```
  Transaction A writes Message number  5
  Transaction B    .................   6
  Transaction A    .................   7
  Transaction C    .................   8
  ```

  At this point the queue depth is 8. Assume Transaction A rolls back, in which case messages 5 and 7 will be never retrieved. Note that this is not an error. The queue depth is now 6, and the next MSN will be 9.

  From an application point of view this has no impact at all, but can be surprising when using the MQMT dialogs.

  Note: To be able to use SYNCPOINT ROLLBACK, you MUST use a CICS System LOG file, that is, define a CICS JCT.

Triggers

Some applications run continuously, and are always available to read a message when it arrives on the application's input queue. However, keeping the application active consumes system resources, even when the application is waiting for a message to arrive. This additional load on the system is not desirable. Instead of the application running continuously, the application is designed to run only when there are messages to be processed. The queue manager's triggering facility is used to help make this happen.

Overview of triggering

A local queue definition can have a trigger event associated with it when it is defined. This event is defined to activate the MQ trigger API Handler, that is, the MQ02 CICS Transaction.

The trigger API handler does either a CICS LINK to the application program or a CICS START to the application transaction. This is based on whether you defined a program name or a transaction name in the queue definition.

When an application program is entered, an information area is available. This area can be mapped by using the structure defined in the member CMQTMV.C:

1. If the trigger facility specified a program name, this area is passed using the COMMAREA.

   To return to the API handler, you should issue an EXEC CICS RETURN.

2. If the trigger facility specified a transaction name, this information area can be accessed by issuing an EXEC CICS RETRIEVE command.

   Before exiting from the program, you must issue an MQCLOSE command.

Note: In order to perform this function, this transaction ID must be unique in respect to any MQSeries system local queue. Essentially, the MQSeries system queue manager recognizes this transaction ID as a local queue being opened. When this queue is closed fully, this trigger event will be closed, allowing another trigger for this queue to be activated.

Trigger conditions

The queue manager activates a trigger event based on the event type defined for the current queue, against which the MQPUT operation has been requested.

Note: If a non-empty queue is stopped and restarted, the trigger condition suffices, regardless of the trigger event type.

The trigger API handler waits until this MQPUT request has been completed. This implies that the MQPUT request can be successful or unsuccessful, that is, rolled back. The activated trigger application program should perform an MQGET call.

If the result of this MQGET call is an empty condition, that is, MQRC_NO_MSG_AVAILABLE, the original application current logical unit-of-work has been rolled back. It is up to the application trigger program to determine whether to continue to wait or just end.

A trigger event type of “FIRST” generates a trigger event after the queue goes from an empty status to a non-empty one. Therefore, any application triggered in this manner must process the queue until the queue is empty.

A trigger event type of “EVERY” generates a trigger event after every MQPUT call has been completed, up to the maximum number of trigger events specified on the Extended Local Queue Configuration screen. See “Local queue extended definition screen” on page 55 for further information.

Defining a sender channel component

A sender channel component causes the channel to start if there are messages on the transmission queue to be sent to the remote node.

In contrast, a server channel component will not start unless started by a remote requester component, or by manual intervention, even when there are messages to be sent.

On the transmission queue for the sender channel, code the fields as follows:

- Usage Mode – T
- Trigger Enable – Y
- Trigger Type – E
- Max Trigger Starts – 1
- Transaction ID – <blanks>
- Program ID – MQPSEND
- Remote CID – <the name of the channel>

Note: MQSeries for VSE/ESA does not support requester channels.

Defining a program to be triggered

This technique is used when an application program is to receive messages from the MQSeries system queue manager in the manner described in “Overview of triggering” on page 170 for a CICS LINK.

- Usage Mode – N
- Trigger Enable – Y
- Trigger Type – E or F
- Max Trigger Starts – 1
- Transaction ID – <blanks>
- Program ID – <application program name>
- Remote CID – <blanks>

Defining a transaction to be triggered

“Overview of triggering” on page 170, for CICS START, provides details of how to trigger a program based on its transaction ID. Note, that the transaction should not be invoked outside the trigger mechanism. However, by defining a different transaction name with the same program name, the program can be invoked outside the trigger environment.

Code as follows in the queue definition:

- Usage Mode – N
- Trigger Enable – Y
- Trigger Type – E or F
- Max Trigger Starts – 1
- Transaction ID – <user Transaction>
- Program ID – <blanks>
- Remote CID – <blanks>

Appendix E. Sample programs

This appendix lists the COBOL-language sample programs that are supplied with MQSeries for VSE/ESA V2.1.1.

Sample program TTPTST2.Z

This program is a test facility for sending and receiving messages. It must be invoked by terminal input format as:

```
TST2 func nn queue-name
```

where:

TST1
: Is the transaction ID.

func
: Is any of the following functions:

BOTH	Put and get messages.
GET	Get messages.
GETD	Get and delete messages.
INQ	Invoke MQINQ to inquire about the attributes of queues.
PUT	Put messages.
PUTR	Put messages and send reply.
PUT1	Put and delete messages.

nn
: Is the number of messages to be processed, from 01 through 99.

queue name
: Is the name of the local or transmission queue to be processed.

For example, `TST2 PUT 99 QUE1` puts 99 messages into a local queue named QUE1. All the messages read `THIS IS A MESSAGE TEXT`. Typing `TST2` without parameters causes help instructions to be displayed.

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID.    TTPTST2.
 AUTHOR.        IBM.

 DATE-COMPILED.
*-----------------------------------------------------------------*
*                                                                 *
*   Program:      TTPTST2                                         *
*   Description:  Sample program to illustrate the use of the     *
*                 MQ Message Queue Interface (MQI).               *
*                                                                 *
*-----------------------------------------------------------------*
/
 ENVIRONMENT DIVISION.
 CONFIGURATION SECTION.
 DATA DIVISION.

 WORKING-STORAGE SECTION.

*-------------------------------------------------------------*

 01  WS-WORK-FIELDS.
     05  WS-IDX                  PIC S9(4)  COMP VALUE ZERO.
     05  WS-COUNT                PIC S9(4)  COMP VALUE ZERO.
     05  WS-PROCESS-TIMES        PIC  9(4)       VALUE ZERO.
     05  WS-DURATION-SECS        PIC  X(8)       VALUE SPACES.
     05  WS-PASS-MSG-LENGTH      PIC S9(4)  COMP   VALUE ZERO.
     05  WS-APPL-MSG-LENGTH      PIC S9(8)  COMP   VALUE ZERO.
     05  WS-ABSTIME              PIC S9(15) COMP-3 VALUE ZERO.
     05  WS-ABSTIME2             PIC S9(15) COMP-3 VALUE ZERO.
     05  WS-DATE.
        10  WS-DATE-CC           PIC  99  VALUE ZERO.
        10  WS-DATE-YYMMDD.
          12  WS-DATE-YY         PIC  99  VALUE ZERO.
          12  WS-DATE-MM         PIC  99  VALUE ZERO.
          12  WS-DATE-DD         PIC  99  VALUE ZERO.
     05  WS-TIME-9               PIC  9(7)  VALUE ZERO.
     05  WS-TIME  REDEFINES  WS-TIME-9.
        10  FILLER               PIC  9.
        10  WS-TIME-HHMMSS.
          12  WS-TIME-HH         PIC  99.
          12  WS-TIME-MM         PIC  99.
          12  WS-TIME-SS         PIC  99.
     05  WS-FORMATTED-TIME.
         10  WS-FORMAT-TIME-HH   PIC  X(02) VALUE SPACES.
         10  FILLER              PIC  X(01) VALUE ':'.
         10  WS-FORMAT-TIME-MM   PIC  X(02) VALUE SPACES.
         10  FILLER              PIC  X(01) VALUE ':'.
         10  WS-FORMAT-TIME-SS   PIC  X(02) VALUE SPACES.
     05  WS-FORMATTED-DATE.
         10  WS-FORMAT-DATE-MM   PIC  X(02) VALUE SPACES.
         10  FILLER              PIC  X(01) VALUE '/'.
```

```
          10  WS-FORMAT-DATE-DD     PIC  X(02) VALUE SPACES.
          10  FILLER                PIC  X(01) VALUE '/'.
          10  WS-FORMAT-DATE-YY     PIC  X(02) VALUE SPACES.

      05  WS-QM-Q-NAME.
        10  WS-QM-NAME              PIC  X(48) VALUE 'QM1   '.
        10  WS-Q-NAME               PIC  X(48) VALUE 'QUEUE'.

      05  WS-REPLY-Q                PIC  X(48) VALUE 'QUE1'.

      05  WS-ERR-MSG-FLAG           PIC  X     VALUE SPACES.
       88 WS-ERR-MSG                          VALUE 'Y'.

      05  WS-STARTED-FLAG           PIC  X     VALUE SPACES.
       88 WS-STARTED                          VALUE 'Y'.

      05  WS-TIMESTAMP              PIC  X     VALUE SPACES.
       88 WS-PUT-TIMESTAMP                    VALUE 'Y'.

      05  WS-TIMESTAMP-VALUE.
         10  WS-TIMESTAMP-DATE      PIC X(6) VALUE SPACES.
         10  WS-TIMESTAMP-TIME      PIC X(6) VALUE SPACES.
         10  WS-TIMESTAMP-COUNT     PIC 999   VALUE ZERO.

      05  WS-STARTCODE               PIC  XX   VALUE SPACE.
        88  START-WITH-DATA         VALUE 'SD'.
        88  START-WITH-NO-DATA      VALUE 'S '.

      05  WS-END-OF-MESSAGES-FLAG   PIC  X  VALUE SPACES.
        88 WS-END-OF-MESSAGES              VALUE 'Y'.

      05  WS-TRUNCATED-MESSAGES-F   PIC  X  VALUE SPACES.
        88 WS-TRUNCATED-MESSAGES           VALUE 'Y'.

*-----------------------------------------------------------------*
 77  WS-DATA-FLENGTH               PIC S9(8) COMP VALUE ZERO.
 77  WS-DATA-LENGTH                PIC S9(4) COMP VALUE ZERO.
 01  WS-DATA-ALL.
     05  WS-DATA-WITH-QUEUE.
       10  WS-DATA-WITH-TIMES.
          12  WS-DATA-WITH-FUNCTION.
            15  WS-TRANSID          PIC  X(5)  VALUE 'TST2 '.
            15  WS-DATA-FUNCTION    PIC  XXXX.
            88 VALID-DATA-FUNCTION           VALUE 'PUT'
                                                   'GET'
                                                   'BOTH'
                                                   'PUT1'
                                                   'INQ'
                                                   'PUTR'
                                                   'GETD'
                                                   'HELP'
                                                   '?'.
            88 WS-HELP-FUN                   VALUE 'HELP' '?'.
            88 WS-PUT                        VALUE 'PUT'.
            88 WS-GET                        VALUE 'GET'.
            88 WS-BOTH                       VALUE 'BOTH'.
            88 WS-PUT1                       VALUE 'PUT1'.
            88 WS-PUT-WITH-REPLY             VALUE 'PUTR'.
            88 WS-GET-WITH-DELETE            VALUE 'GETD'.
            88 WS-INQ                        VALUE 'INQ'.

          12  FILLER                PIC  X     VALUE ' '.
          12  WS-DATA-TIMES         PIC  99    VALUE 01.
       10  WS-DATA-SYNC-FLAG        PIC  X     VALUE ' '.
       10  WS-DATA-QUEUE            PIC  X(48) VALUE SPACES.

 01  MQI-SELECTOR-COUNT.
    05 WS-SELECTOR-COUNT           PIC S9(8) COMP VALUE ZERO.

 01  MQI-SELECTOR.
    05  MQI-SELECTOR-ENTRY   OCCURS 40 TIMES
                             PIC S9(8) COMP.

 01  MQI-IN-ATTR-COUNT.
    05 WS-IN-ATTR-COUNT         PIC S9(8) COMP VALUE +40.

 01  MQI-IN-ATTR.
    05 MQI-IN-ATTR-ENTRY   OCCURS 40 TIMES
                             PIC S9(8) COMP.

*-----------------------------------------------------------------*
 01  WS-PASSED-INFO.
     COPY   TTITST2.

  EJECT
*-----------------------------------------------------------------*
 01  WS-NEED-REPLY.
     05  FILLER                  PIC  X(80) VALUE
     'Please enter REPLY QUEUE name with trailing blanks or ErsEOF
-    ' (eg. Ctrl - Del)'.
  EJECT
*-----------------------------------------------------------------*
 01  WS-HELP.
     05  FILLER                  PIC  X(80) VALUE
     ' TST2 is a test facility for SENDING / RECEIVING messages'.
     05  FILLER                  PIC  X(80) VALUE
     ' The format of command is as follows:'.
     05  FILLER                  PIC  X(80) VALUE
     ' TST2 XXXX £NN‘ QQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQ
-    'QQ'.
     05  FILLER                  PIC  X(80) VALUE SPACES.
     05  FILLER                  PIC  X(80) VALUE
     '(NOTE a single space or comma separates the params)'.
     05  FILLER                  PIC  X(80) VALUE
     '  XXXX  4-character function code, pad with trailing blank'.
     05  FILLER                  PIC  X(80) VALUE
     '                      HELP - DISPLAY THIS HELP TEXT'.
     05  FILLER                  PIC  X(80) VALUE
     '                      PUT  - MQPUT  MESSAGES'.
     05  FILLER                  PIC  X(80) VALUE
     '                      PUT1 - MQPUT1 MESSAGES'.
     05  FILLER                  PIC  X(80) VALUE
     '                      PUTR - MQPUT W/ REPLY MESSAGE'.
     05  FILLER                  PIC  X(80) VALUE
     '                      GET  - MQGET  MESSAGES'.
     05  FILLER                  PIC  X(80) VALUE
     '                      GETD - MQGET W/ BROWSE & DELETE'.
     05  FILLER                  PIC  X(80) VALUE
     '                      BOTH - MQPUT FOLLOWED BY MQGET'.
     05  FILLER                  PIC X(80)  VALUE
     '                      INQ  - INQ ABOUT QUEUE (no count NN)'.
     05  FILLER                  PIC  X(80) VALUE
     '  NN    2-digit number with leading zero (01 TO 99)'.
     05  FILLER                  PIC  X(80) VALUE
     '  QQQQ  A 48-character field giving the name of a queue.'.
     05  FILLER                  PIC  X(80) VALUE
     '  An additional prompt will ask for the name of the reply qu
-    'eue for PUTR option.'.
 01  WS-HELP-RED  REDEFINES   WS-HELP.
     05  WS-HELP-LINE  OCCURS 17 TIMES
                               PIC  X(80).
*-----------------------------------------------------------------*
  EJECT
*-----------------------------------------------------------------*
 01  WS-ALL-MSG.
     05  WS-OK-MSG.
         10  FILLER                  PIC  X(80) VALUE
          ' FULL CYCLE HAS BEEN PERFORMED SUCCESSFULLY'.
         10 WS-OK-MSG-1              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-2              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-3              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-4              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-5              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-6              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-7              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-8              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-9              PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-10             PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-11             PIC  X(80) VALUE SPACES.
         10 WS-OK-MSG-12             PIC  X(80) VALUE SPACES.
     05  WS-ERR-LINES.
         10  FILLER                  PIC  X(400) VALUE SPACES.

 01  WS-OK-STATS-LINE-1.
     05  FILLER                  PIC  X(20) VALUE
        '    QUEUE USED -'.
     05  WS-OK-QUEUE             PIC  X(48).

 01  WS-OK-STATS-LINE-2.
     05  FILLER                  PIC  X(20) VALUE
        ' REPLY Q-'.
     05  WS-OK-QUEUE-REPLY       PIC  X(48).
```

```
 01  WS-OK-STATS-LINE-3.
     05  FILLER                  PIC  X(40) VALUE
        '    NUMBER OF MESSAGES PROCESSED -'.
     05  WS-OK-MESSAGES          PIC Z99.

 01  WS-OK-STATS-LINE-4.
     05  FILLER                  PIC  X(40) VALUE
        '    TOTAL SECONDS ..... -'.
     05  WS-OK-TIME              PIC  X(8).
 01  WS-INQ-DETS.
     05 FILLER                   PIC X(6)
        VALUE 'TYPE: '.
     05 WS-I-TYPE                PIC 99.
     05 FILLER                   PIC X(10)
        VALUE ' INHIBIT: '.
     05 WS-I-INHIBIT             PIC 99.
     05 FILLER                   PIC X(7)
       VALUE ' MAXL: '.
     05 WS-I-MAXL                PIC 999999.

*-----------------------------------------------------------------*
  EJECT
*-----------------------------------------------------------------*
 01  WS-ERROR-MESSAGES.
     05 WS-ERR-DATA.
       10  FILLER                 PIC  X(13) VALUE
       '  DATA ERROR:'.
       10  FILLER                 PIC  X(9) VALUE
       '  LENGTH='.
       10  WS-ERR-DATA-LENGTH     PIC  9(8) VALUE ZERO.
       10  FILLER                 PIC  X(9) VALUE
       ', DATA  ='.
       10  WS-ERR-DATA-AREA       PIC  X(200) VALUE SPACES.
       10  FILLER                 PIC  X(4) VALUE
       '****'.

     05 WS-ERR-DISPLAY.
       10  FILLER                 PIC  X(13) VALUE
       '  MQ   ERROR:'.
       10  FILLER                 PIC  X(9) VALUE
       '  LEVEL ='.
       10  WS-LEVEL               PIC  X(8) VALUE SPACES.
       10  FILLER                 PIC  X(9) VALUE
       ', FUNC  ='.
       10  WS-FUNCTION            PIC  X(8) VALUE SPACES.
       10  FILLER                 PIC  X(9) VALUE
       ', CC    ='.
       10  WS-ERR-DISPLAY-CCODE   PIC  9(4) VALUE ZERO.
       10  FILLER                 PIC  X(9) VALUE
       ', RC    ='.
       10  WS-ERR-DISPLAY-RCODE   PIC  9(4) VALUE ZERO.
       10  FILLER                 PIC  X(4) VALUE
       '****'.
  EJECT
*-----------------------------------------------------------------*
 01  FILLER.
*****************************************************************
**                                                             **
**  FILE NAME:        CMQV                                     **
**                                                             **
**  DESCRIPTIVE NAME: COBOL copy file for MQI constants        **
**                                                             **
**  VERSION 2.1.0                                              **
**                                                             **
**  FUNCTION:         This file declares the constants         **
**                    which form part of the IBM Message       **
**                    Queue Interface (MQI).                   **
**                                                             **
*****************************************************************

*****************************************************************
**  Values Related to MQDLH Structure                          **
*****************************************************************
**   Structure Identifier
  10 MQDLH-STRUC-ID PIC X(4) VALUE 'DLH '.

**   Structure Version Number
  10 MQDLH-VERSION-1 PIC S9(9) BINARY  VALUE 1.


*****************************************************************
**  Values Related to MQGMO Structure                          **
*****************************************************************
**   Structure Identifier
  10 MQGMO-STRUC-ID PIC X(4) VALUE 'GMO '.

**   Structure Version Number
  10 MQGMO-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Get-Message Options
  10 MQGMO-WAIT                    PIC S9(9) BINARY  VALUE 1.
  10 MQGMO-NO-WAIT                 PIC S9(9) BINARY  VALUE 0.
  10 MQGMO-BROWSE-FIRST            PIC S9(9) BINARY  VALUE 16.
  10 MQGMO-BROWSE-NEXT             PIC S9(9) BINARY  VALUE 32.
  10 MQGMO-ACCEPT-TRUNCATED-MSG    PIC S9(9) BINARY  VALUE 64.
  10 MQGMO-SET-SIGNAL              PIC S9(9) BINARY  VALUE 8.
  10 MQGMO-SYNCPOINT               PIC S9(9) BINARY  VALUE 2.
  10 MQGMO-NO-SYNCPOINT            PIC S9(9) BINARY  VALUE 4.
  10 MQGMO-MSG-UNDER-CURSOR        PIC S9(9) BINARY  VALUE 256.
  10 MQGMO-LOCK                    PIC S9(9) BINARY  VALUE 512.
  10 MQGMO-UNLOCK                  PIC S9(9) BINARY  VALUE 1024.
  10 MQGMO-CONVERT                 PIC S9(9) BINARY  VALUE 16384.

**   Wait Interval
  10 MQWI-UNLIMITED PIC S9(9) BINARY  VALUE -1.


*****************************************************************
**  Values Related to MQMD Structure                           **
*****************************************************************

**   Structure Identifier
  10 MQMD-STRUC-ID PIC X(4) VALUE 'MD  '.

**   Structure Version Number
  10 MQMD-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Report Options
  10 MQRO-NONE PIC S9(9) BINARY  VALUE 0.

**   Message Types
  10 MQMT-REQUEST  PIC S9(9) BINARY  VALUE 1.
  10 MQMT-REPLY    PIC S9(9) BINARY  VALUE 2.
  10 MQMT-DATAGRAM PIC S9(9) BINARY  VALUE 8.
  10 MQMT-REPORT   PIC S9(9) BINARY  VALUE 4.

**   Expiry Value
  10 MQEI-UNLIMITED PIC S9(9) BINARY  VALUE -1.

**   Feedback Values
  10 MQFB-NONE         PIC S9(9) BINARY  VALUE 0.
  10 MQFB-QUIT         PIC S9(9) BINARY  VALUE 256.
  10 MQFB-SYSTEM-FIRST PIC S9(9) BINARY  VALUE 1.
  10 MQFB-SYSTEM-LAST  PIC S9(9) BINARY  VALUE 65535.
  10 MQFB-APPL-FIRST   PIC S9(9) BINARY  VALUE 65536.
  10 MQFB-APPL-LAST    PIC S9(9) BINARY  VALUE 999999999.

* format
  10 MQFMT-NONE                  PIC  X(8) VALUE SPACES.
  10 MQFMT-DEAD-LETTER-Q-HEADER  PIC  X(8) VALUE 'MQDLQH'.
  10 MQFMT-TRIGGER               PIC  X(8) VALUE 'MQTRIG'.
  10 MQFMT-XMIT-Q-HEADER         PIC  X(8) VALUE 'MQXMIT'.
  10 MQFMT-STRING                PIC  X(8) VALUE 'MQSTR'.
  10 MQFMT-ADMIN                 PIC  X(8) VALUE 'MQADMIN '.
  10 MQFMT-CICS                  PIC  X(8) VALUE 'MQCICS  '.
  10 MQFMT-COMMAND-1             PIC  X(8) VALUE 'MQCMD1  '.
  10 MQFMT-COMMAND-2             PIC  X(8) VALUE 'MQCMD2  '.
  10 MQFMT-DIST-HEADER           PIC  X(8) VALUE 'MQHDIST '.
  10 MQFMT-DEAD-LETTER-HEADER    PIC  X(8) VALUE 'MQDEAD  '.
  10 MQFMT-EVENT                 PIC  X(8) VALUE 'MQEVENT '.
  10 MQFMT-IMS                   PIC  X(8) VALUE 'MQIMS   '.
  10 MQFMT-IMS-VAR-STRING        PIC  X(8) VALUE 'MQIMSVS '.
  10 MQFMT-PCF                   PIC  X(8) VALUE 'MQPCF   '.
  10 MQFMT-REF-MSG-HEADER        PIC  X(8) VALUE 'MQHREF  '
  10 MQFMT-RF-HEADER             PIC  X(8) VALUE 'MQHRF   '
  10 MQFMT-SAP                   PIC  X(8) VALUE 'MQHSAP  '
  10 MQFMT-WORK-INFO-HEADER      PIC  X(8) VALUE 'MQHWIH  '

**   Encoding Value
  10 MQENC-NATIVE PIC S9(9) BINARY  VALUE 785.

**   Encoding Masks
  10 MQENC-INTEGER-MASK  PIC S9(9) BINARY  VALUE 15.
  10 MQENC-DECIMAL-MASK  PIC S9(9) BINARY  VALUE 240.
```

```
  10 MQENC-FLOAT-MASK    PIC S9(9) BINARY  VALUE 3840.
  10 MQENC-RESERVED-MASK PIC S9(9) BINARY  VALUE -4096.

**   Encodings for Binary Integers
  10 MQENC-INTEGER-UNDEFINED PIC S9(9) BINARY  VALUE 0.
  10 MQENC-INTEGER-NORMAL    PIC S9(9) BINARY  VALUE 1.
  10 MQENC-INTEGER-REVERSED  PIC S9(9) BINARY  VALUE 2.

**   Encodings for Packed-Decimal Integers
  10 MQENC-DECIMAL-UNDEFINED PIC S9(9) BINARY  VALUE 0.
  10 MQENC-DECIMAL-NORMAL    PIC S9(9) BINARY  VALUE 16.
  10 MQENC-DECIMAL-REVERSED  PIC S9(9) BINARY  VALUE 32.

**   Encodings for Floating-Point Numbers
  10 MQENC-FLOAT-UNDEFINED     PIC S9(9) BINARY  VALUE 0.
  10 MQENC-FLOAT-IEEE-NORMAL   PIC S9(9) BINARY  VALUE 256.
  10 MQENC-FLOAT-IEEE-REVERSED PIC S9(9) BINARY  VALUE 512.
  10 MQENC-FLOAT-S390          PIC S9(9) BINARY  VALUE 768.

**   Coded Character-Set Identifier
  10 MQCCSI-Q-MGR PIC S9(9) BINARY  VALUE 0.

**   Persistence Values
  10 MQPER-PERSISTENT           PIC S9(9) BINARY  VALUE 1.
  10 MQPER-PERSISTENCE-AS-Q-DEF PIC S9(9) BINARY  VALUE 2.

**   Message Id Value
  10 MQMI-NONE PIC X(24) VALUE LOW-VALUES.

**   Correlation Id Value
  10 MQCI-NONE PIC X(24) VALUE LOW-VALUES.


****************************************************************
**  Values Related to MQOD Structure                          **
****************************************************************

**   Structure Identifier
  10 MQOD-STRUC-ID PIC X(4) VALUE 'OD  '.

**   Structure Version Number
  10 MQOD-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Object Types
  10 MQOT-Q PIC S9(9) BINARY  VALUE 1.


****************************************************************
**  Values Related to MQPMO Structure                         **
****************************************************************

**   Structure Identifier
  10 MQPMO-STRUC-ID PIC X(4) VALUE 'PMO '.

**   Structure Version Number
  10 MQPMO-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Put-Message Options
  10 MQPMO-SYNCPOINT            PIC S9(9) BINARY  VALUE 2.
  10 MQPMO-NO-SYNCPOINT         PIC S9(9) BINARY  VALUE 4.

****************************************************************
**  Values Related to MQTM Structure                          **
****************************************************************

**   Structure Identifier
  10 MQTM-STRUC-ID PIC X(4) VALUE 'TM  '.

**   Structure Version Number
  10 MQTM-VERSION-1 PIC S9(9) BINARY  VALUE 1.


****************************************************************
**  Values Related to MQCLOSE Call                            **
****************************************************************

**   Close Options
  10 MQCO-NONE PIC S9(9) BINARY  VALUE 0.


****************************************************************
**  Values Related to MQINQ Call                              **
****************************************************************

**   Character-Attribute Selectors
  10 MQCA-BASE-Q-NAME       PIC S9(9) BINARY  VALUE 2002.
  10 MQCA-CREATION-DATE     PIC S9(9) BINARY  VALUE 2004.
  10 MQCA-CREATION-TIME     PIC S9(9) BINARY  VALUE 2005.
  10 MQCA-FIRST             PIC S9(9) BINARY  VALUE 2001.
  10 MQCA-INITIATION-Q-NAME PIC S9(9) BINARY  VALUE 2008.
  10 MQCA-LAST              PIC S9(9) BINARY  VALUE 4000.
  10 MQCA-PROCESS-NAME      PIC S9(9) BINARY  VALUE 2012.
  10 MQCA-Q-DESC            PIC S9(9) BINARY  VALUE 2013.
  10 MQCA-Q-NAME            PIC S9(9) BINARY  VALUE 2016.
  10 MQCA-REMOTE-Q-MGR-NAME PIC S9(9) BINARY  VALUE 2017.
  10 MQCA-REMOTE-Q-NAME     PIC S9(9) BINARY  VALUE 2018.

**   Integer-Attribute Selectors
  10 MQIA-CURRENT-Q-DEPTH   PIC S9(9) BINARY  VALUE 3.
  10 MQIA-DEF-PERSISTENCE   PIC S9(9) BINARY  VALUE 5.
  10 MQIA-DEFINITION-TYPE   PIC S9(9) BINARY  VALUE 7.
  10 MQIA-FIRST             PIC S9(9) BINARY  VALUE 1.
  10 MQIA-INHIBIT-GET       PIC S9(9) BINARY  VALUE 9.
  10 MQIA-INHIBIT-PUT       PIC S9(9) BINARY  VALUE 10.
  10 MQIA-LAST              PIC S9(9) BINARY  VALUE 2000.
  10 MQIA-MAX-MSG-LENGTH    PIC S9(9) BINARY  VALUE 13.
  10 MQIA-MAX-Q-DEPTH       PIC S9(9) BINARY  VALUE 15.
  10 MQIA-OPEN-INPUT-COUNT  PIC S9(9) BINARY  VALUE 17.
  10 MQIA-OPEN-OUTPUT-COUNT PIC S9(9) BINARY  VALUE 18.
  10 MQIA-Q-TYPE            PIC S9(9) BINARY  VALUE 20.
  10 MQIA-SHAREABILITY      PIC S9(9) BINARY  VALUE 23.
  10 MQIA-TRIGGER-CONTROL   PIC S9(9) BINARY  VALUE 24.
  10 MQIA-TRIGGER-TYPE      PIC S9(9) BINARY  VALUE 28.
  10 MQIA-USAGE             PIC S9(9) BINARY  VALUE 12.

**   Integer Attribute Value Denoting 'Not Applicable'
  10 MQIAV-NOT-APPLICABLE PIC S9(9) BINARY  VALUE -1.


****************************************************************
**  Values Related to MQOPEN Call                             **
****************************************************************

**   Open Options
  10 MQOO-INPUT-SHARED    PIC S9(9) BINARY  VALUE 2.
  10 MQOO-INPUT-EXCLUSIVE PIC S9(9) BINARY  VALUE 4.
  10 MQOO-BROWSE          PIC S9(9) BINARY  VALUE 8.
  10 MQOO-OUTPUT          PIC S9(9) BINARY  VALUE 16.
  10 MQOO-INQUIRE         PIC S9(9) BINARY  VALUE 32.


****************************************************************
**  Values Related to All Calls                               **
****************************************************************

**   String Lengths
  10 MQ-CREATION-DATE-LENGTH     PIC S9(9) BINARY  VALUE 12.
  10 MQ-CREATION-TIME-LENGTH     PIC S9(9) BINARY  VALUE 8.
  10 MQ-PROCESS-APPL-ID-LENGTH   PIC S9(9) BINARY  VALUE 256.
  10 MQ-PROCESS-DESC-LENGTH      PIC S9(9) BINARY  VALUE 64.
  10 MQ-PROCESS-ENV-DATA-LENGTH  PIC S9(9) BINARY  VALUE 128.
  10 MQ-PROCESS-NAME-LENGTH      PIC S9(9) BINARY  VALUE 48.
  10 MQ-PROCESS-USER-DATA-LENGTH PIC S9(9) BINARY  VALUE 128.
  10 MQ-Q-DESC-LENGTH            PIC S9(9) BINARY  VALUE 64.
  10 MQ-Q-NAME-LENGTH            PIC S9(9) BINARY  VALUE 48.
  10 MQ-Q-MGR-DESC-LENGTH        PIC S9(9) BINARY  VALUE 64.
  10 MQ-Q-MGR-NAME-LENGTH        PIC S9(9) BINARY  VALUE 48.
  10 MQ-TRIGGER-DATA-LENGTH      PIC S9(9) BINARY  VALUE 64.

**   Completion Codes
  10 MQCC-OK      PIC S9(9) BINARY  VALUE 0.
  10 MQCC-WARNING PIC S9(9) BINARY  VALUE 1.
  10 MQCC-FAILED  PIC S9(9) BINARY  VALUE 2.

**   Reason Codes
  10 MQRC-NONE                      PIC S9(9) BINARY  VALUE 0.
  10 MQRC-ACCESS-RESTRICTED         PIC S9(9) BINARY  VALUE 2000.
  10 MQRC-ALIAS-BASE-Q-TYPE-ERROR   PIC S9(9) BINARY  VALUE 2001.
  10 MQRC-ALREADY-CONNECTED         PIC S9(9) BINARY  VALUE 2002.
  10 MQRC-BUFFER-ERROR              PIC S9(9) BINARY  VALUE 2004.
  10 MQRC-BUFFER-LENGTH-ERROR       PIC S9(9) BINARY  VALUE 2005.
  10 MQRC-CHAR-ATTR-LENGTH-ERROR    PIC S9(9) BINARY  VALUE 2006.
  10 MQRC-CHAR-ATTRS-ERROR          PIC S9(9) BINARY  VALUE 2007.
  10 MQRC-CHAR-ATTRS-TOO-SHORT      PIC S9(9) BINARY  VALUE 2008.
  10 MQRC-CONNECTION-BROKEN         PIC S9(9) BINARY  VALUE 2009.
```

```
10 MQRC-DATA-LENGTH-ERROR         PIC S9(9) BINARY  VALUE 2010.
10 MQRC-EXPIRY-ERROR              PIC S9(9) BINARY  VALUE 2013.
10 MQRC-FEEDBACK-ERROR            PIC S9(9) BINARY  VALUE 2014.
10 MQRC-GET-INHIBITED             PIC S9(9) BINARY  VALUE 2016.
10 MQRC-HANDLE-NOT-AVAILABLE      PIC S9(9) BINARY  VALUE 2017.
10 MQRC-HCONN-ERROR               PIC S9(9) BINARY  VALUE 2018.
10 MQRC-HOBJ-ERROR                PIC S9(9) BINARY  VALUE 2019.
10 MQRC-INT-ATTR-COUNT-ERROR      PIC S9(9) BINARY  VALUE 2021.
10 MQRC-INT-ATTR-COUNT-TOO-SMALL  PIC S9(9) BINARY  VALUE 2022.
10 MQRC-INT-ATTRS-ARRAY-ERROR     PIC S9(9) BINARY  VALUE 2023.
10 MQRC-MAX-CONNS-LIMIT-REACHED   PIC S9(9) BINARY  VALUE 2025.
10 MQRC-MD-ERROR                  PIC S9(9) BINARY  VALUE 2026.
10 MQRC-MISSING-REPLY-TO-Q        PIC S9(9) BINARY  VALUE 2027.
10 MQRC-MSG-TYPE-ERROR            PIC S9(9) BINARY  VALUE 2029.
10 MQRC-MSG-TOO-BIG-FOR-Q         PIC S9(9) BINARY  VALUE 2030.
10 MQRC-NO-MSG-AVAILABLE          PIC S9(9) BINARY  VALUE 2033.
10 MQRC-NO-MSG-UNDER-CURSOR       PIC S9(9) BINARY  VALUE 2034.
10 MQRC-NOT-AUTHORIZED            PIC S9(9) BINARY  VALUE 2035.
10 MQRC-NOT-OPEN-FOR-BROWSE       PIC S9(9) BINARY  VALUE 2036.
10 MQRC-NOT-OPEN-FOR-INPUT        PIC S9(9) BINARY  VALUE 2037.
10 MQRC-NOT-OPEN-FOR-INQUIRE      PIC S9(9) BINARY  VALUE 2038.
10 MQRC-NOT-OPEN-FOR-OUTPUT       PIC S9(9) BINARY  VALUE 2039.
10 MQRC-OBJECT-CHANGED            PIC S9(9) BINARY  VALUE 2041.
10 MQRC-OBJECT-IN-USE             PIC S9(9) BINARY  VALUE 2042.
10 MQRC-OBJECT-TYPE-ERROR         PIC S9(9) BINARY  VALUE 2043.
10 MQRC-OD-ERROR                  PIC S9(9) BINARY  VALUE 2044.
10 MQRC-OPTION-NOT-VALID-FOR-TYPE PIC S9(9) BINARY  VALUE 2045.
10 MQRC-OPTIONS-ERROR             PIC S9(9) BINARY  VALUE 2046.
10 MQRC-PERSISTENCE-ERROR         PIC S9(9) BINARY  VALUE 2047.
10 MQRC-PRIORITY-EXCEEDS-MAXIMUM  PIC S9(9) BINARY  VALUE 2049.
10 MQRC-PRIORITY-ERROR            PIC S9(9) BINARY  VALUE 2050.
10 MQRC-PUT-INHIBITED             PIC S9(9) BINARY  VALUE 2051.
10 MQRC-Q-FULL                    PIC S9(9) BINARY  VALUE 2053.
10 MQRC-Q-SPACE-NOT-AVAILABLE     PIC S9(9) BINARY  VALUE 2056.
10 MQRC-Q-MGR-NAME-ERROR          PIC S9(9) BINARY  VALUE 2058.
10 MQRC-Q-MGR-NOT-AVAILABLE       PIC S9(9) BINARY  VALUE 2059.
10 MQRC-REPORT-OPTIONS-ERROR      PIC S9(9) BINARY  VALUE 2061.
10 MQRC-SECURITY-ERROR            PIC S9(9) BINARY  VALUE 2063.
10 MQRC-SELECTOR-COUNT-ERROR      PIC S9(9) BINARY  VALUE 2065.
10 MQRC-SELECTOR-LIMIT-EXCEEDED   PIC S9(9) BINARY  VALUE 2066.
10 MQRC-SELECTOR-ERROR            PIC S9(9) BINARY  VALUE 2067.
10 MQRC-SELECTOR-NOT-FOR-TYPE     PIC S9(9) BINARY  VALUE 2068.
10 MQRC-SIGNAL-OUTSTANDING        PIC S9(9) BINARY  VALUE 2069.
10 MQRC-SIGNAL-REQUEST-ACCEPTED   PIC S9(9) BINARY  VALUE 2070.
10 MQRC-STORAGE-NOT-AVAILABLE     PIC S9(9) BINARY  VALUE 2071.
10 MQRC-SYNCPOINT-NOT-AVAILABLE   PIC S9(9) BINARY  VALUE 2072.
10 MQRC-TRUNCATED-MSG-ACCEPTED    PIC S9(9) BINARY  VALUE 2079.
10 MQRC-TRUNCATED-MSG-FAILED      PIC S9(9) BINARY  VALUE 2080.
10 MQRC-UNEXPECTED-CONNECT-ERROR  PIC S9(9) BINARY  VALUE 2081.
10 MQRC-UNKNOWN-ALIAS-BASE-Q      PIC S9(9) BINARY  VALUE 2082.
10 MQRC-UNKNOWN-OBJECT-NAME       PIC S9(9) BINARY  VALUE 2085.
10 MQRC-UNKNOWN-OBJECT-Q-MGR      PIC S9(9) BINARY  VALUE 2086.
10 MQRC-UNKNOWN-REMOTE-Q-MGR      PIC S9(9) BINARY  VALUE 2087.
10 MQRC-WAIT-INTERVAL-ERROR       PIC S9(9) BINARY  VALUE 2090.
10 MQRC-XMIT-Q-TYPE-ERROR         PIC S9(9) BINARY  VALUE 2091.
10 MQRC-XMIT-Q-USAGE-ERROR        PIC S9(9) BINARY  VALUE 2092.

10 MQRC-FORMAT-ERROR              PIC S9(9) BINARY  VALUE 2110.
10 MQRC-SOURCE-CCSID-ERROR        PIC S9(9) BINARY  VALUE 2111.
10 MQRC-SOURCE-INTEGER-ENC-ERROR  PIC S9(9) BINARY  VALUE 2112.
10 MQRC-SOURCE-DECIMAL-ENC-ERROR  PIC S9(9) BINARY  VALUE 2113.
10 MQRC-SOURCE-FLOAT-ENC-ERROR    PIC S9(9) BINARY  VALUE 2114.
10 MQRC-TARGET-CCSID-ERROR        PIC S9(9) BINARY  VALUE 2115.
10 MQRC-TARGET-INTEGER-ENC-ERROR  PIC S9(9) BINARY  VALUE 2116.
10 MQRC-TARGET-DECIMAL-ENC-ERROR  PIC S9(9) BINARY  VALUE 2117.
10 MQRC-TARGET-FLOAT-ENC-ERROR    PIC S9(9) BINARY  VALUE 2118.
10 MQRC-NOT-CONVERTED             PIC S9(9) BINARY  VALUE 2119.
10 MQRC-CONVERTED-MSG-TOO-BIG     PIC S9(9) BINARY  VALUE 2120.
10 MQRC-SOURCE-LENGTH-ERROR       PIC S9(9) BINARY  VALUE 2143.
10 MQRC-TARGET-LENGTH-ERROR       PIC S9(9) BINARY  VALUE 2144.
10 MQRC-DBCS-ERROR                PIC S9(9) BINARY  VALUE 2150.
10 MQRC-CONVERTED-STRING-TOO-BIG  PIC S9(9) BINARY  VALUE 2190.

10 MQRC-PMO-ERROR                 PIC S9(9) BINARY  VALUE 2173.
10 MQRC-GMO-ERROR                 PIC S9(9) BINARY  VALUE 2186.

10 MQRC-UNEXPECTED-ERROR          PIC S9(9) BINARY  VALUE 2195.
10 MQRC-MSG-ID-ERROR              PIC S9(9) BINARY  VALUE 2206.
10 MQRC-CORREL-ID-ERROR           PIC S9(9) BINARY  VALUE 2207.

10 MQRC-FILE-SYSTEM-ERROR         PIC S9(9) BINARY  VALUE 2208.
10 MQRC-NO-MSG-LOCKED             PIC S9(9) BINARY  VALUE 2209.
```

```
      ****************************************************************
      **  Values Related to Queue Attributes                        **
      ****************************************************************

      **   Queue Types
        10 MQQT-LOCAL  PIC S9(9) BINARY  VALUE 1.
        10 MQQT-ALIAS  PIC S9(9) BINARY  VALUE 3.
        10 MQQT-REMOTE PIC S9(9) BINARY  VALUE 6.

      **   Queue Definition Types
        10 MQQDT-PREDEFINED PIC S9(9) BINARY  VALUE 1.

      **   Inhibit Get
        10 MQQA-GET-INHIBITED PIC S9(9) BINARY  VALUE 1.
        10 MQQA-GET-ALLOWED   PIC S9(9) BINARY  VALUE 0.

      **   Inhibit Put
        10 MQQA-PUT-INHIBITED PIC S9(9) BINARY  VALUE 1.
        10 MQQA-PUT-ALLOWED   PIC S9(9) BINARY  VALUE 0.

      **   Queue Shareability
        10 MQQA-SHAREABLE     PIC S9(9) BINARY  VALUE 1.
        10 MQQA-NOT-SHAREABLE PIC S9(9) BINARY  VALUE 0.

      **   Message Delivery Sequence
        10 MQMDS-FIFO PIC S9(9) BINARY  VALUE 1.

      **   Trigger Control
        10 MQTC-OFF PIC S9(9) BINARY  VALUE 0.
        10 MQTC-ON  PIC S9(9) BINARY  VALUE 1.

      **   Trigger Types
        10 MQTT-NONE  PIC S9(9) BINARY  VALUE 0.
        10 MQTT-FIRST PIC S9(9) BINARY  VALUE 1.
        10 MQTT-EVERY PIC S9(9) BINARY  VALUE 2.

      **   Queue Usage
        10 MQUS-NORMAL       PIC S9(9) BINARY  VALUE 0.
        10 MQUS-TRANSMISSION PIC S9(9) BINARY  VALUE 1.


      ****************************************************************
      **  Values Related to Process-Definition Attributes           **
      ****************************************************************

      **   Application Type
        10 MQAT-USER-FIRST PIC S9(9) BINARY  VALUE 65536.
        10 MQAT-USER-LAST  PIC S9(9) BINARY  VALUE 999999999.


      *
        10 MQAT-OS2        PIC S9(9) BINARY VALUE 4.
        10 MQAT-DOS        PIC S9(9) BINARY VALUE 5.
        10 MQAT-AIX        PIC S9(9) BINARY VALUE 6.
        10 MQAT-OS400      PIC S9(9) BINARY VALUE 8.
        10 MQAT-WINDOWS    PIC S9(9) BINARY VALUE 9.
        10 MQAT-CICS-VSE   PIC S9(9) BINARY VALUE 10.
        10 MQAT-VMS        PIC S9(9) BINARY VALUE 12.
        10 MQAT-GUARDIAN   PIC S9(9) BINARY VALUE 13.
        10 MQAT-VOS        PIC S9(9) BINARY VALUE 14.


      ****************************************************************
      **  Values Related to Queue-Manager Attributes                **
      ****************************************************************

      **   Syncpoint Availability
        10 MQSP-AVAILABLE PIC S9(9) BINARY  VALUE 1.

        EJECT
      *-------------------------------------------------------------*
      * COMMON PARMS
       01  FILLER          PIC X(8) VALUE 'PARMS:--'.
       01  WS-HCONN-ADDR-AREA.
           05  WS-HCONN-VALUE             USAGE POINTER.

       01  WS-HOBJ-ADDR-AREA.
           05  WS-HOBJ-VALUE              USAGE POINTER.

       01  WS-HOBJ-ADDR-AREA-REPLY.
           05  WS-HOBJ-VALUE-REPLY        USAGE POINTER.
```

```
 01  WS-CCODE-ADDR-AREA.
     05  WS-CCODE-VALUE             PIC S9(8) COMP.

 01  WS-RCODE-ADDR-AREA.
     05  WS-RCODE-VALUE             PIC S9(8) COMP.

*-------------------------------------------------------------*
*--CONNECT PARM
 01  WS-QM-NAME-AREA.
     05  WS-QM-NAME-CONNECT         PIC  X(48).

*--OPEN    PARM
 01  WS-Q-NAME-AREA.
*****************************************************************
**                                                             **
**  FILE NAME:        CMQODV                                   **
**                                                             **
**  DESCRIPTIVE NAME: COBOL copy file for MQOD structure       **
**                                                             **
**  VERSION 2.1.0                                              **
**                                                             **
**  FUNCTION:         This file declares the MQOD structure,   **
**                    which forms part of the IBM Message      **
**                    Queue Interface (MQI).                   **
**                                                             **
*****************************************************************

**   MQOD structure
  10 MQOD.
**    Structure identifier
    15 MQOD-STRUCID         PIC X(4) VALUE 'OD  '.
**    Structure version number
    15 MQOD-VERSION         PIC S9(9) BINARY   VALUE 1.
**    Object type
    15 MQOD-OBJECTTYPE      PIC S9(9) BINARY   VALUE 1.
**    Object name
    15 MQOD-OBJECTNAME      PIC X(48) VALUE SPACES.
**    Object queue manager name
    15 MQOD-OBJECTQMGRNAME  PIC X(48) VALUE SPACES.
**    Dynamic queue name
    15 MQOD-DYNAMICQNAME    PIC X(48) VALUE '*'.
**    Alternate user identifier
    15 MQOD-ALTERNATEUSERID PIC X(12) VALUE SPACES.

 01  WS-Q-OPEN-OPTIONS.
     05  WS-Q-OPEN-OPTIONS-VALUE    PIC S9(8) COMP.
     EJECT

*--INQ

 01  MQI-CHAR-ATTR-LENGTH.
     05  WS-CHAR-ATTR-LENGTH        PIC S9(8) COMP.
 01  MQI-CHAR-ATTR.
     05  WS-CHAR-ATTR            PIC X(500) VALUE SPACES.
 01  WS-D-FILLER REDEFINES MQI-CHAR-ATTR.
     05  WS-A-DESC               PIC X(64).
     05  WS-A-Q-N                PIC X(64).



*--PUT/GET PARM
 01  WS-MSG-DESCRIPTOR.
*****************************************************************
**                                                             **
**  FILE NAME:        CMQMDV                                   **
**                                                             **
**  DESCRIPTIVE NAME: COBOL copy file for MQMD structure       **
**                                                             **
**  VERSION 2.1.0                                              **
**                                                             **
**  FUNCTION:         This file declares the MQMD structure,   **
**                    which forms part of the IBM Message      **
**                    Queue Interface (MQI).                   **
**                                                             **
*****************************************************************

**   MQMD structure
  10 MQMD.
**    Structure identifier
    15 MQMD-STRUCID           PIC X(4) VALUE 'MD  '.
**    Structure version number
    15 MQMD-VERSION           PIC S9(9) BINARY  VALUE 1.
**    Reserved
    15 MQMD-REPORT            PIC S9(9) BINARY  VALUE 0.
**    Message type
    15 MQMD-MSGTYPE           PIC S9(9) BINARY  VALUE 8.
**    Reserved
    15 MQMD-EXPIRY            PIC S9(9) BINARY  VALUE -1.
**    Feedback code
    15 MQMD-FEEDBACK          PIC S9(9) BINARY  VALUE 0.
**    Data encoding
    15 MQMD-ENCODING          PIC S9(9) BINARY  VALUE 785.
**    Coded character set identifier
    15 MQMD-CODEDCHARSETID    PIC S9(9) BINARY  VALUE 0.
**    Format name
    15 MQMD-FORMAT            PIC X(8) VALUE SPACES.
**    Reserved
    15 MQMD-PRIORITY          PIC S9(9) BINARY  VALUE 0.
**    Message persistence
    15 MQMD-PERSISTENCE       PIC S9(9) BINARY  VALUE 2.
**    Message identifier
    15 MQMD-MSGID             PIC X(24) VALUE LOW-VALUES.
**    Correlation identifier
    15 MQMD-CORRELID          PIC X(24) VALUE LOW-VALUES.
**    Reserved
    15 MQMD-BACKOUTCOUNT      PIC S9(9) BINARY  VALUE 0.
**    Name of reply queue
    15 MQMD-REPLYTOQ          PIC X(48) VALUE SPACES.
**    Name of reply queue manager
    15 MQMD-REPLYTOQMGR       PIC X(48) VALUE SPACES.
**    Reserved
    15 MQMD-USERIDENTIFIER    PIC X(12) VALUE SPACES.
**    Reserved
    15 MQMD-ACCOUNTINGTOKEN   PIC X(32) VALUE LOW-VALUES.
**    Reserved
    15 MQMD-APPLIDENTITYDATA  PIC X(32) VALUE SPACES.
**    Reserved
    15 MQMD-PUTAPPLTYPE       PIC S9(9) BINARY  VALUE 0.
**    Reserved
    15 MQMD-PUTAPPLNAME       PIC X(28) VALUE SPACES.
**    Reserved
    15 MQMD-PUTDATE           PIC X(8) VALUE SPACES.
**    Reserved
    15 MQMD-PUTTIME           PIC X(8) VALUE SPACES.
**    Reserved
    15 MQMD-APPLORIGINDATA    PIC X(4) VALUE SPACES.


 01  WS-PUT-OPTIONS.
*****************************************************************
**                                                             **
**  FILE NAME:        CMQPMOV                                  **
**                                                             **
**  DESCRIPTIVE NAME: COBOL copy file for MQPMO structure      **
**                                                             **
**  VERSION 2.1.0                                              **
**                                                             **
**  FUNCTION:         This file declares the MQPMO structure,  **
**                    which forms part of the IBM Message      **
**                    Queue Interface (MQI).                   **
**                                                             **
*****************************************************************

**   MQPMO structure
  10 MQPMO.
**    Structure identifier
    15 MQPMO-STRUCID          PIC X(4) VALUE 'PMO '.
**    Structure version number
    15 MQPMO-VERSION          PIC S9(9) BINARY   VALUE 1.
**    Reserved
    15 MQPMO-OPTIONS          PIC S9(9) BINARY   VALUE 0.
**    Reserved
    15 MQPMO-TIMEOUT          PIC S9(9) BINARY   VALUE -1.
**    Reserved
    15 MQPMO-CONTEXT          PIC S9(9) BINARY   VALUE 0.
**    Reserved
    15 MQPMO-KNOWNDESTCOUNT   PIC S9(9) BINARY   VALUE 0.
**    Reserved
    15 MQPMO-UNKNOWNDESTCOUNT PIC S9(9) BINARY   VALUE 0.
**    Reserved
    15 MQPMO-INVALIDDESTCOUNT PIC S9(9) BINARY   VALUE 0.
**    Resolved name of destination queue
    15 MQPMO-RESOLVEDQNAME    PIC X(48) VALUE SPACES.
```

```
**    Resolved name of destination queue manager
   15 MQPMO-RESOLVEDQMGRNAME  PIC X(48) VALUE SPACES.


 01  WS-GET-OPTIONS.
**************************************************************
**                                                          **
**  FILE NAME:        CMQGMOV                               **
**                                                          **
**  DESCRIPTIVE NAME: COBOL copy file for MQGMO structure   **
**                                                          **
**  VERSION 2.1.0                                         **
**                                                          **
**  FUNCTION:         This file declares the MQGMO structure,**
**                    which forms part of the IBM Message   **
**                    Queue Interface (MQI).                **
**                                                          **
**************************************************************

**   MQGMO structure
  10 MQGMO.
**    Structure identifier
   15 MQGMO-STRUCID        PIC X(4) VALUE 'GMO '.
**    Structure version number
   15 MQGMO-VERSION        PIC S9(9) BINARY   VALUE 1.
**    Options
   15 MQGMO-OPTIONS        PIC S9(9) BINARY   VALUE 0.
**    Wait interval
   15 MQGMO-WAITINTERVAL   PIC S9(9) BINARY   VALUE 0.
**    Signal
   15 MQGMO-SIGNAL1        PIC S9(9) BINARY   VALUE 0.
**    Reserved
   15 MQGMO-SIGNAL2        PIC S9(9) BINARY   VALUE 0.
**    Resolved name of destination queue
   15 MQGMO-RESOLVEDQNAME  PIC X(48) VALUE SPACES.


 01  WS-DATA-L-AREA.
     05  WS-DATA-LENGTH-USER        PIC S9(8) COMP VALUE +200.

 01  WS-BUFFER-L-AREA.
     05  WS-BUFFER-LENGTH           PIC S9(8) COMP VALUE +200.

 77  WS-MSG-LENGTH                  PIC S9(8) COMP VALUE +200.
 01  WS-RECEIVE-BUFFER              PIC X(1024) VALUE SPACE.
 01  WS-REMAINDER                   PIC X(1024) VALUE SPACES.
 01  WS-POINTER                     PIC 9(4).
 01  WS-MSG-AREA.
     05  FILLER                     PIC  X(500) VALUE
     'THIS IS A MESSAGE TEXT'.

 01  WS-BUFFER-AREA.
     05  WS-BUFFER-TS               PIC  X(16)  VALUE SPACES.
     05  WS-BUFFER-TEXT             PIC  X(500) VALUE SPACES.

*    COPY    MQWEOWS.
*-------------------------------------------------------------*
 LINKAGE SECTION.
*-------------------------------------------------------------*

 01  LK-DATA.
     05  FILLER                   PIC X.
  EJECT
*-------------------------------------------------------------*
 PROCEDURE DIVISION.
*-------------------------------------------------------------*

 0000-MAIN-LINE.

*--INITIALIZE
     MOVE  'INIT   ' TO   WS-LEVEL.
     PERFORM 1000-INITIALIZE
        THRU 1000-EXIT.

*-------------------------------------------------------------*
     PERFORM    1   TIMES

*--SEND QUEUE RECORDS
          IF WS-PUT  OR WS-BOTH
           THEN
               PERFORM 2000-PUT-MESSAGES
                  THRU 2000-EXIT
          END-IF

*--GET  QUEUE RECORDS
          IF WS-GET  OR WS-BOTH
           THEN
               PERFORM 3000-GET-MESSAGES
                  THRU 3000-EXIT
          END-IF

          IF WS-PUT1
           THEN
               PERFORM 4000-PUT1-MESSAGES
                  THRU 4000-EXIT
          END-IF

          IF WS-GET-WITH-DELETE
           THEN
               PERFORM 5000-GETD-MESSAGES
                  THRU 5000-EXIT
          END-IF

          IF WS-PUT-WITH-REPLY
           THEN
               PERFORM 6000-PUT-WITH-REPLY
                  THRU 6000-EXIT
          END-IF
          IF WS-INQ
           THEN
               PERFORM 6500-INQ-MESSAGES
                  THRU 6500-EXIT
          END-IF


     END-PERFORM.
*-------------------------------------------------------------*
 0000-SEND-TOTALS.
     IF NOT WS-STARTED
      THEN
             PERFORM   7000-SEND-TOTALS.


*-------------------------------------------------------------*
 0000-RETURN.
     EXEC CICS RETURN
          END-EXEC.

     GOBACK.
  EJECT
*-------------------------------------------------------------*
 1000-INITIALIZE.
*-------------------------------------------------------------*
* PURPOSE: SETUP DATA AREAS
*-------------------------------------------------------------*
*--GET STARTED CICS CODE
      EXEC CICS ASSIGN
                STARTCODE (WS-STARTCODE)
           END-EXEC.
*
*--SET TIME/DATE
     EXEC  CICS ASKTIME
                ABSTIME(WS-ABSTIME)
           END-EXEC.
*
     EXEC  CICS FORMATTIME
                ABSTIME(WS-ABSTIME)
                YYMMDD (WS-DATE-YYMMDD)
           END-EXEC.

     IF WS-DATE-YY >  50
      THEN
            MOVE  19                  TO  WS-DATE-CC
      ELSE
            MOVE  20                  TO  WS-DATE-CC.
*
     MOVE  EIBTIME   TO   WS-TIME-9.
     EXEC CICS FORMATTIME
                ABSTIME (WS-ABSTIME)
                MMDDYY  (WS-FORMATTED-DATE)
                DATESEP ('/')
                TIME    (WS-FORMATTED-TIME)
                TIMESEP (':')
          END-EXEC.
*
*--GET INPUT INFO...
```

```
     IF  START-WITH-DATA
      THEN
             PERFORM  1100-PASSED-INFO
      ELSE
             PERFORM  1200-SETUP-INPUT.

*-----------------------------------------------------------------*
 1000-EXIT.
     EXIT.

  EJECT
*-----------------------------------------------------------------*
 1100-PASSED-INFO.
*-----------------------------------------------------------------*
* PURPOSE: SETUP PASSED DATA AREAS
*-----------------------------------------------------------------*
*--GET PASSED DATA
     MOVE LENGTH OF WS-PASSED-INFO TO WS-PASS-MSG-LENGTH.
     EXEC CICS RETRIEVE
                     INTO (WS-PASSED-INFO)
                   LENGTH (WS-PASS-MSG-LENGTH)
          END-EXEC.

     IF  WS-PASS-MSG-LENGTH <  LENGTH OF WS-PASSED-INFO
      THEN
             GO TO  0000-RETURN.
*
     SET WS-STARTED  TO TRUE.
     MOVE TST2-FUNCTION    TO WS-DATA-FUNCTION.
     MOVE TST2-PUT-NUM-MSG TO  WS-PROCESS-TIMES.
     MOVE TST2-PUT-QUEUE-NAME TO WS-DATA-QUEUE.
     MOVE TST2-PUT-MSG-SIZE   TO WS-MSG-LENGTH.
     MOVE TST2-PUT-MSG        TO WS-MSG-AREA.
     MOVE TST2-PUT-MSG-TIMESTAMP  TO WS-TIMESTAMP.

*-----------------------------------------------------------------*
   EJECT
*-----------------------------------------------------------------*
 1100-SEND-HELP.
*-----------------------------------------------------------------*
*--SEND HELPLIST
     EXEC CICS SEND
               FROM   (WS-HELP)
               LENGTH (LENGTH OF WS-HELP)
               ERASE
     END-EXEC.

*-----------------------------------------------------------------*
   EJECT
*-----------------------------------------------------------------*
 1200-SETUP-INPUT.
*-----------------------------------------------------------------*
*--GET DATA
     MOVE LENGTH OF WS-RECEIVE-BUFFER TO WS-DATA-LENGTH
     EXEC  CICS RECEIVE
                     INTO(WS-RECEIVE-BUFFER)
                     LENGTH(WS-DATA-LENGTH)
     END-EXEC
*-- Handle variable number of parameters.
     MOVE +1 TO WS-POINTER
     UNSTRING WS-RECEIVE-BUFFER DELIMITED BY ALL SPACES INTO
              WS-TRANSID
              WS-DATA-FUNCTION
              WITH POINTER WS-POINTER
     END-UNSTRING
*-- Handle mixed case.
     INSPECT WS-DATA-FUNCTION CONVERTING
      'abcdefghijklmnopqrstuvwxyz' TO
      'ABCDEFGHIJKLMNOPQRSTUVWXYZ'

*-- Check for invalid function codes.
     IF (NOT VALID-DATA-FUNCTION) OR WS-HELP-FUN
      THEN
          PERFORM  1100-SEND-HELP
          GO TO   0000-RETURN
     END-IF

*--Extract the remaining options according to the function code.
     IF NOT WS-INQ THEN
       UNSTRING WS-RECEIVE-BUFFER DELIMITED BY ALL SPACES INTO
                WS-DATA-TIMES
                WS-DATA-QUEUE
                WS-TIMESTAMP
                WITH POINTER WS-POINTER
       END-UNSTRING
     ELSE
       UNSTRING WS-RECEIVE-BUFFER DELIMITED BY ALL SPACES INTO
                WS-DATA-QUEUE
                WITH POINTER WS-POINTER
       END-UNSTRING
     END-IF
*--CHECK WHAT WE'RE DOING
*-- --COMMAND IS  "TST2 GET 01 QUEUENAME"
*
     MOVE  WS-DATA-TIMES  TO WS-PROCESS-TIMES.
     IF WS-PROCESS-TIMES  EQUAL  ZERO
      THEN
            MOVE  100  TO   WS-PROCESS-TIMES.
*
*--IF REPLY ..SEND AND GET
     IF NOT WS-PUT-WITH-REPLY
      THEN
            GO TO  1000-EXIT.
*
*--IF REPLY ..SEND AND GET
     EXEC CICS SEND
               FROM   (WS-NEED-REPLY)
               LENGTH (LENGTH OF WS-NEED-REPLY)
               ERASE
     END-EXEC.

     EXEC  CICS RECEIVE
                      SET (ADDRESS OF LK-DATA)
                   LENGTH(WS-DATA-LENGTH)
          END-EXEC.

     IF WS-DATA-LENGTH >  48
      THEN
             MOVE +48  TO  WS-DATA-LENGTH.

     MOVE WS-DATA-LENGTH TO WS-DATA-FLENGTH
     MOVE  LK-DATA(1:WS-DATA-FLENGTH) TO
                              WS-REPLY-Q(1:WS-DATA-FLENGTH)
     .
*
*-----------------------------------------------------------------*
  EJECT
*-----------------------------------------------------------------*
 2000-PUT-MESSAGES.
*-----------------------------------------------------------------*
* PURPOSE: CONNECT , OPEN
*          PUT
*          CLOSE,    DISCONNECT
*-----------------------------------------------------------------*
*
*--MQCONNECT TO QM
     MOVE  'CONNECT' TO   WS-FUNCTION.
     MOVE  SPACES    TO   WS-QM-NAME-CONNECT.
     MOVE MQCC-OK                        TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE                      TO   WS-RCODE-VALUE.
     SET WS-HCONN-VALUE  TO NULL.
     CALL 'MQCONN'  USING  WS-QM-NAME-AREA
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.
*
*--MQOPEN   QUEUE TO QM
     MOVE  'OPEN'    TO   WS-FUNCTION.
     MOVE MQOO-OUTPUT    TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE SPACES         TO   MQOD-OBJECTQMGRNAME.
     MOVE WS-DATA-QUEUE  TO   MQOD-OBJECTNAME.
     MOVE MQCC-OK        TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE      TO   WS-RCODE-VALUE.
     SET WS-HOBJ-VALUE   TO   NULL.
     CALL 'MQOPEN'  USING  WS-HCONN-ADDR-AREA
                           WS-Q-NAME-AREA
                           WS-Q-OPEN-OPTIONS
                           WS-HOBJ-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
```

```
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.

*-----------------------------------------------------------------*
     PERFORM   WS-PROCESS-TIMES   TIMES

*--CHECK IF MUST PUT TIME STAMP ON MESSAGE
       IF WS-PUT-TIMESTAMP
        THEN
             PERFORM 8000-GET-TIME-STAMP
             MOVE WS-COUNT TO WS-TIMESTAMP-COUNT
             MOVE WS-TIMESTAMP-VALUE  TO  WS-BUFFER-TS
             MOVE  LENGTH OF WS-BUFFER-TS
                                  TO WS-BUFFER-LENGTH
             ADD WS-MSG-LENGTH     TO WS-BUFFER-LENGTH
             MOVE WS-MSG-AREA         TO  WS-BUFFER-TEXT
        ELSE
             MOVE WS-MSG-LENGTH       TO  WS-BUFFER-LENGTH
             MOVE WS-MSG-AREA         TO  WS-BUFFER-AREA
       END-IF

*--MQPUT TO QUEUE TO QM
       MOVE  'PUT'     TO   WS-FUNCTION
       MOVE MQCC-OK    TO   WS-CCODE-VALUE
       MOVE MQRC-NONE  TO   WS-RCODE-VALUE
       CALL 'MQPUT'   USING  WS-HCONN-ADDR-AREA
                             WS-HOBJ-ADDR-AREA
                             WS-MSG-DESCRIPTOR
                             WS-PUT-OPTIONS
                             WS-BUFFER-L-AREA
                             WS-BUFFER-AREA
                             WS-CCODE-ADDR-AREA
                             WS-RCODE-ADDR-AREA
*
       IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        THEN
               GO TO  9900-ERR-DISPLAY
       END-IF
       ADD  +1         TO   WS-COUNT


*--SYNPOINT PUT SO ECHO CAN GET IT
*-- --CHECK IF "NEGATIVE " PROCESSING OPTION SPECIFIED
*      IF WS-DATA-SYNC-FLAG NOT EQUAL '-'
*       THEN
*            EXEC  CICS SYNCPOINT
*                  END-EXEC
*      END-IF

     END-PERFORM.
*-----------------------------------------------------------------*

*--MQCLOSE  QUEUE TO QM
     MOVE  'CLOSE'   TO   WS-FUNCTION.
     MOVE  ZERO      TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQCLOSE' USING  WS-HCONN-ADDR-AREA
                           WS-HOBJ-ADDR-AREA
                           WS-Q-OPEN-OPTIONS
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.

*--MQDISC  FROM QM
     MOVE  'DISCONN' TO   WS-FUNCTION.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQDISC'  USING
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.

*-----------------------------------------------------------------*
 2000-EXIT.
     EXIT.
  EJECT
*-----------------------------------------------------------------*
 3000-GET-MESSAGES.
*-----------------------------------------------------------------*
* PURPOSE: CONNECT , OPEN
*          GET
*          CLOSE,    DISCONNECT
*-----------------------------------------------------------------*
*
*--MQCONNECT TO QM
     MOVE  'CONNECT' TO   WS-FUNCTION.
     MOVE  SPACES    TO   WS-QM-NAME.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     SET WS-HCONN-VALUE  TO NULL.
     CALL 'MQCONN'  USING  WS-QM-NAME-AREA
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.
*
*--MQOPEN   QUEUE TO QM
     MOVE  'OPEN'    TO   WS-FUNCTION.
     MOVE MQOO-INPUT-SHARED TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE SPACES            TO   MQOD-OBJECTQMGRNAME.
     MOVE WS-DATA-QUEUE     TO   MQOD-OBJECTNAME.
     MOVE MQCC-OK           TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE         TO   WS-RCODE-VALUE.
     SET WS-HOBJ-VALUE   TO   NULL.
     CALL 'MQOPEN'  USING  WS-HCONN-ADDR-AREA
                           WS-Q-NAME-AREA
                           WS-Q-OPEN-OPTIONS
                           WS-HOBJ-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.


*-----------------------------------------------------------------*
     PERFORM   WS-PROCESS-TIMES   TIMES
*
*--MQGET TO QUEUE TO QM
       MOVE  'GET'     TO   WS-FUNCTION
       MOVE MQCC-OK    TO   WS-CCODE-VALUE
       MOVE MQRC-NONE  TO   WS-RCODE-VALUE
       MOVE 500  TO   WS-BUFFER-LENGTH
       MOVE MQGMO-ACCEPT-TRUNCATED-MSG
                 TO   MQGMO-OPTIONS
       MOVE  LOW-VALUES TO  MQMD-MSGID
                            MQMD-CORRELID
*
       CALL 'MQGET'   USING  WS-HCONN-ADDR-AREA
                             WS-HOBJ-ADDR-AREA
                             WS-MSG-DESCRIPTOR
                             WS-GET-OPTIONS
                             WS-BUFFER-L-AREA
                             WS-BUFFER-AREA
                             WS-DATA-L-AREA
                             WS-CCODE-ADDR-AREA
                             WS-RCODE-ADDR-AREA
*
       IF  (WS-CCODE-VALUE   NOT EQUAL ZERO)
        THEN
             IF WS-RCODE-VALUE EQUAL 2079
              THEN
                   SET WS-TRUNCATED-MESSAGES  TO TRUE
             ELSE
             IF WS-RCODE-VALUE EQUAL 2033
              THEN
                   SET WS-END-OF-MESSAGES  TO TRUE
                   GO TO     3000-GET-EOF
             ELSE
                 GO TO  9900-ERR-DISPLAY
             END-IF
             END-IF
```

```
*
      END-IF
*-- --CHECK IF "NEGATIVE " PROCESSING OPTION SPECIFIED
       IF WS-DATA-SYNC-FLAG  NOT EQUAL  '-'
        THEN
             EXEC  CICS SYNCPOINT
                   END-EXEC
       END-IF
       ADD  +1         TO   WS-COUNT

    END-PERFORM.
*-------------------------------------------------------------*
*
 3000-GET-EOF.
*--MQCLOSE  QUEUE TO QM
     MOVE  'CLOSE'   TO   WS-FUNCTION.
     MOVE  ZERO      TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQCLOSE' USING  WS-HCONN-ADDR-AREA
                           WS-HOBJ-ADDR-AREA
                           WS-Q-OPEN-OPTIONS
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.

*--MQDISC  FROM QM
     MOVE  'DISCONN' TO   WS-FUNCTION.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQDISC'  USING
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.

*-------------------------------------------------------------*
 3000-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 4000-PUT1-MESSAGES.
*-------------------------------------------------------------*
* PURPOSE: CONNECT , OPEN
*          PUT
*          CLOSE,    DISCONNECT
*-------------------------------------------------------------*
*
*--MQCONNECT TO QM
     MOVE  'CONNECT' TO   WS-FUNCTION.
     MOVE  SPACES    TO   WS-QM-NAME-CONNECT.
     MOVE MQCC-OK                      TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE                    TO   WS-RCODE-VALUE.
     SET WS-HCONN-VALUE  TO NULL.
     CALL 'MQCONN'  USING  WS-QM-NAME-AREA
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.

*-------------------------------------------------------------*
     PERFORM   WS-PROCESS-TIMES   TIMES
*
*--CHECK IF MUST PUT TIME STAMP ON MESSAGE
       IF WS-PUT-TIMESTAMP
        THEN
             PERFORM 8000-GET-TIME-STAMP
             MOVE WS-TIMESTAMP-VALUE  TO  WS-BUFFER-TS
             MOVE  LENGTH OF WS-BUFFER-TS
                                   TO WS-BUFFER-LENGTH
             ADD WS-MSG-LENGTH     TO WS-BUFFER-LENGTH
             MOVE WS-MSG-AREA         TO  WS-BUFFER-TEXT
        ELSE
             MOVE WS-MSG-LENGTH       TO  WS-BUFFER-LENGTH
             MOVE WS-MSG-AREA         TO  WS-BUFFER-AREA
       END-IF
*
*--MQPUT1   QUEUE TO QM
       MOVE  'PUT1'    TO   WS-FUNCTION
       MOVE MQOO-OUTPUT    TO   MQPMO-OPTIONS
       MOVE SPACES         TO   MQOD-OBJECTQMGRNAME
       MOVE WS-DATA-QUEUE  TO   MQOD-OBJECTNAME
       MOVE MQCC-OK        TO   WS-CCODE-VALUE
       MOVE MQRC-NONE      TO   WS-RCODE-VALUE
       CALL 'MQPUT1'  USING  WS-HCONN-ADDR-AREA
                             WS-Q-NAME-AREA
                             WS-MSG-DESCRIPTOR
                             WS-PUT-OPTIONS
                             WS-BUFFER-L-AREA
                             WS-BUFFER-AREA
                             WS-CCODE-ADDR-AREA
                             WS-RCODE-ADDR-AREA
*
       IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        THEN
                  GO TO  9900-ERR-DISPLAY
       END-IF
*
    END-PERFORM.
*-------------------------------------------------------------*
*--MQDISC  FROM QM
     MOVE  'DISCONN' TO   WS-FUNCTION.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQDISC'  USING
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.

*-------------------------------------------------------------*
 4000-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 5000-GETD-MESSAGES.
*-------------------------------------------------------------*
* PURPOSE: CONNECT , OPEN
*          GET
*          CLOSE,    DISCONNECT
*-------------------------------------------------------------*
*
*--MQCONNECT TO QM
     MOVE  'CONNECT' TO   WS-FUNCTION.
     MOVE  SPACES    TO   WS-QM-NAME.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     SET WS-HCONN-VALUE  TO NULL.
     CALL 'MQCONN'  USING  WS-QM-NAME-AREA
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.
*
*--MQOPEN   QUEUE TO QM
     MOVE  'OPEN'    TO   WS-FUNCTION.
     MOVE MQOO-BROWSE       TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE SPACES            TO   MQOD-OBJECTQMGRNAME.
     MOVE WS-DATA-QUEUE     TO   MQOD-OBJECTNAME.
     MOVE MQCC-OK           TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE         TO   WS-RCODE-VALUE.
     SET WS-HOBJ-VALUE   TO   NULL.
     CALL 'MQOPEN'  USING  WS-HCONN-ADDR-AREA
                           WS-Q-NAME-AREA
                           WS-Q-OPEN-OPTIONS
                           WS-HOBJ-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
```

```
      THEN
               GO TO  9900-ERR-DISPLAY.
*
*-----------------------------------------------------------------*
     PERFORM   WS-PROCESS-TIMES   TIMES
*
*--MQGET TO QUEUE TO QM
       MOVE  'GET'     TO   WS-FUNCTION
       MOVE MQCC-OK    TO   WS-CCODE-VALUE
       MOVE MQRC-NONE  TO   WS-RCODE-VALUE
       MOVE 500  TO   WS-BUFFER-LENGTH
       MOVE MQGMO-BROWSE-FIRST   TO  MQGMO-OPTIONS
       ADD  MQGMO-ACCEPT-TRUNCATED-MSG
                              TO  MQGMO-OPTIONS
       MOVE  LOW-VALUES TO  MQMD-MSGID
                            MQMD-CORRELID
*
       CALL 'MQGET'   USING  WS-HCONN-ADDR-AREA
                             WS-HOBJ-ADDR-AREA
                             WS-MSG-DESCRIPTOR
                             WS-GET-OPTIONS
                             WS-BUFFER-L-AREA
                             WS-BUFFER-AREA
                             WS-DATA-L-AREA
                             WS-CCODE-ADDR-AREA
                             WS-RCODE-ADDR-AREA

*-- --CHECK RC
       IF  (WS-CCODE-VALUE   NOT EQUAL ZERO)
        THEN
             IF WS-RCODE-VALUE EQUAL 2079
              THEN
                   SET WS-TRUNCATED-MESSAGES  TO TRUE
              ELSE
             IF WS-RCODE-VALUE EQUAL 2033
              THEN
                   SET WS-END-OF-MESSAGES  TO TRUE
                   GO TO  5000-GET-EOF
              ELSE
                  GO TO  9900-ERR-DISPLAY
             END-IF
             END-IF
       END-IF
*
       MOVE ZERO TO MQMD-REPORT

*--MQGET TO QUEUE TO QM W/ DELETE UNDER CURSOR
       MOVE  'GET'     TO   WS-FUNCTION
       MOVE MQCC-OK    TO   WS-CCODE-VALUE
       MOVE MQRC-NONE  TO   WS-RCODE-VALUE
       MOVE MQGMO-MSG-UNDER-CURSOR   TO  MQGMO-OPTIONS
       MOVE 500  TO   WS-BUFFER-LENGTH
       MOVE  LOW-VALUES TO  MQMD-MSGID
                            MQMD-CORRELID
*
       CALL 'MQGET'   USING  WS-HCONN-ADDR-AREA
                             WS-HOBJ-ADDR-AREA
                             WS-MSG-DESCRIPTOR
                             WS-GET-OPTIONS
                             WS-BUFFER-L-AREA
                             WS-BUFFER-AREA
                             WS-DATA-L-AREA
                             WS-CCODE-ADDR-AREA
                             WS-RCODE-ADDR-AREA
*
       IF  (WS-CCODE-VALUE   NOT EQUAL ZERO)
        THEN
             IF WS-RCODE-VALUE EQUAL 2079
              THEN
                   SET WS-TRUNCATED-MESSAGES  TO TRUE
              ELSE
                  GO TO  9900-ERR-DISPLAY
             END-IF
       END-IF
*

*--ADDED 4/ 5/93
*-- --CHECK IF "NEGATIVE " PROCESSING OPTION SPECIFIED
       IF WS-DATA-SYNC-FLAG  NOT EQUAL  '-'
        THEN
             EXEC  CICS SYNCPOINT
                   END-EXEC
       END-IF
       ADD  +1         TO   WS-COUNT

     END-PERFORM.
*-----------------------------------------------------------------*
 5000-GET-EOF.
*
*--MQCLOSE  QUEUE TO QM
     MOVE  'CLOSE'   TO   WS-FUNCTION.
     MOVE  ZERO      TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQCLOSE' USING  WS-HCONN-ADDR-AREA
                           WS-HOBJ-ADDR-AREA
                           WS-Q-OPEN-OPTIONS
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.

*--MQDISC  FROM QM
     MOVE  'DISCONN' TO   WS-FUNCTION.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQDISC'  USING
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.

*-----------------------------------------------------------------*
 5000-EXIT.
     EXIT.
  EJECT
*-----------------------------------------------------------------*
 6000-PUT-WITH-REPLY.
*-----------------------------------------------------------------*
* PURPOSE: CONNECT , OPEN
*          PUT
*          CLOSE,    DISCONNECT
*-----------------------------------------------------------------*
*
*--MQCONNECT TO QM
     MOVE  'CONNECT' TO   WS-FUNCTION.
     MOVE  SPACES    TO   WS-QM-NAME-CONNECT.
     MOVE MQCC-OK                      TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE                    TO   WS-RCODE-VALUE.
     SET WS-HCONN-VALUE  TO NULL.
     CALL 'MQCONN'  USING  WS-QM-NAME-AREA
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
               GO TO  9900-ERR-DISPLAY.
*

*--MQOPEN   QUEUE FOR REPLY QUEUE
     MOVE  'OPEN'    TO   WS-FUNCTION.
     MOVE MQOO-INPUT-SHARED TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE  MQMT-REQUEST TO  MQMD-MSGTYPE.
     MOVE  SPACES       TO  MQMD-REPLYTOQMGR.
     MOVE  SPACES       TO  MQMD-REPLYTOQ.

     MOVE SPACES            TO   MQOD-OBJECTQMGRNAME.
     MOVE  WS-REPLY-Q       TO   MQOD-OBJECTNAME.
     MOVE MQCC-OK           TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE         TO   WS-RCODE-VALUE.
     SET WS-HOBJ-VALUE-REPLY   TO   NULL.
     CALL 'MQOPEN'  USING  WS-HCONN-ADDR-AREA
                           WS-Q-NAME-AREA
                           WS-Q-OPEN-OPTIONS
                           WS-HOBJ-ADDR-AREA-REPLY
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
```

```
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.


*-----------------------------------------------------------------*
     PERFORM   WS-PROCESS-TIMES   TIMES
*--CHECK IF MUST PUT TIME STAMP ON MESSAGE
       IF WS-PUT-TIMESTAMP
        THEN
             PERFORM 8000-GET-TIME-STAMP
             MOVE WS-TIMESTAMP-VALUE  TO  WS-BUFFER-TS
             ADD WS-MSG-LENGTH  LENGTH OF WS-BUFFER-TS
                                  GIVING WS-BUFFER-LENGTH
             MOVE WS-MSG-AREA         TO  WS-BUFFER-TEXT
        ELSE
             MOVE WS-MSG-LENGTH       TO  WS-BUFFER-LENGTH
             MOVE WS-MSG-AREA         TO  WS-BUFFER-AREA
       END-IF
*
*--MQPUT1   QUEUE TO QM
       MOVE  'PUT1'    TO   WS-FUNCTION
       MOVE  MQMT-REPLY   TO  MQMD-MSGTYPE
       MOVE  SPACES       TO  MQMD-REPLYTOQMGR
       MOVE  WS-REPLY-Q   TO  MQMD-REPLYTOQ

       MOVE MQOO-OUTPUT    TO   MQPMO-OPTIONS
       MOVE SPACES         TO   MQOD-OBJECTQMGRNAME
       MOVE WS-DATA-QUEUE  TO   MQOD-OBJECTNAME
       MOVE MQCC-OK        TO   WS-CCODE-VALUE
       MOVE MQRC-NONE      TO   WS-RCODE-VALUE
       CALL 'MQPUT1'  USING  WS-HCONN-ADDR-AREA
                             WS-Q-NAME-AREA
                             WS-MSG-DESCRIPTOR
                             WS-PUT-OPTIONS
                             WS-BUFFER-L-AREA
                             WS-BUFFER-AREA
                             WS-CCODE-ADDR-AREA
                             WS-RCODE-ADDR-AREA
*
       IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        THEN
                GO TO  9900-ERR-DISPLAY
       END-IF

*--SYNPOINT PUT SO ECHO CAN GET IT
       EXEC  CICS SYNCPOINT
             END-EXEC

*--MQGET TO QUEUE TO QM
       MOVE  'GET'     TO   WS-FUNCTION
       MOVE  MQMT-REQUEST TO  MQMD-MSGTYPE
       MOVE  LOW-VALUES    TO  MQMD-MSGID
                               MQMD-CORRELID
       MOVE  SPACES       TO  MQMD-REPLYTOQMGR

       MOVE  SPACES       TO  MQMD-REPLYTOQ

       MOVE MQCC-OK    TO   WS-CCODE-VALUE
       MOVE MQRC-NONE  TO   WS-RCODE-VALUE
       MOVE 500  TO   WS-BUFFER-LENGTH
       MOVE MQGMO-ACCEPT-TRUNCATED-MSG
                                 TO  MQGMO-OPTIONS
       ADD  MQGMO-WAIT
                 TO   MQGMO-OPTIONS

       MOVE  LOW-VALUES TO  MQMD-MSGID
                            MQMD-CORRELID
*--WAIT 30 SECONDS (IE, 30,000 MILL-SECONDS)
       MOVE +30000  TO   MQGMO-WAITINTERVAL
*
       CALL 'MQGET'   USING  WS-HCONN-ADDR-AREA
                             WS-HOBJ-ADDR-AREA-REPLY
                             WS-MSG-DESCRIPTOR
                             WS-GET-OPTIONS
                             WS-BUFFER-L-AREA
                             WS-BUFFER-AREA
                             WS-DATA-L-AREA
                             WS-CCODE-ADDR-AREA
                             WS-RCODE-ADDR-AREA
*
       IF  (WS-CCODE-VALUE   NOT EQUAL ZERO)
            THEN
                 IF WS-RCODE-VALUE EQUAL 2079
                  THEN
                       SET WS-TRUNCATED-MESSAGES  TO TRUE
                  ELSE
                 IF WS-RCODE-VALUE EQUAL 2033
                  THEN
                       SET WS-END-OF-MESSAGES  TO TRUE
                       GO TO  6000-PUT-WITH-EOF
                  ELSE
                       GO TO  9900-ERR-DISPLAY
                 END-IF
                 END-IF
       END-IF

       ADD  +1         TO   WS-COUNT

*--SYNPOINT PUT SO ECHO CAN GET IT
       EXEC  CICS SYNCPOINT
             END-EXEC


     END-PERFORM.
*-----------------------------------------------------------------*
 6000-PUT-WITH-EOF.

*--MQCLOSE  QUEUE TO QM
     MOVE  'CLOSE'   TO   WS-FUNCTION.
     MOVE  ZERO      TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQCLOSE' USING  WS-HCONN-ADDR-AREA
                           WS-HOBJ-ADDR-AREA-REPLY
                           WS-Q-OPEN-OPTIONS
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.


*--MQDISC  FROM QM
     MOVE  'DISCONN' TO   WS-FUNCTION.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQDISC'  USING
                           WS-HCONN-ADDR-AREA
                           WS-CCODE-ADDR-AREA
                           WS-RCODE-ADDR-AREA.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
      THEN
                GO TO  9900-ERR-DISPLAY.

*-----------------------------------------------------------------*
 6000-EXIT.
     EXIT.
   EJECT
*-----------------------------------------------------------------*
*-- INQ function added.
 6500-INQ-MESSAGES.
*-----------------------------------------------------------------
* PURPOSE: CONNECT , OPEN
*          INQ
*          CLOSE,    DISCONNECT
*-----------------------------------------------------------------
*
*--MQCONNECT TO QM
      MOVE  'CONNECT' TO   WS-FUNCTION.
      MOVE  SPACES    TO   WS-QM-NAME-CONNECT.
      MOVE MQCC-OK                       TO   WS-CCODE-VALUE.
      MOVE MQRC-NONE                     TO   WS-RCODE-VALUE.
      SET WS-HCONN-VALUE  TO NULL.
      CALL 'MQCONN'  USING  WS-QM-NAME-AREA
                            WS-HCONN-ADDR-AREA
                            WS-CCODE-ADDR-AREA
                            WS-RCODE-ADDR-AREA.
*
      IF WS-CCODE-VALUE   NOT EQUAL  ZERO
       THEN
                GO TO  9900-ERR-DISPLAY.
```

```
*
*--MQOPEN   QUEUE TO QM
      MOVE  'OPEN'    TO   WS-FUNCTION.
      MOVE MQOO-INQUIRE   TO   WS-Q-OPEN-OPTIONS-VALUE.
      MOVE SPACES         TO   MQOD-OBJECTQMGRNAME.
      MOVE WS-DATA-QUEUE  TO   MQOD-OBJECTNAME.
      MOVE MQCC-OK        TO   WS-CCODE-VALUE.
      MOVE MQRC-NONE      TO   WS-RCODE-VALUE.
      SET WS-HOBJ-VALUE   TO   NULL.
      CALL 'MQOPEN'  USING  WS-HCONN-ADDR-AREA
                            WS-Q-NAME-AREA
                            WS-Q-OPEN-OPTIONS
                            WS-HOBJ-ADDR-AREA
                            WS-CCODE-ADDR-AREA
                            WS-RCODE-ADDR-AREA.
*
      IF WS-CCODE-VALUE   NOT EQUAL  ZERO
       THEN
                GO TO  9900-ERR-DISPLAY.

*--SETUP INQ PARMS
      MOVE MQCA-Q-DESC   TO MQI-SELECTOR-ENTRY (1).
      MOVE MQCA-Q-NAME   TO MQI-SELECTOR-ENTRY (2).
      MOVE MQIA-INHIBIT-PUT   TO MQI-SELECTOR-ENTRY (3).
      MOVE MQIA-Q-TYPE   TO MQI-SELECTOR-ENTRY (4).
      MOVE MQIA-MAX-MSG-LENGTH   TO MQI-SELECTOR-ENTRY (5).
      MOVE +5      TO WS-SELECTOR-COUNT.
      MOVE LENGTH OF WS-CHAR-ATTR TO
                              WS-CHAR-ATTR-LENGTH
*
*--MQPUT TO QUEUE TO QM
      MOVE  'INQ'     TO   WS-FUNCTION.
      MOVE MQCC-OK    TO   WS-CCODE-VALUE.
      MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
      CALL 'MQINQ'   USING    WS-HCONN-ADDR-AREA
                              WS-HOBJ-ADDR-AREA
                              WS-SELECTOR-COUNT
                              MQI-SELECTOR
                              MQI-IN-ATTR-COUNT
                              MQI-IN-ATTR
                              MQI-CHAR-ATTR-LENGTH
                              MQI-CHAR-ATTR
                              WS-CCODE-ADDR-AREA
                              WS-RCODE-ADDR-AREA.
*
      IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        THEN
              GO TO  9900-ERR-DISPLAY
      ELSE
         STRING 'NAME: ' WS-A-Q-N  DELIMITED BY SIZE
           INTO WS-OK-MSG-7
         END-STRING
         STRING 'DESC: ' WS-A-DESC DELIMITED BY SIZE
           INTO WS-OK-MSG-8
         END-STRING
         MOVE MQI-IN-ATTR-ENTRY(1) TO WS-I-INHIBIT
         MOVE MQI-IN-ATTR-ENTRY(2) TO WS-I-TYPE
         MOVE MQI-IN-ATTR-ENTRY(3) TO WS-I-MAXL
         MOVE WS-INQ-DETS TO WS-OK-MSG-9

      END-IF
*
*--MQCLOSE  QUEUE TO QM
      MOVE  'CLOSE'   TO   WS-FUNCTION.
      MOVE  ZERO      TO   WS-Q-OPEN-OPTIONS-VALUE.
      MOVE MQCC-OK    TO   WS-CCODE-VALUE.
      MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
      CALL 'MQCLOSE' USING  WS-HCONN-ADDR-AREA
                            WS-HOBJ-ADDR-AREA
                            WS-Q-OPEN-OPTIONS
                            WS-CCODE-ADDR-AREA
                            WS-RCODE-ADDR-AREA.
*
      IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        THEN
                GO TO  9900-ERR-DISPLAY.

*--MQDISC  FROM QM
      MOVE  'DISCONN' TO   WS-FUNCTION.
      MOVE MQCC-OK    TO   WS-CCODE-VALUE.
      MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
      CALL 'MQDISC'  USING
                            WS-HCONN-ADDR-AREA
                            WS-CCODE-ADDR-AREA
                            WS-RCODE-ADDR-AREA.
*
       IF WS-CCODE-VALUE   NOT EQUAL  ZERO
         THEN
                 GO TO  9900-ERR-DISPLAY.

*-------------------------------------------------------------*
 6500-EXIT.
     EXIT.
*-------------------------------------------------------------*
 7000-SEND-TOTALS.
*-------------------------------------------------------------*
*--GET DURACTION TIME
     EXEC CICS ASKTIME
               ABSTIME(WS-ABSTIME2)
          END-EXEC.

     SUBTRACT WS-ABSTIME  FROM WS-ABSTIME2.
     EXEC CICS FORMATTIME
               ABSTIME (WS-ABSTIME2)
               TIME  (WS-DURATION-SECS)
               TIMESEP(':')
          END-EXEC.
*
     MOVE  WS-COUNT          TO   WS-OK-MESSAGES.
     MOVE  WS-DURATION-SECS  TO   WS-OK-TIME.
     MOVE  WS-DATA-QUEUE     TO   WS-OK-QUEUE.
     IF  WS-PUT-WITH-REPLY
      THEN
         MOVE  WS-REPLY-Q        TO  WS-OK-QUEUE-REPLY
         MOVE WS-OK-STATS-LINE-2 TO  WS-OK-MSG-2.

*-- --MOVE REST
     MOVE WS-OK-STATS-LINE-1 TO  WS-OK-MSG-1.
     MOVE WS-OK-STATS-LINE-3 TO  WS-OK-MSG-3.
     MOVE WS-OK-STATS-LINE-4 TO  WS-OK-MSG-4.
*-- --CHECK IF ANY ERRORS
     IF WS-END-OF-MESSAGES
      THEN
             MOVE 'NO MORE MESSAGES'    TO WS-OK-MSG-5.
*
     IF WS-TRUNCATED-MESSAGES
      THEN
             MOVE 'TRUNCATED MESSAGES'  TO WS-OK-MSG-6.
*

     IF WS-ERR-MSG
        EXEC CICS SEND
                  FROM   (WS-ALL-MSG)
                  LENGTH (LENGTH OF WS-ALL-MSG)
                  ERASE
        END-EXEC
      ELSE
        EXEC CICS SEND
                  FROM   (WS-OK-MSG)
                  LENGTH (LENGTH OF WS-OK-MSG)
                  ERASE
        END-EXEC.

*-------------------------------------------------------------*
   EJECT
*-------------------------------------------------------------*
 8000-GET-TIME-STAMP.
*-------------------------------------------------------------*
     EXEC  CICS ASKTIME
                ABSTIME(WS-ABSTIME)
           END-EXEC.
*
     EXEC  CICS FORMATTIME
                ABSTIME(WS-ABSTIME)
                YYMMDD (WS-DATE-YYMMDD)
           END-EXEC.

*
     MOVE  EIBTIME   TO   WS-TIME-9.
*
     MOVE WS-DATE-YYMMDD TO   WS-TIMESTAMP-DATE.
     MOVE WS-TIME-HHMMSS TO   WS-TIMESTAMP-TIME.

*-------------------------------------------------------------*
```

```
   EJECT                                                                *
*-------------------------------------------------------------*     *
 9900-ERR-DISPLAY.                                                    *
*-------------------------------------------------------------*     *
*--ERROR IN "MQ" VERB                                                 *
*                                                                    *
     SET WS-ERR-MSG  TO TRUE.                                        *
     MOVE WS-CCODE-VALUE TO  WS-ERR-DISPLAY-CCODE.                   *
     MOVE WS-RCODE-VALUE TO  WS-ERR-DISPLAY-RCODE.                   *
     MOVE WS-ERR-DISPLAY TO  WS-ERR-LINES.                           *
     GO TO  0000-SEND-TOTALS.                                        *
     GO TO  0000-RETURN.
```

Sample program TTPTST3.Z

This program is a test facility for putting and getting messages, by starting the sample transaction TST2 (program ID TTPTST2). It can be invoked:

- By passing data, using a CICS “START” command.
- By the terminal input “TST3”, which produces the screen requesting more input shown in Figure 46.

```
07/10/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
15:50:37             Test System Programs 3 - STARTS                CIC1
                                                                    A001

                    Async TASK Information
        Number of tasks....:


                    Message Processing Information
        Number of messages.:
        Function...........:          P=PUT, or G=GET

        PUT QUEUE name.....:
        PUT message size...:
        PUT message .......:
        PUT TimeStamp......:       Y=Yes, N=No



ENTER START VALUES.

    ENTER = Process              PF3 = Quit
```

Figure 46. Test System Programs 3 - start

On this screen the fields are:

Number of tasks	The number of asynchronous tasks (TST2 transactions).
Number of messages	The number of messages to be sent and received.
Function	Specify “P” to put message, “G” to get message.
PUT queue name	The queue name to be PUT or GET.
PUT message size	For the PUT function only, to specify the size of the message. If the PUT timestamp option is selected, the message is 16 characters larger than the PUT message size.
PUT message	The content of the message.
PUT TimeStamp	For the PUT function only, to put a time stamp in the message in the format `YYMMDDHHMMSS`. If you specify this option, the actual message size is 16 characters larger than the size specified in the PUT message size.

```
 IDENTIFICATION DIVISION.
 PROGRAM-ID.    TTPTST3.
 DATE-COMPILED.
*-------------------------------------------------------------*
*
* SUMMARY CHANGES:                  TRACE POINT CODE: 109
*-------------------------------------------------------------
*
* CHANGE  DATE       PGM   COMMENT
*
*
*                                                             *
*-------------------------------------------------------------*
*                                                             *
*  TEST PROGRAMS TO START ASYNC TASKS                         *
*                                                             *
*              IBM MQI SYSTEM                                 *
*                                                             *
*-------------------------------------------------------------*
* PURPOSE: START ASYNC TASK     DEFINITION                    *
*-------------------------------------------------------------*
*                                                             *
* COPYBOOKS:  TTMTST3  - COBOL MAP SYMBOLIC                   *
*             MQIMTP   - MASTER TERMINAL COMMAREA             *
*             TTITST2  - TTPTST2 COMMAREA FOR STARTS          *
*             MQIERRWS - ERROR VALUES                         *
*             MQIERRCD - ERROR CODE                           *
*             TTETST3  - ERROR MESSAGES                       *
*             MQIENV   - ENVIRONMENT                          *
*             DFHAID   - 3270 AID DEFINITION                  *
*             DFHBMSCA - 3270 BMS CONTROL CHARACTERS          *
*                                                             *
* TRANSACTION:   TST3  - MASTER TERMINAL  (UPDATE )           *
*                                                             *
* MAPSET:        TTMTST3                                      *
* MAPS:          MAIN    - MAIN                               *
*                                                             *
* SUMMARY CHANGES:                                            *
*                                                             *
*-------------------------------------------------------------*
     EJECT
*-------------------------------------------------------------*
 ENVIRONMENT DIVISION.
 DATA DIVISION.
 WORKING-STORAGE SECTION.
*-------------------------------------------------------------*
*    COPY COPYRWS.
*-------------------------------------------------------------*
* COPYRIGHT WORKING STORAGE  FOR COBOL MODULES                 *
*-------------------------------------------------------------*
 01   FILLER.
      05 FILLER                  PIC X(72) VALUE
      'Licensed Materials - Property of IBM'.
      05 FILLER                  PIC X(72) VALUE SPACES.
      05 FILLER                  PIC X(72) VALUE
      '5686-A06  '.
      05 FILLER                  PIC X(72) VALUE SPACES.
      05 FILLER                  PIC X(72) VALUE
      '(C) Copyright IBM Corp. 1998            All Rights Reserve
-     'd'.
      05 FILLER                  PIC X(72) VALUE SPACES.
      05 FILLER                  PIC X(72) VALUE
      'US Government Users Restricted Rights - Use, duplication or
-     '  '.
      05 FILLER                  PIC X(72) VALUE
      'disclosure restricted by GSA ADP Schedule Contract with IBM
-     ' Corp.'.
*-------------------------------------------------------------*
*Debugging eyecatcher information for start of WORKING-STORAGE.
*-------------------------------------------------------------*
 01  WS-RWS-PROGRAM-NAME1        PIC X(8).
 01  FILLER                      PIC X(16) VALUE
      ' Version V2.1.0'.
 01  WS-RWS-WHEN-COMPILED        PIC X(21).
 01  FILLER                      PIC X(7)  VALUE '========'.
*-------------------------------------------------------------*


 01  WS-VALUES.
     05  WS-CONFIGURATION-ADDRESS USAGE IS POINTER VALUE NULL.
     05  WS-REC-SIZE             PIC S9(4) COMP VALUE ZERO.
     05  WS-SS-STARTS            PIC  9(4)      VALUE ZERO.
     05  WS-NUM                  PIC  9(8)      VALUE ZERO.
     05  WS-NUM4                 PIC  9(4)      VALUE ZERO.

     05  WS-APPLID               PIC X(8)   VALUE SPACES.
     05  WS-SYSID                PIC X(4)   VALUE SPACES.
     05  WS-STARTCD              PIC XX     VALUE SPACES.
       88 WS-STARTED                        VALUE 'SD'.

     05  WS-ABSTIME                PIC S9(15) COMP-3.
     05  WS-DATE-CCYYMMDD.
        10  WS-DATE-CC             PIC  99  VALUE ZERO.
        10  WS-DATE-YYMMDD.
          12  WS-DATE-YY           PIC  99  VALUE ZERO.
          12  WS-DATE-MM           PIC  99  VALUE ZERO.
          12  WS-DATE-DD           PIC  99  VALUE ZERO.
          12  FILLER               PIC  XX  VALUE ZERO.

     05  WS-UNPACK-TIME-9          PIC 9(07) VALUE ZEROES.
     05  WS-UNPACK-TIME-X REDEFINES WS-UNPACK-TIME-9.
         10  FILLER                PIC  X(01).
         10  WS-TIME-HHMMSS.
            12  WS-TIME-HH         PIC  X(02).
            12  WS-TIME-MM         PIC  X(02).
            12  WS-TIME-SS         PIC  X(02).
     05  WS-FORMATTED-TIME.
         10  WS-FORMAT-TIME-HH     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE ':'.
         10  WS-FORMAT-TIME-MM     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE ':'.
         10  WS-FORMAT-TIME-SS     PIC  X(02) VALUE SPACES.
     05  WS-FORMATTED-DATE.
         10  WS-FORMAT-DATE-MM     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE '/'.
         10  WS-FORMAT-DATE-DD     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE '/'.
         10  WS-FORMAT-DATE-CC     PIC  X(02) VALUE SPACES.
         10  WS-FORMAT-DATE-YY     PIC  X(02) VALUE SPACES.
     05  WS-TRAN-ID                PIC  X(4)  VALUE SPACES.
     05  WS-EDIT-ERR-FLAG          PIC  X(1) VALUE 'N'.
      88 WS-EDIT-ERR                        VALUE 'Y'.

     05  WS-RECORD-FLAG            PIC  X      VALUE SPACES.
      88 WS-RECORD-FOUND           VALUE 'T'.
      88 WS-RECORD-NOT-FOUND       VALUE 'F'.

     05  WS-ERROR-MESSAGE          PIC  X(79)  VALUE SPACES.
     05  WS-ERR-COUNT              PIC S9(4) COMP VALUE ZEROS.
     05  WS-ERR-MAX                PIC S9(4) COMP VALUE +20.
     05  WS-ERR-MESSAGE  VALUE SPACES.
       10  WS-ERR-MSG              PIC  X(79) OCCURS 20 TIMES.

*-------------------------------------------------------------*
   EJECT
*-------------------------------------------------------------*
     COPY DFHAID.
   EJECT
*-------------------------------------------------------------*
     COPY DFHBMSCA.

   EJECT
*-------------------------------------------------------------*
* BMS MAP
*-------------------------------------------------------------*
     COPY TTMTST3.
*-------------------------------------------------------------*
* TST2 COMMAREA
*-------------------------------------------------------------*
 01  WS-TST2-COMMAREA.
*    COPY TTITST2.
*-------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: TTITST2   ***          - BEGIN - *
*-------------------------------------------------------------*
*   3/ 4/93   REV:                                            *
*-------------------------------------------------------------*
*  MQPINIT1 COMMAREA                                          *
*-------------------------------------------------------------*

     05  TST2-PASSED-INFO.
         10 TST2-FUNCTION           PIC  X(4) VALUE 'PUT'.
           88 TST2-FUNCT-PUT                 VALUE 'PUT'.
           88 TST2-FUNCT-GET                 VALUE 'GET'.

         10 TST2-PUT-NUM-MSG        PIC S9(4) COMP VALUE ZERO.
```

```
         10 TST2-PUT-QUEUE-NAME      PIC  X(48) VALUE SPACES.
         10 TST2-PUT-MSG-SIZE        PIC S9(4) COMP VALUE ZERO.
         10 TST2-PUT-MSG             PIC  X(48) VALUE SPACES.
         10 TST2-PUT-MSG-TIMESTAMP   PIC  X     VALUE SPACES.
          88 TST2-PUT-MSG-W-TIMESTAMP           VALUE 'Y'.

*-----------------------------------------------------------------*
* - END -        ***  COPYBOOK: TTITST2   ***           - END - *
*-----------------------------------------------------------------*
     EJECT
*-----------------------------------------------------------------*
* ENVIRNOMENT VALUES
*-----------------------------------------------------------------*
 01  FILLER.
*    COPY MQICENV.
*-----------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQICENV   ***          - BEGIN - *
*-----------------------------------------------------------------*
*   ENVIRONMENT VALUE            - SYSTEM   (ENV)                 *
*-----------------------------------------------------------------*

     02 ENV-DEFINITION.
     03 ENV-DATA-FOR-SYSTEM.
        05 ENV-PRODUCT-INSTALLED       PIC  X(4) VALUE 'MQI '.
          88  ENV-PRODUCT-MQM         VALUE 'MQM '.

        05 ENV-PRODUCT-RUNTIME         PIC  X(4).
          88  ENV-PRODUCT-RT-MQM      VALUE 'MQM '.

        05 ENV-LANG-INFO.
           10 ENV-LANGUAGE-FILE-CODE   PIC  99 VALUE 01.
           10 ENV-LANGUAGE             PIC  X(24)
                                      VALUE 'ENGLISH'.
        05 ENV-DATE-FORMAT             PIC  99 VALUE 01.
          88 ENV-DATE-MMDDYY                  VALUE 01.
          88 ENV-DATE-YYMMDD                  VALUE 02.
          88 ENV-DATE-YYDDMM                  VALUE 03.
          88 ENV-DATE-YYDDD                   VALUE 04.
          88 ENV-DATE-DDMMYY                  VALUE 05.


     03 ENV-DATA-FOR-TRAN.

        05 ENV-MASTER-TERMINAL-TRAN.
           10 ENV-MT-MASTER-TASK-ID    PIC  X(4) VALUE 'MQMT'.
           10 ENV-MT-CONFIG-TASK-ID    PIC  X(4) VALUE 'MQMC'.
           10 ENV-MT-MONITOR-TASK-ID   PIC  X(4) VALUE 'MQMM'.
           10 ENV-MT-OPER-TASK-ID      PIC  X(4) VALUE 'MQMO'.
           10 ENV-MT-DISP-TASK-ID      PIC  X(4) VALUE 'MQBQ'.
           10 ENV-MT-QUEUE-TASK-ID     PIC  X(4) VALUE 'MQMQ'.
           10 ENV-MT-QUEUEI-TASK-ID    PIC  X(4) VALUE 'MQDQ'.
           10 ENV-MT-COM-TASK-ID       PIC  X(4) VALUE 'MQMH'.
           10 ENV-MT-COMI-TASK-ID      PIC  X(4) VALUE 'MQDH'.
           10 ENV-MT-SYS-TASK-ID       PIC  X(4) VALUE 'MQMS'.
           10 ENV-MT-SYSI-TASK-ID      PIC  X(4) VALUE 'MQDS'.
           10 ENV-MT-MONQ-TASK-ID      PIC  X(4) VALUE 'MQQM'.
           10 ENV-MT-MONC-TASK-ID      PIC  X(4) VALUE 'MQCM'.
           10 ENV-MT-SS-TASK-ID        PIC  X(4) VALUE 'MQMA'.
           10 ENV-MT-SC-TASK-ID        PIC  X(4) VALUE 'MQMB'.
           10 ENV-MT-SI-TASK-ID        PIC  X(4) VALUE 'MQMI'.
           10 ENV-MT-SR-TASK-ID        PIC  X(4) VALUE 'MQMR'.
           10 ENV-MT-SD-TASK-ID        PIC  X(4) VALUE 'MQMD'.
           10 FILLER                   PIC  X(4) VALUE SPACES.
           10 FILLER                   PIC  X(4) VALUE SPACES.
           10 FILLER                   PIC  X(4) VALUE SPACES.

        05 ENV-INTERNAL-ITEMS-TRAN.
           10 ENV-II-MONITOR           PIC  X(4) VALUE 'MQSM'.
           10 ENV-II-M-RECOVERY        PIC  X(4) VALUE 'MQSR'.
           10 ENV-II-Q-RECOVERY        PIC  X(4) VALUE 'MQSQ'.
           10 ENV-II-START-STOP        PIC  X(4) VALUE 'MQSS'.
           10 ENV-II-TRAN-AIP2         PIC  X(4) VALUE 'MQ02'.
           10 ENV-II-TRAN-COM-CHECKP   PIC  X(4) VALUE 'MQCP'.
           10 ENV-II-TRAN-QUE-DELETE   PIC  X(4) VALUE 'MQQD'.
           10 ENV-II-TRAN-QUE-DEL-ALL  PIC  X(4) VALUE 'MQQA'.
           10 ENV-II-TRAN-REORG-QUE    PIC  X(4) VALUE 'MQRG'.
           10 ENV-II-TRAN-TCPIP        PIC  X(4) VALUE 'MQTL'.
           10 FILLER                   PIC  X(4) VALUE SPACES.


     03 ENV-DATA-FOR-PROGRAMS.

        05 ENV-MASTER-TERMINAL-PROGRAMS.
           10 ENV-MT-MASTER-PROGRAM    PIC  X(8) VALUE 'MQPMTP'.
           10 ENV-MT-CONFIG-PROGRAM    PIC  X(8) VALUE 'MQPMCFG'.
           10 ENV-MT-MONITOR-PROGRAM   PIC  X(8) VALUE 'MQPMMON'.
           10 ENV-MT-OPER-PROGRAM      PIC  X(8) VALUE 'MQPMOPR'.
           10 ENV-MT-DISP-PROGRAM      PIC  X(8) VALUE 'MQPDISP'.
           10 ENV-MT-QUEUE-PROGRAM     PIC  X(8) VALUE 'MQPMQUE'.
           10 ENV-MT-QUEUEI-PROGRAM    PIC  X(8) VALUE 'MQPMQUE'.
           10 ENV-MT-COM-PROGRAM       PIC  X(8) VALUE 'MQPMCOM'.
           10 ENV-MT-COMI-PROGRAM      PIC  X(8) VALUE 'MQPMCOM'.
           10 ENV-MT-SYS-PROGRAM       PIC  X(8) VALUE 'MQPMSYS'.
           10 ENV-MT-SYSI-PROGRAM      PIC  X(8) VALUE 'MQPMSYS'.
           10 ENV-MT-MONQ-PROGRAM      PIC  X(8) VALUE 'MQPMMOQ'.
           10 ENV-MT-MONC-PROGRAM      PIC  X(8) VALUE 'MQPMMOC'.
           10 ENV-MT-SS-PROGRAM        PIC  X(8) VALUE 'MQPMSS'.
           10 ENV-MT-SC-PROGRAM        PIC  X(8) VALUE 'MQPMSC'.
           10 ENV-MT-SI-PROGRAM        PIC  X(8) VALUE 'MQPMSI'.
           10 ENV-MT-SR-PROGRAM        PIC  X(8) VALUE 'MQPMMSN'.
           10 ENV-MT-SD-PROGRAM        PIC  X(8) VALUE 'MQPMDEL'.
           10 ENV-MT-CMD-PROGRAM       PIC  X(8) VALUE 'MQPCMD'.
           10 FILLER                   PIC  X(8) VALUE SPACES.
           10 FILLER                   PIC  X(8) VALUE SPACES.

        05 ENV-INTERNAL-ITEMS-PROGRAMS.
           10 ENV-II-LINK-ERROR        PIC  X(8) VALUE 'MQPERR  '.
           10 ENV-II-LINK-EIB1         PIC  X(8) VALUE 'MQPEIB1 '.
           10 ENV-II-LINK-AIP0         PIC  X(8) VALUE 'MQPAIP0 '.
           10 ENV-II-LINK-AIP1         PIC  X(8) VALUE 'MQPAIP1 '.
           10 ENV-II-LINK-AIP2         PIC  X(8) VALUE 'MQPAIP2 '.

           10 ENV-II-LINK-ECHO         PIC  X(8) VALUE 'MQPECHO '.
           10 ENV-II-LINK-FINDQ        PIC  X(8) VALUE 'MQPFINDQ'.
           10 ENV-II-LINK-QUE1         PIC  X(8) VALUE 'MQPQUE1 '.
           10 ENV-II-LINK-QUE2         PIC  X(8) VALUE 'MQPQUE2 '.
           10 ENV-II-LINK-INIT1        PIC  X(8) VALUE 'MQPINIT1'.
           10 ENV-II-LINK-INIT2        PIC  X(8) VALUE 'MQPINIT2'.
           10 ENV-II-LINK-SSQ          PIC  X(8) VALUE 'MQPSSQ  '.
           10 ENV-II-LINK-SCHK         PIC  X(8) VALUE 'MQPSCHK '.
           10 ENV-II-LINK-SREC         PIC  X(8) VALUE 'MQPSREC '.
           10 ENV-II-LINK-QRECOVERY    PIC  X(8) VALUE 'MQPQREC '.
           10 ENV-II-LINK-SENDER       PIC  X(8) VALUE 'MQPSEND '.
           10 ENV-II-LINK-RECIEVER     PIC  X(8) VALUE 'MQPRECV '.
           10 ENV-II-LINK-COM-CHECKP   PIC  X(8) VALUE 'MQPCCKPT'.
           10 ENV-II-LINK-QUE-DELETE   PIC  X(8) VALUE 'MQPQDEL'.
           10 ENV-II-LINK-SET-MAP      PIC  X(8) VALUE 'MQPSMAP'.
           10 ENV-II-LINK-MQPVSAM      PIC  X(8) VALUE 'MQPVSAM'.
     *-- This module is no longer used. As a dirty fix the area has
     *-- been reused to hold the code page information.
     *          10 ENV-II-LINK-LU21         PIC  X(8) VALUE 'MQPLU21'.
           10 ENV-CODE-PAGE            PIC S9(4) COMP.
           10 ENV-TCPIP-PORT-NUMBER    PIC 9(8)  COMP.
           10 FILLER                   PIC XX.

           10 ENV-II-LINK-REPORT       PIC  X(8) VALUE 'MQPRPRT'.
           10 ENV-II-LINK-MQPCMD       PIC  X(8) VALUE 'MQPCMD'.
           10 ENV-II-LINK-MQPCLNT      PIC  X(8) VALUE 'MQPEXT1'.

     03 ENV-DATA-FOR-MAPS.

        05 ENV-MASTER-TERMINAL-MAPS.
           10 ENV-MT-MASTER-MAPSCREEN  PIC  X(8) VALUE 'MQMMTP'.
           10 ENV-MT-CONFIG-MAPSCREEN  PIC  X(8) VALUE 'MQMMCFG'.
           10 ENV-MT-MONITOR-MAPSCREEN PIC  X(8) VALUE 'MQMMMON'.
           10 ENV-MT-OPER-MAPSCREEN    PIC  X(8) VALUE 'MQMMOPR'.
           10 ENV-MT-DISP-MAPSCREEN    PIC  X(8) VALUE 'MQMDISP'.
           10 ENV-MT-QUEUE-MAPSCREEN   PIC  X(8) VALUE 'MQMMQUE'.
           10 ENV-MT-QUEUEI-MAPSCREEN  PIC  X(8) VALUE 'MQMMQUE'.
           10 ENV-MT-COM-MAPSCREEN     PIC  X(8) VALUE 'MQMMCOM'.
           10 ENV-MT-COMI-MAPSCREEN    PIC  X(8) VALUE 'MQMMCOM'.
           10 ENV-MT-SYS-MAPSCREEN     PIC  X(8) VALUE 'MQMMSYS'.
           10 ENV-MT-SYSI-MAPSCREEN    PIC  X(8) VALUE 'MQMMSYS'.
           10 ENV-MT-MONQ-MAPSCREEN    PIC  X(8) VALUE 'MQMMMOQ'.
           10 ENV-MT-MONC-MAPSCREEN    PIC  X(8) VALUE 'MQMMMOC'.
           10 ENV-MT-SS-MAPSCREEN      PIC  X(8) VALUE 'MQMMSS'.
           10 ENV-MT-SC-MAPSCREEN      PIC  X(8) VALUE 'MQMMSC'.
           10 ENV-MT-SI-MAPSCREEN      PIC  X(8) VALUE 'MQMMSI'.
           10 ENV-MT-SR-MAPSCREEN      PIC  X(8) VALUE 'MQMMMSN'.
           10 ENV-MT-SD-MAPSCREEN      PIC  X(8) VALUE 'MQMMDEL'.
           10 FILLER                   PIC  X(8) VALUE SPACES.
           10 FILLER                   PIC  X(8) VALUE SPACES.
           10 FILLER                   PIC  X(8) VALUE SPACES.
```

```
     03 ENV-DATA-FOR-CONSTANTS.

        05 ENV-CONFIG-DDNAME           PIC  X(8) VALUE 'MQFCNFG'.
        05 ENV-SYSTEM-NUMBER           PIC  9(4) VALUE 1.
        05 ENV-MASTER-TERMINAL-CONS.
           10 ENV-MT-TITLE             PIC  X(40) VALUE
        '   IBM MQSeries for VSE/ESA Version 2 '.

        05 ENV-INTERNAL-ITEMS-CONS.
           10 ENV-II-ERROR-TD          PIC  X(4) VALUE 'MQER'.
           10 ENV-II-ERROR-CSMT        PIC  X(4) VALUE 'CSMT'.
           10 ENV-II-SYSTEM-ANCHOR     PIC  X(8) VALUE 'MQTAQM'.
           10 ENV-II-SYSTEM-PREFIX     PIC  X(4) VALUE 'MQI '.
           10 ENV-II-DUMPCODE          PIC  X(4) VALUE 'MQ??'.
           10 ENV-II-ENQ-INIT1         PIC  X(8) VALUE 'MQPINIT1'.
           10 ENV-II-SYSTEM-ENVIR      PIC  X(8) VALUE 'MQTENV  '.
           10 ENV-IT-UN-INIT-MSG       PIC  X(80) VALUE
       'MQI900000: MQSERIES VSE ENVIRONMENT NOT INITIALIZED.'.
           10 FILLER                   PIC  X(80) VALUE SPACES.

*----------------------------------------------------------------*
* - END   -      ***  COPYBOOK: MQICENV   ***          - END   - *
*----------------------------------------------------------------*
     EJECT
*----------------------------------------------------------------*
* FINDQ COMMAREA
*----------------------------------------------------------------*
 01  WS-FINDQ.
*    COPY MQIFINDQ.
*----------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQIFINDQ  ***          - BEGIN - *
*----------------------------------------------------------------*
*   9/ 1/93   REV:                                               *
*----------------------------------------------------------------*
*  FIND QUEUE    CALL PARAMETERS.                                *
*----------------------------------------------------------------*
     02  FINDQ-CALL-PARAMETERS.

*--PASSED INFO...
     03  FINDQ-PASSED-PARAMETERS.
         05  FINDQ-CALL-TYPE         PIC  X     VALUE SPACES.
             88  FINDQ-QUEUE-LOOKUP         VALUE 'Q'.
             88  FINDQ-SYSTEM-STATUS-ONLY   VALUE 'S'.

         05  FILLER                  PIC  X     VALUE SPACES.
         05  FINDQ-CALL-SYSTEM-NUM   PIC  99    VALUE ZERO.

*-- --QUEUE INFO
         05  FINDQ-QM-QUEUE-NAME.
           10 FINDQ-QM-NAME          PIC  X(48) VALUE SPACES.
           10 FINDQ-QUEUE-NAME       PIC  X(48) VALUE SPACES.

*--RETURN INFO
*-- --SYSTEM RETURN (ALWAYS RETURNED)
     03  FINDQ-RETURNED-PARAMETERS.
         05  FINDQ-SYSTEM-CODE       PIC  X     VALUE SPACES.
             88  FINDQ-SYSTEM-ACTIVE        VALUE 'A'.
             88  FINDQ-SYSTEM-INACTIVE      VALUE 'I'.
             88  FINDQ-SYSTEM-UN-INIT       VALUE SPACE.

         05  FILLER                  PIC  XXX   VALUE SPACES.
*-- -- --SYSTEM INFO (NOT SET IF SYSTEM UN-INIT)
         05 FINDQ-DEFAULT-QM-INFO.
           10 FINDQ-DEFAULT-NAME              PIC  X(48).
           10 FINDQ-QM-DESCRIPTION            PIC  X(64).
           10 FINDQ-DEFAULT-MAX-MSG           PIC S9(8) COMP.
           10 FINDQ-DEFAULT-MAX-CONN          PIC S9(8) COMP.
           10 FINDQ-DEFAULT-MAX-HANDLES       PIC S9(8) COMP.
           10 FINDQ-DEFAULT-MAX-WAIT-MON      PIC S9(8) COMP.
           10 FINDQ-DEFAULT-MAX-WAIT-REC      PIC S9(8) COMP.
           10 FINDQ-DEFAULT-MAX-REC-TASKS     PIC S9(4) COMP.
           10 FILLER                          PIC  XX.
           10 FINDQ-CONFIG-FILE               PIC  X(8).
             88 FINDQ-CONFIG-FILE-OK     VALUE 'MQFCNFG'.

           10 FINDQ-DEADLETTER-NAME           PIC  X(48).
           10 FINDQ-LOG-NAME                  PIC  X(48).
           10 FINDQ-AUDIT-NAME                PIC  X(48).
           10 FINDQ-MONITOR-NAME              PIC  X(48).
           10 FINDQ-ERROR-NAME                PIC  X(48).
           10 FINDQ-MONITOR-SYS-FLAG          PIC  X.
             88 FINDQ-MONITOR-ON         VALUE 'Y'.
           10 FINDQ-ERROR-TO-CSMT-FLAG        PIC  X.
             88 FINDQ-ERROR-TO-CSMT      VALUE 'Y', 'B'.
             88 FINDQ-ERROR-TO-BOTH      VALUE 'B'.

           10 FILLER                          PIC  XX.

*-- --QUEUE  RETURN (ONLY RETURNED IF QUEUE REQUESTED)
         05  FINDQ-QUEUE-CODE        PIC  X     VALUE SPACES.
             88  FINDQ-QUEUE-OK             VALUE  'Y'.
             88  FINDQ-QUEUE-NOT-FOUND      VALUE SPACES.

         05  FILLER                  PIC  XXX   VALUE SPACES.

*-- -- --ACTUAL MQI RETURN CODE
         05  FINDQ-QUEUE-ERROR-CODE  PIC S9(8) COMP VALUE ZERO.

*-- -- --QUEUE INFO (NOT RETURNED IF QUEUE NOT-FOUND)
         05  FINDQ-RESOLVED-QM-QUEUE-NAME.
           10 FINDQ-R-QM-NAME        PIC  X(48) VALUE SPACES.
           10 FINDQ-R-QUEUE-NAME     PIC  X(48) VALUE SPACES.

         05  FINDQ-RESOLVED-LOCAL-NAME
                                     PIC X(48) VALUE SPACES.
         05  FINDQ-QUEUE-DRQ-ITEM    PIC S9(4) COMP VALUE ZERO.
         05  FILLER                  PIC  XX    VALUE SPACES.

*-- -- -- --STATUS FROM DRQ
         05  FINDQ-RESOLVE-STATUS.
           10 FINDQ-R-INBOUND-STAT   PIC  XX    VALUE SPACES.
           10 FINDQ-R-OUTBOUND-STAT  PIC  XX    VALUE SPACES.

*-- -- -- --ORIGINAL QUEUE VALUES
         05 FINDQ-QUEUE-DATA.
           10 FINDQ-ADDED-DATA.
              15 FINDQ-ADDED-TIME            PIC  X(6).
              15 FILLER                      PIC  XX.
              15 FINDQ-ADDED-DATE            PIC  X(8).
              15 FINDQ-ADDED-TERMID          PIC  X(8).
              15 FINDQ-ADDED-USERID          PIC  X(3).
              15 FILLER                      PIC  X.

           10 FINDQ-DESCRIPTION              PIC  X(64).
           10 FINDQ-TYPE                     PIC X.
             88 FINDQ-QUEUE-DEFINITION                VALUE
                                  'L', 'X', 'A', 'R', 'M'.
             88 FINDQ-LOCAL-Q-ENTRY                   VALUE 'L'.
             88 FINDQ-LOCAL-AIX-Q                     VALUE 'X'.
             88 FINDQ-ALIAS-Q-ENTRY                   VALUE 'A'.
             88 FINDQ-REMOTE-Q-ENTRY                  VALUE 'R'.
             88 FINDQ-MODEL-Q-ENTRY                   VALUE 'M'.

           10 FINDQ-TYPE-ALIAS               PIC X.
             88 FINDQ-ALIAS-QUEUE                     VALUE 'Q'.
             88 FINDQ-ALIAS-MANAGER                   VALUE 'M'.
             88 FINDQ-ALIAS-REPLY                     VALUE 'R'.

           10 FILLER                         PIC XX.

           10 FINDQ-ATTR-FLAGS.
              15 FINDQ-INHIBIT-PUT-FLAG      PIC X.
               88 FINDQ-INHIBIT-PUT                   VALUE 'Y'.
              15 FINDQ-INHIBIT-GET-FLAG      PIC X.
               88 FINDQ-INHIBIT-GET                   VALUE 'Y'.

              15 FINDQ-PERSIST-FLAG          PIC X.
               88 FINDQ-PERSIST-DEFAULT               VALUE 'Y'.

           10 FILLER                         PIC X.

         05 FINDQ-LOCAL-INFO.
           10 FINDQ-DEFINITION-FLAG     PIC  X.
             88 FINDQ-DEF-PERM           VALUE 'Y'.
             88 FINDQ-DEF-NOT-PERM       VALUE 'N'.

           10 FINDQ-USAGE-MODE-FLAG     PIC  X.
             88 FINDQ-U-MODE-NORMAL      VALUE 'N'.
             88 FINDQ-U-MODE-TRANSM      VALUE 'Y'.

           10 FINDQ-SHAREABLE-FLAG      PIC  X.
             88 FINDQ-SHARE-QUEUE        VALUE 'Y'.
             88 FINDQ-NON-SHARE-QUEUE    VALUE 'N'.
```

```
          10 FINDQ-TRIGGER-TYPE       PIC  X.
           88 FINDQ-NO-TRIGGER          VALUE SPACE.
           88 FINDQ-TRIGGER-ON          VALUE 'Y'.

*-----------------------------------------------------------------*
* - END -        ***  COPYBOOK: MQIFINDQ  ***           - END - *
*-----------------------------------------------------------------*

     EJECT
*-----------------------------------------------------------------*
* COMMAREA
*-----------------------------------------------------------------*
*    COPY MQIMTP.
*-----------------------------------------------------------------*
*-----------------------------------------------------------------*
* COPYBOOK: MQIMTP                                                *
*                                                                 *
* FUNCTION: COMMAREA FOR MASTER TERMINAL TASK                     *
*                                                                 *
*-----------------------------------------------------------------*
*-----------------------------------------------------------------*
 01  MTP-COMMAREA.
     05  MTP-HEADER-FLAG     PIC X(4) VALUE 'MQI '.
         88 MTP-HEADER-OK             VALUE 'MQI '.

     05  MTP-MAIN-TASK       PIC X(4) VALUE SPACES.
       88 MTP-NO-RETURN-TASK          VALUE SPACES.

     05  MTP-ACTIVE-TASK     PIC X(4) VALUE SPACES.

     05  MTP-MAP-VALUE       PIC X(8) VALUE 'MAIN'.
         88 MTP-MAP-MAIN           VALUE 'MAIN'.
         88 MTP-MAP-OPTIONS        VALUE 'OPTIONS'.
         88 MTP-MAP-QUEUE          VALUE 'QUEUE  '.
         88 MTP-MAP-LOCAL          VALUE 'LOCAL  '.
         88 MTP-MAP-QLIST          VALUE 'QLIST  '.
         88 MTP-MAP-REORG          VALUE 'REORG  '.

     05  MTP-SCREEN-IND      PIC X    VALUE SPACE.
         88 MTP-SCREEN-FIRST       VALUE 'F'.
         88 MTP-SCREEN-RETURN      VALUE SPACE.
         88 MTP-SCREEN-SEND        VALUE 'S'.
         88 MTP-SCREEN-RECEIVE     VALUE 'R'.

     05  MTP-MAP-FUNCTION    PIC X(8) VALUE 'DISPLAY'.
         88 MTP-MAP-DISPLAY        VALUE 'DISPLAY'.
         88 MTP-MAP-LIST           VALUE 'LIST'.
         88 MTP-MAP-ADD            VALUE 'ADD    '.
         88 MTP-MAP-UPDATE         VALUE 'UPDATE '.
         88 MTP-MAP-DELETE         VALUE 'DELETE '.

     05  MTP-CONFIG-FILE     PIC X(8)  VALUE SPACE.
     05  MTP-SYSTEM-REC-FLAG PIC X  VALUE SPACE.
         88 MTP-SYSTEM-REC-FOUND    VALUE 'Y'.
         88 MTP-SYSTEM-REC-NOTFOUND VALUE 'N'.

     05  MTP-CONFIRM-IND     PIC X VALUE SPACE.
         88  MTP-CONFIRM           VALUE 'Y'.
         88  MTP-NO-CONFIRM        VALUE 'N'.

     05  FILLER              PIC XX     VALUE SPACE.

*--CONFIGURATION DATA
     05  MTP-CONFIG-DATA     PIC X(4) VALUE SPACES.

*--GENERAT EXTENDED DATA
     05  MTP-EXTENDED-COMMAREA.
         10 FILLER           PIC X(2000) VALUE SPACES.

*-----------------------------------------------------------------*
*-----------------------------------------------------------------*
     EJECT
*-----------------------------------------------------------------*
* CONFIGURATION FILE
*-----------------------------------------------------------------*
*    COPY MQICONFG.
*-----------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQICONFG  ***          - BEGIN - *
*-----------------------------------------------------------------*
*-----------------------------------------------------------------*
*    CONFIGURATION FILE                                           *
*-----------------------------------------------------------------*
*-----------------------------------------------------------------*
*   MAIN CONFIGURATION RECORD                                     *
*-----------------------------------------------------------------*
 01  CONFIGURATION-RECORD VALUE SPACES.
     03 FILLER                          PIC  X(2048).



*-----------------------------------------------------------------*
*   ENVIRONMENT VALUE            - SYSTEM   (ENV)                 *
*-----------------------------------------------------------------*

 01  ENVIRONMENT-RECORD
     REDEFINES  CONFIGURATION-RECORD.
     03 ENV-RECORD-KEY.
        05 ENV-RECORD-ID                PIC  X(4).
          88 RECORD-TYPE-IS-ENV              VALUE 'ENV'.
        05 ENV-RECORD-VERSION           PIC  9(4).
        05 ENV-RECORD-TYPE              PIC  X(4).
          88 ENV-TYPE-SYSTEM                 VALUE 'SYS'.
          88 ENV-TYPE-TRANACTION             VALUE 'TRAN'.
          88 ENV-TYPE-PROGRAM                VALUE 'PROG'.
          88 ENV-TYPE-MAPS                   VALUE 'MAPS'.
          88 ENV-TYPE-CONSTANTS              VALUE 'CONS'.
        05 ENV-FILLER                   PIC  X(88).

     03 ENV-LAST-MAINTAINED-DATA.
        05 ENV-LAST-TIME                PIC  9(6).
        05 FILLER                       PIC  XX.
        05 ENV-LAST-DATE                PIC  X(8).
        05 ENV-LAST-TERMID              PIC  X(4).
        05 ENV-LAST-USERID              PIC  X(8).

     03 ENV-ADDED-MAINTAINED-DATA.
        05 ENV-ADDED-TIME               PIC  9(6).
        05 FILLER                       PIC  XX.
        05 ENV-ADDED-DATE               PIC  X(8).
        05 ENV-ADDED-TERMID             PIC  X(4).
        05 ENV-ADDED-USERID             PIC  X(8).

     03 ENV-DATA-AREA.
        05 FILLER                       PIC  X(1892).

*-----------------------------------------------------------------*
*   SYSTEM DESCRIPTOR RECORD (SYS)                                *
*-----------------------------------------------------------------*

 01  SYSTEM-DESCRIPTOR-RECORD
     REDEFINES  CONFIGURATION-RECORD.
     03 SYS-RECORD-KEY.
        05 SYS-RECORD-ID                PIC  X(4).
          88 RECORD-TYPE-IS-SYS              VALUE 'SYS'.
        05 SYS-RECORD-SYSTEM-NUMBER     PIC  9(4).
        05 SYS-RECORD-TYPE              PIC  X(4).
          88 SYS-TYPE-SYS                    VALUE 'SYS'.
          88 SYS-TYPE-QUE-MAX                VALUE 'QUEM'.
          88 SYS-TYPE-QUE-DEFAULT            VALUE 'QUED'.
          88 SYS-TYPE-COM-MAX                VALUE 'COMM'.
          88 SYS-TYPE-COM-DEFAULT            VALUE 'COMD'.
          88 SYS-TYPE-COM-PARM               VALUE 'COMP'.
        05 SYS-FILLER                   PIC  X(88).

     03 SYS-LAST-MAINTAINED-DATA.
        05 SYS-LAST-TIME                PIC  9(6).
        05 FILLER                       PIC  XX.
        05 SYS-LAST-DATE                PIC  X(8).
        05 SYS-LAST-TERMID              PIC  X(4).
        05 SYS-LAST-USERID              PIC  X(8).

     03 SYS-ADDED-MAINTAINED-DATA.
        05 SYS-ADDED-TIME               PIC  9(6).
        05 FILLER                       PIC  XX.
        05 SYS-ADDED-DATE               PIC  X(8).
        05 SYS-ADDED-TERMID             PIC  X(4).
        05 SYS-ADDED-USERID             PIC  X(8).

     03 SYS-DATA.
        05 FILLER                       PIC  X(1892).


*-----------------------------------------------------------------*
*   QUEUE DESCRIPTOR RECORD (QDR)                                 *
```

```
*-------------------------------------------------------------*

 01  QUEUE-DESCRIPTOR-RECORD
     REDEFINES  CONFIGURATION-RECORD.
     03 QDR-RECORD-KEY.
        05 QDR-RECORD-ID                  PIC  X(4).
          88 RECORD-TYPE-IS-QDR                    VALUE 'QDR'.
        05 QDR-RECORD-SYSTEM-NUMBER       PIC  9(4).
        05 QDR-OBJ-NAME                   PIC  X(48).
        05 FILLER                         PIC  X(44).

     03 QDR-LAST-MAINTAINED-DATA.
        05 QDR-LAST-TIME                  PIC  9(6).
        05 FILLER                         PIC  XX.
        05 QDR-LAST-DATE                  PIC  X(8).
        05 QDR-LAST-TERMID                PIC  X(4).
        05 QDR-LAST-USERID                PIC  X(8).

     03 QDR-ADDED-MAINTAINED-DATA.
        05 QDR-ADDED-TIME                 PIC  9(6).
        05 FILLER                         PIC  XX.
        05 QDR-ADDED-DATE                 PIC  X(8).
        05 QDR-ADDED-TERMID               PIC  X(4).
        05 QDR-ADDED-USERID               PIC  X(8).

     03 QDR-DATA.
        05 FILLER                         PIC  X(1892).


*-------------------------------------------------------------*
*   COMMUNICATION  (COM)                                      *
*-------------------------------------------------------------*

 01  COMMUNICATION-RECORD
     REDEFINES  CONFIGURATION-RECORD.
     03 COM-RECORD-KEY.
        05 COM-RECORD-ID                  PIC  X(4).
          88 RECORD-TYPE-IS-COM                    VALUE 'COM'.
        05 COM-RECORD-SYSTEM-NUMBER       PIC  9(4).
        05 COM-NAME                       PIC  X(20).
        05 COM-KEY-TYPE                   PIC  X.
        05 FILLER                         PIC  X(71).

     03 COM-LAST-MAINTAINED-DATA.
        05 COM-LAST-TIME                  PIC  9(6).
        05 FILLER                         PIC  XX.
        05 COM-LAST-DATE                  PIC  X(8).
        05 COM-LAST-TERMID                PIC  X(4).
        05 COM-LAST-USERID                PIC  X(8).

     03 COM-ADDED-MAINTAINED-DATA.
        05 COM-ADDED-TIME                 PIC  9(6).
        05 FILLER                         PIC  XX.
        05 COM-ADDED-DATE                 PIC  X(8).
        05 COM-ADDED-TERMID               PIC  X(4).
        05 COM-ADDED-USERID               PIC  X(8).


     03 COM-DATA.
        05 FILLER                         PIC  X(1892).


*-------------------------------------------------------------*
*   TEXTUAL RECORD (TEXT)                                     *
*-------------------------------------------------------------*

 01  TEXT-RECORD
     REDEFINES  CONFIGURATION-RECORD.
     03 TEXT-RECORD-KEY.
        05 TEXT-RECORD-ID                 PIC  X(4).
          88 RECORD-TYPE-IS-TEXT         VALUE 'TEXT'.

        05 TEXT-RECORD-SYSTEM-NUMBER      PIC  9(4).
        05 TEXT-RECORD-TYPE               PIC  X(4).
          88 TEXT-TYPE-MESSAGES          VALUE 'MSGS'.
          88 TEXT-TYPE-MAPS              VALUE 'MAPS'.
          88 TEXT-TYPE-HELP              VALUE 'HELP'.

        05 TEXT-HELP-KEY.
           10 TEXT-HELP-SCREEN            PIC  X(8).
           10 TEXT-HELP-FUNCTION          PIC  X(40).
           10 TEXT-HELP-FUNCT-SCREEN-NUM  PIC S9(4) COMP.

        05 TEXT-MAPS-KEY
            REDEFINES  TEXT-HELP-KEY.
           10 TEXT-MAPS-SCREEN            PIC  X(8).
             88 TEXT-MAPS-MAIN-TITLE      VALUE 'ALL'.

           10 TEXT-MAPS-MAPSET            PIC  X(8).
           10 TEXT-MAPS-MAPSET-TYPE       PIC  X(4).
            88 TEXT-MAPS-MAPSET-HEADER    VALUE 'HEAD'.
            88 TEXT-MAPS-MAPSET-DATA      VALUE 'DATA'.
            88 TEXT-MAPS-MAPSET-MSGS      VALUE 'MSGS'.

           10 TEXT-MAPS-SCREEN-DATA-NUM   PIC S9(4) COMP.


        05 TEXT-MESSAGE-KEY
            REDEFINES  TEXT-HELP-KEY.
           10 TEXT-MESS-NUMBER            PIC  9(6).
           10 TEXT-MESS-RECORD-NUM        PIC S9(4) COMP.

        05 FILLER                         PIC  X(38).

     03 TEXT-LAST-MAINTAINED-DATA.
        05 TEXT-LAST-TIME                 PIC  9(6).
        05 FILLER                         PIC  XX.
        05 TEXT-LAST-DATE                 PIC  X(8).
        05 TEXT-LAST-TERMID               PIC  X(4).
        05 TEXT-LAST-USERID               PIC  X(8).


     03 TEXT-ADDED-MAINTAINED-DATA.
        05 TEXT-ADDED-TIME                PIC  9(6).
        05 FILLER                         PIC  XX.
        05 TEXT-ADDED-DATE                PIC  X(8).
        05 TEXT-ADDED-TERMID              PIC  X(4).
        05 TEXT-ADDED-USERID              PIC  X(8).


     03 TEXT-DATA-AREA.
        05 FILLER                         PIC  X(1892).

*-------------------------------------------------------------*
* - END -        ***  COPYBOOK: MQICONFG  ***           - END - *
*-------------------------------------------------------------*



     EJECT
*-------------------------------------------------------------*
* ERROR HANDLEING
*-------------------------------------------------------------*
 01  WS-ERR.
*    COPY        MQIERR.
*-------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQIERR    ***          - BEGIN - *
*-------------------------------------------------------------*
*      ERROR MODULE CALLING PARAMETERS                        *
*-------------------------------------------------------------*

     02 ERR-HANDLER-COMMAREA.
        05 ERR-CURRENT-INFO.
          10 ERR-COM-HANDLER       PIC  X(48) VALUE SPACES.
          10 ERR-QUEUE             PIC  X(48) VALUE SPACES.
          10 ERR-FILE              PIC  X(8)  VALUE SPACES.
          10 ERR-DETAIL            PIC  X(80) VALUE SPACES.
          10 ERR-DETAIL2           PIC  X(80) VALUE SPACES.
          10 ERR-Q-CODE            PIC S9(8) COMP VALUE ZERO.
          10 FILLER                PIC  X(8) VALUE SPACES.

        05 ERR-RESULTS.
          10 ERR-CODE              PIC  9(6) VALUE ZERO.
          10 FILLER                PIC  XX   VALUE SPACES.
          10 ERR-PROGRAM           PIC  X(8) VALUE SPACES.
          10 ERR-TRANID            PIC  X(4) VALUE SPACES.
          10 ERR-TERMID            PIC  X(4) VALUE SPACES.
          10 ERR-TASKNO            PIC S9(7)  COMP-3 VALUE ZERO.
          10 ERR-ABSTIME           PIC S9(15) COMP-3 VALUE ZERO.

          10 ERR-DEBUG-EIBFN       PIC  XX   VALUE SPACES.
          10 ERR-DEBUG-EIBRCODE    PIC  X(6) VALUE LOW-VALUES.
          10 ERR-DEBUG-EIBRSRCE    PIC  X(8) VALUE LOW-VALUES.
          10 ERR-DEBUG-EIBRESP     PIC S9(8) COMP VALUE ZEROS.
```

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          10 ERR-DEBUG-EIBRESP2    PIC S9(8) COMP VALUE ZEROS.
          10 ERR-DEBUG-EIBERRCD    PIC  X(4) VALUE LOW-VALUES.
          10 ERR-DEBUG-ABEND       PIC  X(4) VALUE SPACES.
          10 FILLER                PIC  X(12) VALUE SPACES.

*-----------------------------------------------------------------*
* - END -        ***  COPYBOOK: MQIERR    ***           - END - *
*-----------------------------------------------------------------*

*    COPY        MQIERRC.
*-----------------------------------------------------------------*
* IBM MQSERIES COMMON ERROR CODES
*-----------------------------------------------------------------*
 01  MSG-ERROR-MESSAGES.
     05 ERR-NO-ENVIRONMENT           PIC  9(6) VALUE 900000.

     05 ERR-CICS-ERROR               PIC  9(6) VALUE 800000.
     05 ERR-CICS-INVALID-REQ         PIC  9(6) VALUE 800010.
     05 ERR-CICS-ILLOGIC             PIC  9(6) VALUE 800011.
     05 ERR-CICS-ERROR-CHECKPOINT    PIC  9(6) VALUE 800090.
     05 ERR-CICS-ABEND               PIC  9(6) VALUE 800099.
     05 ERR-CICS-FILE-NOTOPEN        PIC  9(6) VALUE 801012.
     05 ERR-CICS-DISABLE             PIC  9(6) VALUE 801019.
     05 ERR-CICS-NO-STORAGE          PIC  9(6) VALUE 802000.
     05 ERR-CICS-LENGTH-ERR          PIC  9(6) VALUE 803001.
     05 ERR-CICS-MAPFAIL             PIC  9(6) VALUE 808000.
     05 ERR-CICS-PGMIDERR            PIC  9(6) VALUE 809000.
     05 ERR-CICS-FILEID              PIC  9(6) VALUE 809010.
     05 ERR-CICS-NOFILE              PIC  9(6) VALUE 809011.
     05 ERR-CICS-IO-ERROR            PIC  9(6) VALUE 809012.
     05 ERR-CICS-TRANIDERR           PIC  9(6) VALUE 809050.

     05 ERR-COM-FREE-ERROR           PIC  9(6) VALUE 501001.
     05 ERR-COM-EIB-ERROR            PIC  9(6) VALUE 501002.
     05 ERR-COM-STAT-ERROR           PIC  9(6) VALUE 501003.
     05 ERR-COM-ALLOC-ERROR          PIC  9(6) VALUE 501004.
     05 ERR-COM-ALLOC-RETRY          PIC  9(6) VALUE 501005.
     05 ERR-COM-CONN-ERROR           PIC  9(6) VALUE 501006.
     05 ERR-COM-SEND-ERROR           PIC  9(6) VALUE 501008.
     05 ERR-COM-RECV-RESP-ERR        PIC  9(6) VALUE 501009.
     05 ERR-COM-RESP-TYPE            PIC  9(6) VALUE 501010.
     05 ERR-COM-RESP-MSN             PIC  9(6) VALUE 501011.
     05 ERR-COM-RESP-FATAL           PIC  9(6) VALUE 501012.
     05 ERR-COM-MSG-ERROR            PIC  9(6) VALUE 501013.
     05 ERR-COM-BIG-INDIAN           PIC  9(6) VALUE 501014.
     05 ERR-COM-TSH-ERROR            PIC  9(6) VALUE 501015.
     05 ERR-COM-CCSID-ERROR          PIC  9(6) VALUE 501016.
     05 ERR-COM-MSH-ERROR            PIC  9(6) VALUE 501017.
     05 ERR-COM-MQX-ERROR            PIC  9(6) VALUE 501018.
     05 ERR-COM-INIT-ERROR           PIC  9(6) VALUE 501019.
     05 ERR-COM-FAP-ERROR            PIC  9(6) VALUE 501020.
     05 ERR-COM-MSG-SIZE             PIC  9(6) VALUE 501021.
     05 ERR-COM-WRAP-ERROR           PIC  9(6) VALUE 501022.
     05 ERR-COM-MCP-DOWN             PIC  9(6) VALUE 501023.
     05 ERR-COM-DOWN                 PIC  9(6) VALUE 501024.
     05 ERR-COM-NOT-FOUND            PIC  9(6) VALUE 501025.
     05 ERR-COM-ERROR                PIC  9(6) VALUE 501026.
     05 ERR-COM-BUSY                 PIC  9(6) VALUE 501027.
     05 ERR-COM-RESYNC-ERROR         PIC  9(6) VALUE 501028.
     05 ERR-COM-STATUS-ERROR         PIC  9(6) VALUE 501029.
     05 ERR-COM-LENGTH-ERROR         PIC  9(6) VALUE 501030.
     05 ERR-COM-MSG-PER-BATCH        PIC  9(6) VALUE 501031.
     05 ERR-COM-MAX-TRANSM-SIZE      PIC  9(6) VALUE 501032.
     05 ERR-COM-RESET-MSN            PIC  9(6) VALUE 501050.

     05 ERR-INT-LINK-ERROR           PIC  9(6) VALUE 400000.
     05 ERR-INT-LINK-COM-SIZE        PIC  9(6) VALUE 400001.
     05 ERR-INT-LINK-COM-DATA        PIC  9(6) VALUE 400002.
     05 ERR-INT-RETURN-ERROR         PIC  9(6) VALUE 400003.
     05 ERR-INT-MOVE-ERROR           PIC  9(6) VALUE 400010.
     05 ERR-INT-STRUC-MISSING        PIC  9(6) VALUE 402000.
     05 ERR-INT-STRUC-ERROR          PIC  9(6) VALUE 402090.

     05 ERR-LOGIC-NOT-SUPPORTED      PIC  9(6) VALUE 300000.
     05 ERR-LOGIC-STARTED-WRONG      PIC  9(6) VALUE 300010.
     05 ERR-LOGIC-REPEATED-FAILURE   PIC  9(6) VALUE 300020.
     05 ERR-LOGIC-LOCKS-EXCEEDED     PIC  9(6) VALUE 300030.
     05 ERR-LOGIC-MISSING-RECORD     PIC  9(6) VALUE 301000.
     05 ERR-LOGIC-RECORD-DUPLICATED  PIC  9(6) VALUE 301010.
     05 ERR-LOGIC-Q-CKP-MISSING      PIC  9(6) VALUE 309010.

     05 ERR-PROC-SYSTEM-STOPPED      PIC  9(6) VALUE 100000.
     05 ERR-PROC-SYSTEM-ACTIVE       PIC  9(6) VALUE 100010.
     05 ERR-PROC-SYS-START-NOQDR     PIC  9(6) VALUE 100011.
     05 ERR-PROC-SYS-START-MAXQDR    PIC  9(6) VALUE 100012.
     05 ERR-PROC-SYS-START-MAXCOM    PIC  9(6) VALUE 100013.
     05 ERR-PROC-SYS-START-NOSYS     PIC  9(6) VALUE 100090.
     05 ERR-PROC-Q-EXCEEDED-DEPTH    PIC  9(6) VALUE 101000.
     05 ERR-PROC-Q-CONCURRENT-UPD    PIC  9(6) VALUE 101010.
     05 ERR-PROC-Q-NOTFOUND          PIC  9(6) VALUE 101015.
     05 ERR-PROC-Q-STOPPED           PIC  9(6) VALUE 101090.
     05 ERR-PROC-Q-DISABLED          PIC  9(6) VALUE 101091.
     05 ERR-PROC-QSN-LIMIT-REACHED   PIC  9(6) VALUE 102090.
     05 ERR-PROC-FILE-SPACE-PUT      PIC  9(6) VALUE 102091.
     05 ERR-PROC-FILE-SPACE          PIC  9(6) VALUE 102092.
     05 ERR-PROC-DUAL-Q-ERROR        PIC  9(6) VALUE 104021.
     05 ERR-PROC-DUAL-Q-FILE         PIC  9(6) VALUE 104022.
     05 ERR-PROC-DUAL-Q-LOGIC        PIC  9(6) VALUE 104023.
     05 ERR-PROC-TRIGGER-ERROR       PIC  9(6) VALUE 105090.
     05 ERR-PROC-TRIGGER-DATA        PIC  9(6) VALUE 105091.
     05 ERR-PROC-NOT-AUTHORIZED      PIC  9(6) VALUE 109000.

     05 ERR-WARN-SYS-STARTED-W-ERR   PIC  9(6) VALUE 010000.
     05 ERR-WARN-SYS-STARTED-W-FILER PIC  9(6) VALUE 010001.
     05 ERR-WARN-SYS-STARTED-W-COMER PIC  9(6) VALUE 010002.
     05 ERR-WARN-SYS-STARTED-W-CHANG PIC  9(6) VALUE 010003.
     05 ERR-WARN-SYS-QUEUE-DISABLED  PIC  9(6) VALUE 010005.
     05 ERR-WARN-SYS-QUEUE-ENABLED   PIC  9(6) VALUE 010007.

     05 ERR-WARN-COM-CONNECT         PIC  9(6) VALUE 005000.
     05 ERR-WARN-COM-OPENED          PIC  9(6) VALUE 005001.
     05 ERR-WARN-COM-QUEUE-OPENED    PIC  9(6) VALUE 005002.
     05 ERR-WARN-COM-LU62-CONNECT    PIC  9(6) VALUE 005003.
     05 ERR-WARN-COM-RECEIVER-ALLOC  PIC  9(6) VALUE 005004.
     05 ERR-WARN-COM-QUEUE-EMPTY     PIC  9(6) VALUE 005005.
     05 ERR-WARN-COM-QUEUE-CLOSED    PIC  9(6) VALUE 005006.
     05 ERR-WARN-COM-DISC            PIC  9(6) VALUE 005007.
     05 ERR-WARN-COM-SHUT            PIC  9(6) VALUE 005008.
     05 ERR-WARN-COM-SHUT-SENT       PIC  9(6) VALUE 005009.

     05 ERR-WARN-COM-TCP-CONNECT     PIC  9(6) VALUE 006003.
     05 ERR-WARN-COM-TCP-STARTED     PIC  9(6) VALUE 006007.
     05 TCP-FREE-ERROR               PIC  9(6) VALUE 006010.
     05 TCP-CONN-ERROR               PIC  9(6) VALUE 006015.
     05 TCP-SEND-ERROR               PIC  9(6) VALUE 006016.
     05 TCP-RECV-RESP-ERROR          PIC  9(6) VALUE 006017.

     05 ERR-FUNCTION-STARTED         PIC  9(6) VALUE 000100.
     05 ERR-FUNCTION-DONE            PIC  9(6) VALUE 001000.
     05 ERR-FUNCTION-NOT-DONE        PIC  9(6) VALUE 001090.

     05 ERR-WARN-SYS-STARTED         PIC  9(6) VALUE 000000.

     05  SYNCH-MSN-ERROR             PIC 9(6)    VALUE 3.
     05  SYNCH-MSG-DUP               PIC 9(6)    VALUE 4.
     05  ERR-WARN-COM-STARTED        PIC 9(6) VALUE 000007.
     05  ERR-WRAP-COM-MISMATCH       PIC 9(6) VALUE 000009.
     05  LU62-FREE-ERROR             PIC 9(6)    VALUE 10.
     05  LU62-EIB-ERROR              PIC 9(6)    VALUE 11.
     05  LU62-STAT-ERROR             PIC 9(6)    VALUE 12.
     05  LU62-ALLOC-ERROR            PIC 9(6)    VALUE 13.
     05  LU62-ALLOC-RETRY-ERROR      PIC 9(6)    VALUE 14.
     05  LU62-CONN-ERROR             PIC 9(6)    VALUE 15.
     05  LU62-SEND-ERROR             PIC 9(6)    VALUE 16.
     05  LU62-RECV-RESP-ERROR        PIC 9(6)    VALUE 17.
     05  INVLD-RESP-TYPE             PIC 9(6)    VALUE 23.
     05  INVLD-RESP-MSN              PIC 9(6)    VALUE 24.
     05  FATAL-RESP-TYPE             PIC 9(6)    VALUE 25.
     05  RECOVERABLE-RESP-TYPE       PIC 9(6)    VALUE 26.
     05  PARSER-MSN-ERROR            PIC 9(6)    VALUE 29.
     05  PARSER-TYPE-ERROR           PIC 9(6)    VALUE 30.
     05  PARSER-PDM-ERROR            PIC 9(6)    VALUE 31.
     05  PARSER-SID-ERROR            PIC 9(6)    VALUE 32.
     05  PARSER-PN-ERROR             PIC 9(6)    VALUE 33.
     05  PARSER-KEY-ERROR            PIC 9(6)    VALUE 34.
     05  PARSER-APID-ERROR           PIC 9(6)    VALUE 35.
     05  PARSER-ORG-DT-ERROR         PIC 9(6)    VALUE 38.
     05  PARSER-ORIG-MSN-ERROR       PIC 9(6)    VALUE 39.
     05  PARSER-BODY-ERROR           PIC 9(6)    VALUE 40.
     05  PARSER-STATUS-ERROR         PIC 9(6)    VALUE 41.
     05  PARSER-LENGTH-ERROR         PIC 9(6)    VALUE 42.
     05  MCCONN-ERROR                PIC 9(6)    VALUE 51.
     05  MQOPEN-ERROR                PIC 9(6)    VALUE 52.
     05  MQGET-ERROR                 PIC 9(6)    VALUE 53.
     05  MQPUT-ERROR                 PIC 9(6)    VALUE 54.
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     05  MQPT1-ERROR                 PIC 9(6)    VALUE 55.
     05  MQCLOSE-ERROR               PIC 9(6)    VALUE 56.
     05  MQDISC-ERROR                PIC 9(6)    VALUE 57.
     05  QM-OTHER-ERROR              PIC 9(6)    VALUE 60.
     05  RECV-RETURN-LON-STATUS      PIC 9(6)    VALUE 80.
     05  RECV-RETURN-LON-TYPE        PIC 9(6)    VALUE 81.
     05  SIDRC-RETURN-MLP-FORMAT     PIC 9(6)    VALUE 91.

*-----------------------------------------------------------------*

*    COPY TTETST3.
*-----------------------------------------------------------------*
* DISPLAY MESSAGES FOR TTPTST3
*-----------------------------------------------------------------*
* NORMAL MESSAGES
 01  MSG-NORMAL.
      05  MSG-START                  PIC  X(60) VALUE
       'ENTER START VALUES.'.
      05  MSG-END                    PIC  X(60) VALUE
       'TEST3  HAS ENDED.'.
      05  MSG-OK                     PIC  X(60) VALUE
       'FUNCTION COMPLETED - ENTER NEW REQUEST.'.
      05  MSG-RETURNING              PIC  X(60) VALUE
       'FUNCTION COMPLETED - ENTER NEW REQUEST.'.

      05  MSG-SYSTEM-INACTIVE        PIC  X(60) VALUE
       '       QUEUING SYSTEM IS NOT ACTIVE'.

* ERROR  MESSAGES
 01  MSG-ERROR.
      05  MSG-ERR-QUEUE              PIC  X(60)  VALUE
       'QUEUE NAME NOT ENTERED.'.
      05  MSG-ERR-TS                 PIC  X(60)  VALUE
       'TIME STAMP FLAG MUST BE SPACE OR Y.'.
      05  MSG-ERR-MSG                PIC  X(60)  VALUE
       'TEXT MESSAGE NOT ENTERED.'.
      05  MSG-ERR-MSG-SIZE           PIC  X(60)  VALUE
       'TEXT MESSAGE SIZE NOT ENTERED.'.
      05  MSG-ERR-MSG-SIZE-VALUE     PIC  X(60)  VALUE
       'TEXT MESSAGE SIZE IF INVALID.'.
      05  MSG-ERR-NUM-MSG            PIC  X(60)  VALUE
       'NUMBER OF MESSAGES TO BE PUT PER TASK NOT ENTERED.'.
      05  MSG-ERR-NUM-MSG-VALUE      PIC  X(60)  VALUE
       'NUMBER OF MESSAGES TO BE PUT PER TASK IS INVALID.'.
      05  MSG-ERR-MAX-TASK           PIC  X(60)  VALUE
       'NUMBER OF TASKS TO START NOT ENTERED.'.
      05  MSG-ERR-MAX-TASK-VALUE     PIC  X(60)  VALUE
       'NUMBER OF TASKS TO START IS INVALID.'.

      05  MSG-ERR-FUNCTION           PIC  X(60)  VALUE
       'FUNCTION NOT ENTERED.'.
      05  MSG-ERR-FUNCTION-VALUE     PIC  X(60)  VALUE
       'FUNCTION MUST BE A "G" OR "P".'.

      05  MSG-ERR-PFKEY              PIC  X(60)  VALUE
       'INVALID PFKEY WAS ENTERED  - ENTER VALID ONE.'.
      05  MSG-ERR-MAPFAIL            PIC  X(60)  VALUE
       'TASK ENTERED IMPROPERLY    - TASK RE-STARTED.'.

      05  MSG-ERR-MAPFAIL-REPEATED   PIC  X(60)  VALUE
       'TASK HAS REPEATED ERRORS - PLEASE CONTACT SUPPORT.'.

*--MAJOR ERROR THAT ARE LOGGED
      05  MSG-ERR-CICS               PIC  X(60)  VALUE
       'CICS ERROR          - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-TRANS-ID           PIC  X(60)  VALUE
       'OPTION NOT AVAILABLE- PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-NOFILE             PIC  X(60)  VALUE
       'CICS FILE  ERROR    - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-DISABLED           PIC  X(60)  VALUE
       'CICS DISABLE  ERROR - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-ILLOGIC            PIC  X(60)  VALUE
       'CICS ILLOGIC  ERROR - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-INVREQ             PIC  X(60)  VALUE
       'CICS REQUEST  ERROR - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-IOERR              PIC  X(60)  VALUE
       'CICS I/O      ERROR - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-NOTFOUND           PIC  X(60)  VALUE
       'CICS NOTFOUND ERROR - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-NOTOPEN            PIC  X(60)  VALUE
       'CICS NOTOPEN  ERROR - PLEASE CONTACT SUPPORT.'.
      05  MSG-ERR-ABENDED            PIC  X(60)  VALUE
       'CICS ABEND    ERROR - PLEASE CONTACT SUPPORT.'.

      05  MSG-ERR-USER-NOT-AUTH      PIC  X(60)  VALUE
       'USER IS NOT AUTHORIZED TO PERFORM FUNCTION. '.

*-----------------------------------------------------------------*

*    COPY        MQWEOWS.
*-----------------------------------------------------------------*
*Debugging eyecatcher information for end of WORKING-STORAGE.
*-----------------------------------------------------------------*
 01  FILLER                      PIC X(16)  VALUE
      '================'.
 01  WS-RWS-PROGRAM-NAME2        PIC X(8).
 01  FILLER                      PIC X(16) VALUE
      ' Version V2.1.0'.
*-----------------------------------------------------------------*
*-----------------------------------------------------------------*
 LINKAGE SECTION.
*-----------------------------------------------------------------*
 01  DFHCOMMAREA.
     05  FILLER                 PIC X(400).


*--STARTED DATA
 01  LK-GET-DATA.
     05  FILLER                 PIC X(400).


*-----------------------------------------------------------------*
 PROCEDURE DIVISION.
*-----------------------------------------------------------------*
 0000-MAIN.

*--SETUP ENVIRONMENT FROM LAST TIME
     PERFORM  1000-INITIAL.

*-- --IF  RECIEVEING - PROCESS FUNCTION
     IF MTP-SCREEN-RECEIVE
      THEN
            PERFORM  2000-SCREEN-FUNCTION
               THRU  2000-SCREEN-EXIT.
*
*-----------------------------------------------------------------*
 0000-RETURN-MQMS.
     PERFORM 7000-SEND-MAP.
     MOVE 'R'          TO MTP-SCREEN-IND.
*
     EXEC  CICS RETURN TRANSID(MTP-ACTIVE-TASK)
                       COMMAREA(MTP-COMMAREA)
                LENGTH  (LENGTH OF MTP-COMMAREA)
          END-EXEC.
*
     GOBACK.
  EJECT
*-----------------------------------------------------------------*
 1000-INITIAL.
*-----------------------------------------------------------------*
* PURPOSE: SETUP HANDLES
*          CHECK IF ENVIRONMENT EXIST - ALREADY
*          IF FIRST TIME - JUST SET MAIN SCREEN AND GET OUT
*-----------------------------------------------------------------*
*
     EXEC CICS HANDLE CONDITION
                       ERROR   (9900-HANDLE-ERROR)
                       TRANSIDERR   (9900-HANDLE-TRANSID)
                       MAPFAIL      (9900-HANDLE-MAPFAIL)
                       FILENOTFOUND (9900-HANDLE-NOFILE)
                       DISABLED (9900-HANDLE-DISABLE)
                       ILLOGIC (9900-HANDLE-ILLOGIC)
                       INVREQ  (9900-HANDLE-INVREQ)
                       IOERR   (9900-HANDLE-IOERR)
                       NOTFND  (9900-HANDLE-NOTFOUND)
                       NOTOPEN (9900-HANDLE-NOTOPEN)
          END-EXEC.

*--SET ERROR INFO
     PERFORM 1050-SET-ERROR-INFO.

*--GET WHAT SYSTEM / APPLIC IS RUNNING
     EXEC CICS ASSIGN SYSID (WS-SYSID)
                      APPLID (WS-APPLID)
                   STARTCODE (WS-STARTCD)
```

```
          END-EXEC.

*--CHECK IF SYSTEM EXIST - ALREADY
     PERFORM 1100-CHECK-SYSTEM
        THRU 1100-EXIT.

*--SETUP  ENVIRONMENT
     PERFORM 1200-SETUP-ENVIR
        THRU 1200-EXIT.

*-------------------------------------------------------------*
 1000-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 1050-SET-ERROR-INFO.
*-------------------------------------------------------------*
* PURPOSE: SET DEFAULT ERROR INFO
*-------------------------------------------------------------*
*--SET CSMT DATE AND TIME
     EXEC CICS ASKTIME
               ABSTIME(WS-ABSTIME)
          END-EXEC.

     MOVE EIBTIME           TO WS-UNPACK-TIME-9.
     MOVE WS-TIME-HH        TO WS-FORMAT-TIME-HH
     MOVE WS-TIME-MM        TO WS-FORMAT-TIME-MM.
     MOVE WS-TIME-SS        TO WS-FORMAT-TIME-SS.

     EXEC CICS FORMATTIME
               ABSTIME (WS-ABSTIME)
               MMDDYY  (WS-FORMATTED-DATE)
               DATESEP ('/')
          END-EXEC.
*-- Save the year field which is held in the century field
*   immediately after the FORMATTIME
     MOVE WS-FORMAT-DATE-CC TO WS-FORMAT-DATE-YY
*
     EXEC  CICS FORMATTIME
                ABSTIME(WS-ABSTIME)
                YYMMDD (WS-DATE-YYMMDD)
           END-EXEC.

*-- --SET CENTURY
     IF WS-DATE-YY >  60
      THEN
            MOVE  19                 TO  WS-DATE-CC
                                         WS-FORMAT-DATE-CC
      ELSE
            MOVE  20                 TO  WS-DATE-CC
                                         WS-FORMAT-DATE-CC
      END-IF

*--SET COMMON ERROR INFO
     MOVE  ZERO         TO  ERR-CODE.
     MOVE  'TTPTST3'    TO  ERR-PROGRAM.

*-------------------------------------------------------------*
  EJECT
*-------------------------------------------------------------*
 1100-CHECK-SYSTEM.
*-------------------------------------------------------------*
* PURPOSE: LINK TO FINQ TO GET SYSTEM STATUS
*-------------------------------------------------------------*
*--SET UP COMMAREA
     MOVE SPACES   TO FINDQ-CALL-PARAMETERS.
     MOVE 'S'      TO FINDQ-CALL-TYPE.

*--CALL
     EXEC CICS LINK PROGRAM (ENV-II-LINK-FINDQ)
                    COMMAREA (FINDQ-CALL-PARAMETERS)
          LENGTH(LENGTH OF  FINDQ-CALL-PARAMETERS)
          END-EXEC.
*
*-------------------------------------------------------------*
 1100-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 1200-SETUP-ENVIR.
*-------------------------------------------------------------*
* PURPOSE: SETUP PROGRAM ENVIR
*-------------------------------------------------------------*
*--SETUP NEW COMMON AREA
     MOVE LOW-VALUES  TO MAINO.

*--IF NOT RE-STARTED
     IF  NOT WS-STARTED
      THEN
*-- --IF NOT STARTED AND NO COMMAREA - JUST SETUP TO MAIN...
          IF  (EIBCALEN EQUAL  ZERO)
           THEN
                MOVE 'S'         TO MTP-SCREEN-IND
                MOVE MSG-START   TO WS-ERROR-MESSAGE
           ELSE
*-- --MOVE COMMAREA TO WORKING-STORAGE..CONTINUE
                MOVE DFHCOMMAREA  TO MTP-COMMAREA
                MOVE 'R'          TO MTP-SCREEN-IND
          END-IF.


*--STARTED - TREAT AS NEW TASK
     IF WS-STARTED
      THEN
          PERFORM 1210-GET-STARTED-DATA
             THRU 1210-GET-STARTED-EXIT

*-- --IF RETURNING FROM ANOTHER APPLI. - TREAT AS NEW
          MOVE LOW-VALUES     TO MAINO
          IF  MTP-SCREEN-RETURN
           THEN
               MOVE MSG-RETURNING  TO WS-ERROR-MESSAGE
               MOVE MTP-CONFIG-DATA
                                   TO MTP-MAIN-TASK
               MOVE SPACES         TO MTP-CONFIG-DATA
           ELSE
               MOVE MSG-START      TO WS-ERROR-MESSAGE
          END-IF
          MOVE 'S'            TO MTP-SCREEN-IND.

*--SETUP TASK ID
     MOVE EIBTRNID  TO   MTP-ACTIVE-TASK.

*-------------------------------------------------------------*
 1200-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 1210-GET-STARTED-DATA.
*-------------------------------------------------------------*
* PURPOSE: READ STARTED DATA
*-------------------------------------------------------------*
*--GET
     EXEC CICS RETRIEVE
               SET    (ADDRESS OF LK-GET-DATA)
               LENGTH (WS-REC-SIZE)
           END-EXEC.
*
     IF WS-REC-SIZE  NOT <  LENGTH OF MTP-COMMAREA
      THEN
*-- --GOT VALID LENGTH- MOVE AND CHECK
            MOVE LK-GET-DATA  TO MTP-COMMAREA
            IF NOT   MTP-HEADER-OK
*-- -- --ERROR IN GET DATA - RESET COMMAREA
             THEN
                MOVE SPACES  TO MTP-COMMAREA
                SET             MTP-HEADER-OK  TO TRUE
                MOVE 'S'     TO MTP-SCREEN-IND
                MOVE 'MAIN'  TO MTP-MAP-VALUE.
*
*-------------------------------------------------------------*
 1210-GET-STARTED-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 2000-SCREEN-FUNCTION.
*-------------------------------------------------------------*
* PURPOSE: GET MAIN MAP
*          CHECK OPTION KEYS
*          CHECK OPTION FIELD
*          PROCESS FUNCTION ENTERED
*-------------------------------------------------------------*
*--PRELIMINARY EDIT OF PF KEYS
     PERFORM  2100-MAIN-CHECK-KEYS.
     IF  NOT WS-EDIT-ERR
```

```
      THEN

*--GET MAP
            PERFORM  7000-RECEIVE-MAP

*--IF RECORD NOT FOUND - SET UP DEFAULT RECORD
            IF NOT FINDQ-SYSTEM-ACTIVE
             THEN
                  MOVE MSG-SYSTEM-INACTIVE
                            TO WS-ERROR-MESSAGE
             ELSE
*-- --EDIT MAP
                  PERFORM  2200-MAIN-EDIT
                     THRU  2200-MAIN-EXIT

*--PROCESS FUNCTION KEY - IF NO ERRORS
                  IF  NOT WS-EDIT-ERR
                   THEN
                       PERFORM  2300-MAIN-FUNCTION
                          THRU  2300-MAIN-EXIT.

*-------------------------------------------------------------*
 2000-SCREEN-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 2100-MAIN-CHECK-KEYS.
*-------------------------------------------------------------*
* PURPOSE: PRELIMINARY PF KEY CHECK
*-------------------------------------------------------------*
*--CHECK AID KEY
*-- --MAIN MENU
     IF  (EIBAID     EQUAL  DFHPF2)
     AND (MTP-MAIN-TASK  NOT EQUAL  SPACES)
      THEN
           GO TO  9000-MAIN-MENU.

*-- --SHUTDOWN
     IF  ((EIBAID  EQUAL  DFHCLEAR OR DFHPA1 OR DFHPA2)
     OR   (EIBAID  EQUAL  DFHPF3))
      THEN
           GO TO  9000-SHUTDOWN.

*-- --QUEUE KEYS - FIRST INQ THEN UPDATE
     IF (EIBAID     EQUAL  DFHPF4)
     OR (EIBAID     EQUAL  DFHENTER)
      THEN
          NEXT SENTENCE
      ELSE
          MOVE -1       TO LTNUML
          MOVE 'Y'     TO WS-EDIT-ERR-FLAG
          MOVE MSG-ERR-PFKEY    TO WS-ERROR-MESSAGE.


*--SET TYPE OF FUNCTION - DEFAULT TO UPDATE
     MOVE  'UPDATE'   TO MTP-MAP-FUNCTION.
*
*-------------------------------------------------------------*
  EJECT
*-------------------------------------------------------------*
 2200-MAIN-EDIT.
*-------------------------------------------------------------*
* PURPOSE: EDIT SCREEN
*-------------------------------------------------------------*

*--FUNCTION
     MOVE DFHBMFSE   TO LFUNCA.
     IF (LFUNCI EQUAL    '?')
     OR (LFUNCI NOT >    SPACE)
      THEN
           MOVE '?'      TO LFUNCO
           MOVE -1       TO LFUNCL
           MOVE DFHUNIMD TO LFUNCA
           MOVE 'Y'      TO WS-EDIT-ERR-FLAG
           MOVE MSG-ERR-FUNCTION
                         TO WS-ERROR-MESSAGE
           PERFORM  8000-MOVE-ERR-MESSAGE
      ELSE
           IF (LFUNCI   EQUAL  'P')
            THEN
                  MOVE  'PUT'   TO TST2-FUNCTION
            ELSE
           IF (LFUNCI   EQUAL  'G')
            THEN
                  MOVE  'GET'   TO TST2-FUNCTION
            ELSE
                   MOVE -1       TO LFUNCL
                   MOVE DFHUNIMD TO LFUNCA
                   MOVE 'Y'      TO WS-EDIT-ERR-FLAG
                   MOVE MSG-ERR-FUNCTION-VALUE
                                 TO WS-ERROR-MESSAGE
                   PERFORM  8000-MOVE-ERR-MESSAGE.


*--NUMBER OF STARTS
     MOVE DFHBMFSE   TO LTNUMA.
     IF (LTNUMI EQUAL    '?')
     OR (LTNUMI NOT >    SPACE)
      THEN
           MOVE '?'      TO LTNUMO
           MOVE -1       TO LTNUML
           MOVE DFHUNIMD TO LTNUMA
           MOVE 'Y'      TO WS-EDIT-ERR-FLAG
           MOVE MSG-ERR-MAX-TASK
                         TO WS-ERROR-MESSAGE
           PERFORM  8000-MOVE-ERR-MESSAGE
      ELSE
           IF (LTNUMI     NUMERIC)
            THEN
                 MOVE  LTNUMI TO WS-NUM
                 IF (WS-NUM    <   0)
                  THEN
                    MOVE -1       TO LTNUML
                    MOVE DFHUNIMD TO LTNUMA
                    MOVE 'Y'      TO WS-EDIT-ERR-FLAG
                    MOVE MSG-ERR-MAX-TASK-VALUE
                                  TO WS-ERROR-MESSAGE
                    PERFORM  8000-MOVE-ERR-MESSAGE
                  ELSE
                    MOVE WS-NUM TO WS-SS-STARTS
            ELSE
                 MOVE -1       TO LTNUML
                 MOVE DFHUNIMD TO LTNUMA
                 MOVE 'Y'      TO WS-EDIT-ERR-FLAG
                 MOVE MSG-ERR-MAX-TASK-VALUE
                               TO WS-ERROR-MESSAGE
                 PERFORM  8000-MOVE-ERR-MESSAGE.

*--CHECK QUEUE FIELD
     MOVE DFHBMFSE   TO LPQUEA.
     IF (LPQUEI EQUAL    '?')
     OR (LPQUEI NOT >    SPACE)
      THEN
           MOVE '?'      TO LPQUEO
           MOVE -1       TO LPQUEL
           MOVE DFHUNIMD TO LPQUEA
           MOVE 'Y'      TO WS-EDIT-ERR-FLAG
           MOVE MSG-ERR-QUEUE
                         TO WS-ERROR-MESSAGE
           PERFORM  8000-MOVE-ERR-MESSAGE
      ELSE
           MOVE  LPQUEI TO TST2-PUT-QUEUE-NAME.

*--NUM OF MESSAGE PER TASK
     MOVE DFHBMFSE   TO LMNUMA.
     IF (LMNUMI EQUAL    '?')
     OR (LMNUMI NOT >    SPACE)
      THEN
           MOVE '?'      TO LMNUMO
           MOVE -1       TO LMNUML
           MOVE DFHUNIMD TO LMNUMA
           MOVE 'Y'      TO WS-EDIT-ERR-FLAG
           MOVE MSG-ERR-NUM-MSG
                          TO WS-ERROR-MESSAGE
           PERFORM  8000-MOVE-ERR-MESSAGE
      ELSE
           IF (LMNUMI     NUMERIC)
            THEN
                 MOVE  LMNUMI TO WS-NUM
                 IF (WS-NUM    <   0)
                  THEN
                    MOVE -1       TO LMNUML
                    MOVE DFHUNIMD TO LMNUMA
                    MOVE 'Y'      TO WS-EDIT-ERR-FLAG
                    MOVE MSG-ERR-NUM-MSG-VALUE
```

```
                              TO WS-ERROR-MESSAGE
                    PERFORM  8000-MOVE-ERR-MESSAGE
                  ELSE
                    MOVE WS-NUM TO TST2-PUT-NUM-MSG
            ELSE
                  MOVE -1       TO LMNUML
                  MOVE DFHUNIMD TO LMNUMA
                  MOVE 'Y'      TO WS-EDIT-ERR-FLAG
                  MOVE MSG-ERR-NUM-MSG-VALUE
                              TO WS-ERROR-MESSAGE
                  PERFORM  8000-MOVE-ERR-MESSAGE.


*--MESSAGE SIZE
     MOVE DFHBMFSE   TO LPSIZEA.
     IF TST2-FUNCT-PUT
      THEN
        IF  ((LPSIZEI EQUAL    '?')  OR (LPSIZEI NOT >    SPACE))
         THEN
           MOVE '?'      TO LPSIZEO
           MOVE -1       TO LPSIZEL
           MOVE DFHUNIMD TO LPSIZEA
           MOVE 'Y'      TO WS-EDIT-ERR-FLAG
           MOVE MSG-ERR-MSG-SIZE
                          TO WS-ERROR-MESSAGE
           PERFORM  8000-MOVE-ERR-MESSAGE
         ELSE
           IF (LPSIZEI     NUMERIC)
            THEN
                  MOVE  LPSIZEI TO WS-NUM
                  IF (WS-NUM    <   0)  OR
                     (WS-NUM    >  32000)
                   THEN
                     MOVE -1       TO LPSIZEL
                     MOVE DFHUNIMD TO LPSIZEA
                     MOVE 'Y'      TO WS-EDIT-ERR-FLAG
                     MOVE MSG-ERR-MSG-SIZE-VALUE
                                   TO WS-ERROR-MESSAGE
                     PERFORM  8000-MOVE-ERR-MESSAGE
                   ELSE
                     MOVE WS-NUM TO TST2-PUT-MSG-SIZE
            ELSE
                  MOVE -1       TO LPSIZEL
                  MOVE DFHUNIMD TO LPSIZEA
                  MOVE 'Y'      TO WS-EDIT-ERR-FLAG
                  MOVE MSG-ERR-MSG-SIZE-VALUE
                                TO WS-ERROR-MESSAGE
                  PERFORM  8000-MOVE-ERR-MESSAGE.

*--CHECK MESSAGE
     MOVE DFHBMFSE   TO LMSGA.
     IF TST2-FUNCT-PUT
      THEN
       IF (LMSGI EQUAL    '?')  OR (LMSGI NOT >    SPACE)
        THEN
           MOVE '?'      TO LMSGO
           MOVE -1       TO LMSGL
           MOVE DFHUNIMD TO LMSGA
           MOVE 'Y'      TO WS-EDIT-ERR-FLAG
           MOVE MSG-ERR-MSG
                          TO WS-ERROR-MESSAGE
           PERFORM  8000-MOVE-ERR-MESSAGE
        ELSE
           MOVE  LMSGI TO TST2-PUT-MSG.

*--CHECK TIME STAMP FLAG
     MOVE DFHBMFSE   TO LTSA.
     IF TST2-FUNCT-PUT
      THEN
        IF (LTSI EQUAL    '?')  OR (LTSI NOT >    SPACE)
         THEN
           MOVE '?'      TO LTSO
           MOVE -1       TO LTSL
           MOVE DFHUNIMD TO LTSA
           MOVE 'Y'      TO WS-EDIT-ERR-FLAG
           MOVE MSG-ERR-TS
                          TO WS-ERROR-MESSAGE
           PERFORM  8000-MOVE-ERR-MESSAGE
         ELSE
           IF TST2-PUT-MSG-TIMESTAMP EQUAL SPACE OR 'Y'
            THEN
                 MOVE  LTSI TO TST2-PUT-MSG-TIMESTAMP.
*-------------------------------------------------------------*
 2200-MAIN-EXIT.
     EXIT.
  EJECT
*-------------------------------------------------------------*
 2300-MAIN-FUNCTION.
*-------------------------------------------------------------*
* PURPOSE: SETUP DEFAULT RECORD AND MESSAGE
*          DEFAULT TO QUEUE PROCESSING
*-------------------------------------------------------------*
*--SET CURSOR
     MOVE -1             TO LTNUML.


*--START TASK.
     PERFORM  WS-SS-STARTS  TIMES
          EXEC CICS START TRANSID('TST2')
                    INTERVAL (000000)
                       FROM  (WS-TST2-COMMAREA)
                     LENGTH  (LENGTH OF WS-TST2-COMMAREA)
            END-EXEC
     END-PERFORM.

*--SAYS OK
     MOVE MSG-OK  TO WS-ERROR-MESSAGE.

*-------------------------------------------------------------*
 2300-MAIN-EXIT.
     EXIT.
  EJECT
     EJECT
*-------------------------------------------------------------*
 7000-RECEIVE-MAP.
*-------------------------------------------------------------*
* PURPOSE: GET USER MAP
*-------------------------------------------------------------*
     EXEC CICS RECEIVE MAP (MTP-MAP-VALUE)
                    MAPSET('TTMTST3')
                     INTO (MAINO)
          END-EXEC.
*
*-------------------------------------------------------------*
     EJECT
*-------------------------------------------------------------*
 7000-SEND-MAP.
*-------------------------------------------------------------*
* PURPOSE: SETUP HEADER DATA
*          SEND SCREEN BASED ON MODE
*-------------------------------------------------------------*
*--SETUP HEADER
     PERFORM 7100-SETUP-HEADER.

*--RESET ERROR TO FIRST ONE..IF MORE THAN ONE
     IF WS-ERR-COUNT  > ZERO
      THEN
             MOVE  WS-ERR-MSG (1)
                        TO WS-ERROR-MESSAGE.
*
*--SEND SCREEN
     IF MTP-SCREEN-SEND
      THEN
*-- --NEW MAP - SETUP INFO....
         MOVE  WS-ERROR-MESSAGE  TO  LERRO
         EXEC CICS SEND MAP (MTP-MAP-VALUE)
                       MAPSET('TTMTST3')
                        FROM (MAINO)
                         ERASE CURSOR
              END-EXEC
      ELSE
         MOVE  WS-ERROR-MESSAGE  TO  LERRO
         EXEC CICS SEND MAP (MTP-MAP-VALUE)
                       MAPSET('TTMTST3')
                        FROM (MAINO)
                         DATAONLY CURSOR
              END-EXEC.

*-------------------------------------------------------------*
     EJECT
*-------------------------------------------------------------*
 7100-SETUP-HEADER.
*-------------------------------------------------------------*
```

```
* PURPOSE: SETUP HEADER DATA
*-------------------------------------------------------------*
*--SETUP HEADER
     MOVE WS-FORMATTED-DATE  TO MDATELO.
     MOVE DFHBMPRF           TO MDATELA.
     MOVE WS-FORMATTED-TIME  TO MTIMELO.

     MOVE WS-SYSID   TO MSYSTLO.
     MOVE EIBTRMID   TO MTERMLO.
     MOVE WS-APPLID  TO MAPPLLO.


*-------------------------------------------------------------*
  EJECT
*-------------------------------------------------------------*
 8000-MOVE-ERR-MESSAGE.
*-------------------------------------------------------------*
* PURPOSE: MOVE MULTIPLE ERROR MESSAGES...
*-------------------------------------------------------------*
     ADD +1  TO WS-ERR-COUNT.
     IF WS-ERR-COUNT NOT > WS-ERR-MAX
      THEN
             MOVE WS-ERROR-MESSAGE
                       TO  WS-ERR-MSG (WS-ERR-COUNT).

*-------------------------------------------------------------*
  EJECT
*-------------------------------------------------------------*
 9000-SHUTDOWN.
*-------------------------------------------------------------*
* PURPOSE: SHUTDOWN PROGRAM
*-------------------------------------------------------------*
*--IF ORIGIN TRAN WAS ME .............
     EXEC CICS SEND FROM (MSG-END)
        LENGTH (LENGTH OF MSG-END) ERASE
                END-EXEC.

*
     EXEC CICS RETURN
                END-EXEC.

*-------------------------------------------------------------*
  EJECT
*-------------------------------------------------------------*
 9000-MAIN-MENU.
*-------------------------------------------------------------*
* PURPOSE: RETURN TO MAIN TASK
*-------------------------------------------------------------*
*--RE-START ORIGINAL TASK
     MOVE SPACE  TO  MTP-SCREEN-IND.
     EXEC  CICS START TRANSID(MTP-MAIN-TASK)
                      TERMID(EIBTRMID)
                      FROM  (MTP-COMMAREA)
           LENGTH(LENGTH OF  MTP-COMMAREA)
                     INTERVAL(0)
                     NOHANDLE
          END-EXEC.

*
     EXEC CICS RETURN
                END-EXEC.

*-------------------------------------------------------------*
  EJECT
*-------------------------------------------------------------*
* PURPOSE: ENVIRONMENT NOT SETUP
*-------------------------------------------------------------*
 9900-NO-ENVIR-SETUP.
     EXEC CICS SEND FROM (ENV-IT-UN-INIT-MSG)
        LENGTH (LENGTH OF ENV-IT-UN-INIT-MSG) ERASE
       END-EXEC

     EXEC CICS RETURN
      END-EXEC.

  EJECT
*-------------------------------------------------------------*
* PURPOSE: ERROR CONDITION
*-------------------------------------------------------------*
 9900-HANDLE-TRANSID.
     MOVE ERR-CICS-TRANIDERR     TO ERR-CODE.
     MOVE WS-TRAN-ID             TO ERR-DETAIL.
     MOVE MSG-ERR-TRANS-ID       TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-NOTAUTH.
     MOVE ERR-PROC-NOT-AUTHORIZED   TO ERR-CODE.
     MOVE WS-TRAN-ID                TO ERR-DETAIL.
     MOVE MSG-ERR-USER-NOT-AUTH     TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-ERROR.
     MOVE ERR-CICS-ERROR    TO ERR-CODE.
     MOVE MSG-ERR-CICS      TO WS-ERROR-MESSAGE.
     GO TO  9999-FATAL-ERR-EXIT.


 9900-HANDLE-NOFILE.
     MOVE ERR-CICS-NOFILE  TO ERR-CODE.
     MOVE MSG-ERR-NOFILE   TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-DISABLE.
     MOVE  ERR-CICS-DISABLE     TO ERR-CODE.
     MOVE  MSG-ERR-DISABLED        TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-ILLOGIC.
     MOVE ERR-CICS-ILLOGIC  TO ERR-CODE.
     MOVE MSG-ERR-ILLOGIC     TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-INVREQ.
     MOVE ERR-CICS-INVALID-REQ  TO ERR-CODE.
     MOVE MSG-ERR-INVREQ        TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-IOERR.
     MOVE ERR-CICS-IO-ERROR   TO ERR-CODE.
     MOVE MSG-ERR-IOERR         TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-NOTFOUND.
     MOVE ERR-LOGIC-MISSING-RECORD TO ERR-CODE.
     MOVE MSG-ERR-NOTFOUND         TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.

 9900-HANDLE-NOTOPEN.
     MOVE  ERR-CICS-FILE-NOTOPEN   TO ERR-CODE.
     MOVE  MSG-ERR-NOTOPEN           TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.


 9900-HANDLE-MAPFAIL.
     EXEC CICS HANDLE CONDITION
                     MAPFAIL (9999-FATAL-ERR-PRE-EXIT)
            END-EXEC.

     MOVE  ERR-CICS-MAPFAIL     TO ERR-CODE.
     MOVE  MSG-ERR-MAPFAIL      TO WS-ERROR-MESSAGE.
     GO TO  9900-ERR-EXIT.
  EJECT
*-------------------------------------------------------------*
 9900-ERR-EXIT.
*-------------------------------------------------------------*
* PURPOSE: ERROR CONDITION
*          SEND SCREEN
*          GO TO CICS RETURN W/ NEXT TRAN ID
*-------------------------------------------------------------*
*--TRANSLATE ERROR CODE
     PERFORM 9999-CONVERT-ERROR-INFO.

*--WRITE ERROR MESSAGE
     PERFORM 9999-ERROR-WRITE.

*--RE-SEND MAIN MAP
     MOVE LOW-VALUES  TO MAINO.
     MOVE -1          TO LTNUML.
     MOVE 'F'         TO MTP-SCREEN-IND.

     GO TO  0000-RETURN-MQMS.
  EJECT
*-------------------------------------------------------------*
 9999-FATAL-ERR-PRE-EXIT.
*-------------------------------------------------------------*
```

```
* PURPOSE: REPEATED MAPFAIL                                          *
*--------------------------------------------------------------*
*--SET ERROR MESSAGE
     MOVE   MSG-ERR-MAPFAIL-REPEATED  TO  WS-ERROR-MESSAGE.
     GO TO  9999-FATAL-ERR-EXIT.



*--------------------------------------------------------------*
 9999-FATAL-ERR-EXIT.
*--------------------------------------------------------------*
* PURPOSE: ERROR EXIT - FOR REPEATED MAPFAIL / ABEND            *
*--------------------------------------------------------------*
*--SEND MESSAGE
     EXEC CICS SEND FROM (WS-ERROR-MESSAGE)
        LENGTH (LENGTH OF WS-ERROR-MESSAGE) ERASE NOHANDLE
          END-EXEC.

*--GET OUT
     EXEC CICS RETURN
          END-EXEC.
  EJECT
*--------------------------------------------------------------*
* ERROR HANDLING CODE
*--------------------------------------------------------------*
*     COPY        MQIERRCD.
/INCLUDE MQIERRCD

*--ABEND MESSAGE SENT....JUST GET OUT
     MOVE   MSG-ERR-ABENDED  TO  WS-ERROR-MESSAGE.
     GO TO  9999-FATAL-ERR-EXIT.
```

Sample program MQPECHO.Z

```
 COPY COPYRSAP.
 IDENTIFICATION DIVISION.
 PROGRAM-ID.    MQPECHO.
 AUTHOR.        IBM.
*****************************************************************
*               T E S T     ECHO                                *
*                                                               *
*          A P P L I C A T I O N   I N T E R F A C E            *
*                                                               *
*                MQSeries for VSE/ESA                           *
*                                                               *
*---------------------------------------------------------------*
* MQPECHO - IBM APPLICATION TEST PROGRAM TO ECHO MESSAGE FROM    *
*           A QUEUE, SAY XXX, TO A QUEUE NAMED 'IBM.REPLY.QUEUE'.*
*                                                               *
* PREREQUISITE:                                                 *
*           1. SENDING QUEUE, A LOCAL QUEUE NAMED XXX, MUST BE  *
*              DEFINED WITH                                     *
*                   TRIGGER ENAABLE: Y                          *
*                   PROGRAM ID     : MQPECHO                    *
*           2. SENDING QUEUE MUST BE ABLE TO TRIGGER MQPECHO    *
*              A. IF XXX HAS MESSAGES, STOP THEN START XXX       *
*              B. IF XXX DOESN'T HAVE ANY MESSAGES OR YOU WANT TO*
*                 ECHO MORE MESSAGES THAN EXISTING ONES, THEN PUT*
*                 SOME MESSAGES BY, EG, TST1 PUT  99 XXX        *
*           3. DEFINE IBM.REPLY.QUEUE, IF IT DOES NOT EXIST     *
*                                                               *
* FUNCTIONS:  1. ACTIVATED VIA TRIGGER MECHANISM BY QUEUE XXX.  *
*             2. READ QUEUE XXX TILL THERE IS NO MORE MESSAGE   *
*             3. ECHO READ MESSAGE INTO IBM.REPLY.QUEUE         *
*                                                               *
* COPYBOOKS:  MQIVALUE - IBM RETURN CODES.                      *
*             MQIERR   - ERROR COMMAREA                         *
*             MQIERRC  - ERROR COMMON CODES                     *
*             MQIERRCD - ERROR CODE                             *
*             MQICENV  - ENVIRONMENT                            *
*                                                               *
* CALLS    :  MQCONN   - CONNECT                                *
*             MQOPEN   - OPEN                                   *
*             MQPUT    - PUT                                    *
*             MQGET    - GET                                    *
*             MQCLOSE  - CLOSE                                  *
*             MQDISC   - DISCONNECT                             *
*                                                               *
* CALLED BY:  -- NONE --                                        *
*                                                               *
* CHANGE SUMMARY:                                               *
*                                                               *
*---------------------------------------------------------------*
 ENVIRONMENT DIVISION.
 CONFIGURATION SECTION.
 DATA DIVISION.
*---------------------------------------------------------------*

 WORKING-STORAGE SECTION.
*     COPY COPYRWS.
*--------------------------------------------------------------*
* COPYRIGHT WORKING STORAGE  FOR COBOL MODULES                  *
*--------------------------------------------------------------*
 01   FILLER.
      05 FILLER                 PIC X(72) VALUE
      'Licensed Materials - Property of IBM'.
      05 FILLER                 PIC X(72) VALUE SPACES.
      05 FILLER                 PIC X(72) VALUE
      '5686-A06  '.
      05 FILLER                 PIC X(72) VALUE SPACES.
      05 FILLER                 PIC X(72) VALUE
      '(C) Copyright IBM Corp. 1998            All Rights Reserve
-     'd'.
      05 FILLER                 PIC X(72) VALUE SPACES.
      05 FILLER                 PIC X(72) VALUE
      'US Government Users Restricted Rights - Use, duplication or
-     '  '.
      05 FILLER                 PIC X(72) VALUE
      'disclosure restricted by GSA ADP Schedule Contract with IBM
-     ' Corp.'.
*--------------------------------------------------------------*
*Debugging eyecatcher information for start of WORKING-STORAGE.
*--------------------------------------------------------------*
 01  WS-RWS-PROGRAM-NAME1        PIC X(8).
 01  FILLER                      PIC X(16) VALUE
      ' Version V2.1.0'.
 01  WS-RWS-WHEN-COMPILED        PIC X(21).
 01  FILLER                      PIC X(7)  VALUE '=======':
*--------------------------------------------------------------*
*--------------------------------------------------------------*

      COPY MQWTRACE.


 01  WS-WORK-FIELDS.
     05  WS-MORE-FLAG               PIC  XX    VALUE SPACES.
       88 WS-MORE-DATA                         VALUE SPACES.
       88 WS-NOMORE-DATA                       VALUE 'Y'.

     05  WS-DATA-LENGTH             PIC S9(4)  COMP   VALUE ZERO.
     05  WS-APPL-MSG-LENGTH         PIC S9(8)  COMP   VALUE ZERO.
     05  WS-ABSTIME                PIC S9(15) COMP-3.
     05  WS-DATE.
        10  WS-DATE-CC             PIC  99  VALUE ZERO.
        10  WS-DATE-YYMMDD.
          12  WS-DATE-YY           PIC  99  VALUE ZERO.
          12  WS-DATE-MM           PIC  99  VALUE ZERO.
          12  WS-DATE-DD           PIC  99  VALUE ZERO.
          12  FILLER               PIC  XX  VALUE ZERO.

     05  WS-UNPACK-TIME-9          PIC 9(07) VALUE ZEROES.
     05  WS-UNPACK-TIME-X REDEFINES WS-UNPACK-TIME-9.
         10  FILLER                PIC  X(01).
         10  WS-TIME-HHMMSS.
            12  WS-TIME-HH         PIC  X(02).
            12  WS-TIME-MM         PIC  X(02).
            12  WS-TIME-SS         PIC  X(02).
     05  WS-FORMATTED-TIME.
         10  WS-FORMAT-TIME-HH     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE ':'.
         10  WS-FORMAT-TIME-MM     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE ':'.
         10  WS-FORMAT-TIME-SS     PIC  X(02) VALUE SPACES.
     05  WS-FORMATTED-DATE.
         10  WS-FORMAT-DATE-MM     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE '/'.
         10  WS-FORMAT-DATE-DD     PIC  X(02) VALUE SPACES.
         10  FILLER                PIC  X(01) VALUE '/'.
```

```
        10  WS-FORMAT-DATE-YY     PIC  X(02) VALUE SPACES.

*--DEFAULT ECHO READQUEUE/QM
     05  WS-READ-QM-QUEUE.
       10  WS-QM-NAME               PIC  X(48) VALUE SPACES.
       10  WS-Q-NAME                PIC  X(48) VALUE
       'QUEUE1'.

*--DEFAULT ECHO RESPONSE QUEUE/QM
     05  WS-RESPONSE-QM-QUEUE.
       10  WS-R-QM-NAME               PIC  X(48) VALUE SPACES.
       10  WS-R-Q-NAME                PIC  X(48) VALUE
       'IBM.REPLY.QUEUE'.

*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
* ERROR MESSAGE FOR QUEUE
*-----------------------------------------------------------------*
 01  WS-ERROR-MESSAGE.
     05 FILLER                      PIC  X(5) VALUE
     'ECHO:'.
     05 FILLER                      PIC  X(6)  VALUE
     ' QID -'.
     05 WS-ERR-DISPLAY-QUEUE        PIC  X(30) VALUE  SPACES.
     05 FILLER                      PIC  X(6)  VALUE
     ',CC  -'.
     05 WS-ERR-DISPLAY-CCODE        PIC  9(4)  VALUE  ZERO.
     05 FILLER                      PIC  X(6)  VALUE
     ',RC  -'.
     05 WS-ERR-DISPLAY-RCODE        PIC  9(4)  VALUE  ZERO.

     05 WS-FUNCTION                 PIC  X(12) VALUE  SPACES.

*
*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
* ERROR WS VALUES
 01  WS-ERR-INFO.
*     COPY   MQIERR.
*-----------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQIERR    ***          - BEGIN - *
*-----------------------------------------------------------------*
*      ERROR MODULE CALLING PARAMETERS                            *
*-----------------------------------------------------------------*

     02 ERR-HANDLER-COMMAREA.
        05 ERR-CURRENT-INFO.
          10 ERR-COM-HANDLER       PIC  X(48) VALUE SPACES.
          10 ERR-QUEUE             PIC  X(48) VALUE SPACES.
          10 ERR-FILE              PIC  X(8)  VALUE SPACES.
          10 ERR-DETAIL            PIC  X(80) VALUE SPACES.
          10 ERR-DETAIL2           PIC  X(80) VALUE SPACES.
          10 ERR-Q-CODE            PIC S9(8) COMP VALUE ZERO.
          10 FILLER                PIC  X(8) VALUE SPACES.

        05 ERR-RESULTS.
          10 ERR-CODE              PIC  9(6) VALUE ZERO.
          10 FILLER                PIC  XX   VALUE SPACES.
          10 ERR-PROGRAM           PIC  X(8) VALUE SPACES.
          10 ERR-TRANID            PIC  X(4) VALUE SPACES.
          10 ERR-TERMID            PIC  X(4) VALUE SPACES.
          10 ERR-TASKNO            PIC S9(7)  COMP-3 VALUE ZERO.
          10 ERR-ABSTIME           PIC S9(15) COMP-3 VALUE ZERO.

          10 ERR-DEBUG-EIBFN       PIC  XX   VALUE SPACES.
          10 ERR-DEBUG-EIBRCODE    PIC  X(6) VALUE LOW-VALUES.
          10 ERR-DEBUG-EIBRSRCE    PIC  X(8) VALUE LOW-VALUES.
          10 ERR-DEBUG-EIBRESP     PIC S9(8) COMP VALUE ZEROS.
          10 ERR-DEBUG-EIBRESP2    PIC S9(8) COMP VALUE ZEROS.
          10 ERR-DEBUG-EIBERRCD    PIC  X(4) VALUE LOW-VALUES.
          10 ERR-DEBUG-ABEND       PIC  X(4) VALUE SPACES.
          10 FILLER                PIC  X(12) VALUE SPACES.

*-----------------------------------------------------------------*
* - END -        ***  COPYBOOK: MQIERR    ***            - END - *
*-----------------------------------------------------------------*
*     COPY   MQIERRC.
*-----------------------------------------------------------------*
* IBM MQSERIES COMMON ERROR CODES
*-----------------------------------------------------------------*
 01  MSG-ERROR-MESSAGES.

05 ERR-NO-ENVIRONMENT          PIC  9(6) VALUE 900000.

05 ERR-CICS-ERROR              PIC  9(6) VALUE 800000.
05 ERR-CICS-INVALID-REQ        PIC  9(6) VALUE 800010.
05 ERR-CICS-ILLOGIC            PIC  9(6) VALUE 800011.
05 ERR-CICS-ERROR-CHECKPOINT   PIC  9(6) VALUE 800090.
05 ERR-CICS-ABEND              PIC  9(6) VALUE 800099.
05 ERR-CICS-FILE-NOTOPEN       PIC  9(6) VALUE 801012.
05 ERR-CICS-DISABLE            PIC  9(6) VALUE 801019.
05 ERR-CICS-NO-STORAGE         PIC  9(6) VALUE 802000.
05 ERR-CICS-LENGTH-ERR         PIC  9(6) VALUE 803001.
05 ERR-CICS-MAPFAIL            PIC  9(6) VALUE 808000.
05 ERR-CICS-PGMIDERR           PIC  9(6) VALUE 809000.
05 ERR-CICS-FILEID             PIC  9(6) VALUE 809010.
05 ERR-CICS-NOFILE             PIC  9(6) VALUE 809011.
05 ERR-CICS-IO-ERROR           PIC  9(6) VALUE 809012.
05 ERR-CICS-TRANIDERR          PIC  9(6) VALUE 809050.

05 ERR-COM-FREE-ERROR          PIC  9(6) VALUE 501001.
05 ERR-COM-EIB-ERROR           PIC  9(6) VALUE 501002.
05 ERR-COM-STAT-ERROR          PIC  9(6) VALUE 501003.
05 ERR-COM-ALLOC-ERROR         PIC  9(6) VALUE 501004.
05 ERR-COM-ALLOC-RETRY         PIC  9(6) VALUE 501005.
05 ERR-COM-CONN-ERROR          PIC  9(6) VALUE 501006.
05 ERR-COM-SEND-ERROR          PIC  9(6) VALUE 501008.
05 ERR-COM-RECV-RESP-ERR       PIC  9(6) VALUE 501009.
05 ERR-COM-RESP-TYPE           PIC  9(6) VALUE 501010.
05 ERR-COM-RESP-MSN            PIC  9(6) VALUE 501011.
05 ERR-COM-RESP-FATAL          PIC  9(6) VALUE 501012.
05 ERR-COM-MSG-ERROR           PIC  9(6) VALUE 501013.
05 ERR-COM-BIG-INDIAN          PIC  9(6) VALUE 501014.
05 ERR-COM-TSH-ERROR           PIC  9(6) VALUE 501015.
05 ERR-COM-CCSID-ERROR         PIC  9(6) VALUE 501016.
05 ERR-COM-MSH-ERROR           PIC  9(6) VALUE 501017.
05 ERR-COM-MQX-ERROR           PIC  9(6) VALUE 501018.
05 ERR-COM-INIT-ERROR          PIC  9(6) VALUE 501019.
05 ERR-COM-FAP-ERROR           PIC  9(6) VALUE 501020.
05 ERR-COM-MSG-SIZE            PIC  9(6) VALUE 501021.
05 ERR-COM-WRAP-ERROR          PIC  9(6) VALUE 501022.
05 ERR-COM-MCP-DOWN            PIC  9(6) VALUE 501023.
05 ERR-COM-DOWN                PIC  9(6) VALUE 501024.
05 ERR-COM-NOT-FOUND           PIC  9(6) VALUE 501025.
05 ERR-COM-ERROR               PIC  9(6) VALUE 501026.
05 ERR-COM-BUSY                PIC  9(6) VALUE 501027.
05 ERR-COM-RESYNC-ERROR        PIC  9(6) VALUE 501028.
05 ERR-COM-STATUS-ERROR        PIC  9(6) VALUE 501029.
05 ERR-COM-LENGTH-ERROR        PIC  9(6) VALUE 501030.
05 ERR-COM-MSG-PER-BATCH       PIC  9(6) VALUE 501031.
05 ERR-COM-MAX-TRANSM-SIZE     PIC  9(6) VALUE 501032.
05 ERR-COM-RESET-MSN           PIC  9(6) VALUE 501050.

05 ERR-INT-LINK-ERROR          PIC  9(6) VALUE 400000.
05 ERR-INT-LINK-COM-SIZE       PIC  9(6) VALUE 400001.
05 ERR-INT-LINK-COM-DATA       PIC  9(6) VALUE 400002.
05 ERR-INT-RETURN-ERROR        PIC  9(6) VALUE 400003.
05 ERR-INT-MOVE-ERROR          PIC  9(6) VALUE 400010.
05 ERR-INT-STRUC-MISSING       PIC  9(6) VALUE 402000.
05 ERR-INT-STRUC-ERROR         PIC  9(6) VALUE 402090.

05 ERR-LOGIC-NOT-SUPPORTED     PIC  9(6) VALUE 300000.
05 ERR-LOGIC-STARTED-WRONG     PIC  9(6) VALUE 300010.
05 ERR-LOGIC-REPEATED-FAILURE  PIC  9(6) VALUE 300020.
05 ERR-LOGIC-LOCKS-EXCEEDED    PIC  9(6) VALUE 300030.
05 ERR-LOGIC-MISSING-RECORD    PIC  9(6) VALUE 301000.
05 ERR-LOGIC-RECORD-DUPLICATED PIC  9(6) VALUE 301010.
05 ERR-LOGIC-Q-CKP-MISSING     PIC  9(6) VALUE 309010.

05 ERR-PROC-SYSTEM-STOPPED     PIC  9(6) VALUE 100000.
05 ERR-PROC-SYSTEM-ACTIVE      PIC  9(6) VALUE 100010.
05 ERR-PROC-SYS-START-NOQDR    PIC  9(6) VALUE 100011.
05 ERR-PROC-SYS-START-MAXQDR   PIC  9(6) VALUE 100012.
05 ERR-PROC-SYS-START-MAXCOM   PIC  9(6) VALUE 100013.
05 ERR-PROC-SYS-START-NOSYS    PIC  9(6) VALUE 100090.
05 ERR-PROC-Q-EXCEEDED-DEPTH   PIC  9(6) VALUE 101000.
05 ERR-PROC-Q-CONCURRENT-UPD   PIC  9(6) VALUE 101010.
05 ERR-PROC-Q-NOTFOUND         PIC  9(6) VALUE 101015.
05 ERR-PROC-Q-STOPPED          PIC  9(6) VALUE 101090.
05 ERR-PROC-Q-DISABLED         PIC  9(6) VALUE 101091.
05 ERR-PROC-QSN-LIMIT-REACHED  PIC  9(6) VALUE 102090.
05 ERR-PROC-FILE-SPACE-PUT     PIC  9(6) VALUE 102091.
05 ERR-PROC-FILE-SPACE         PIC  9(6) VALUE 102092.
05 ERR-PROC-DUAL-Q-ERROR       PIC  9(6) VALUE 104021.
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     05 ERR-PROC-DUAL-Q-FILE         PIC  9(6) VALUE 104022.
     05 ERR-PROC-DUAL-Q-LOGIC        PIC  9(6) VALUE 104023.
     05 ERR-PROC-TRIGGER-ERROR       PIC  9(6) VALUE 105090.
     05 ERR-PROC-TRIGGER-DATA        PIC  9(6) VALUE 105091.
     05 ERR-PROC-NOT-AUTHORIZED      PIC  9(6) VALUE 109000.

     05 ERR-WARN-SYS-STARTED-W-ERR   PIC  9(6) VALUE 010000.
     05 ERR-WARN-SYS-STARTED-W-FILER PIC  9(6) VALUE 010001.
     05 ERR-WARN-SYS-STARTED-W-COMER PIC  9(6) VALUE 010002.
     05 ERR-WARN-SYS-STARTED-W-CHANG PIC  9(6) VALUE 010003.

     05 ERR-WARN-COM-CONNECT         PIC  9(6) VALUE 005000.
     05 ERR-WARN-COM-OPENED          PIC  9(6) VALUE 005001.
     05 ERR-WARN-COM-QUEUE-OPENED    PIC  9(6) VALUE 005002.
     05 ERR-WARN-COM-LU62-CONNECT    PIC  9(6) VALUE 005003.
     05 ERR-WARN-COM-RECEIVER-ALLOC  PIC  9(6) VALUE 005004.
     05 ERR-WARN-COM-QUEUE-EMPTY     PIC  9(6) VALUE 005005.
     05 ERR-WARN-COM-QUEUE-CLOSED    PIC  9(6) VALUE 005006.
     05 ERR-WARN-COM-DISC            PIC  9(6) VALUE 005007.
     05 ERR-WARN-COM-SHUT            PIC  9(6) VALUE 005008.
     05 ERR-WARN-COM-SHUT-SENT       PIC  9(6) VALUE 005009.

     05 ERR-FUNCTION-STARTED         PIC  9(6) VALUE 000100.
     05 ERR-FUNCTION-DONE            PIC  9(6) VALUE 001000.
     05 ERR-FUNCTION-NOT-DONE        PIC  9(6) VALUE 001090.

     05 ERR-WARN-SYS-STARTED         PIC  9(6) VALUE 000000.

     05  SYNCH-MSN-ERROR              PIC 9(6)    VALUE 3.
     05  SYNCH-MSG-DUP                PIC 9(6)    VALUE 4.
     05  LU62-FREE-ERROR              PIC 9(6)    VALUE 10.
     05  LU62-EIB-ERROR               PIC 9(6)    VALUE 11.
     05  LU62-STAT-ERROR              PIC 9(6)    VALUE 12.
     05  LU62-ALLOC-ERROR             PIC 9(6)    VALUE 13.
     05  LU62-ALLOC-RETRY-ERROR       PIC 9(6)    VALUE 14.
     05  LU62-CONN-ERROR              PIC 9(6)    VALUE 15.
     05  LU62-SEND-ERROR              PIC 9(6)    VALUE 16.
     05  LU62-RECV-RESP-ERROR         PIC 9(6)    VALUE 17.
     05  INVLD-RESP-TYPE              PIC 9(6)    VALUE 23.
     05  INVLD-RESP-MSN               PIC 9(6)    VALUE 24.
     05  FATAL-RESP-TYPE              PIC 9(6)    VALUE 25.
     05  RECOVERABLE-RESP-TYPE        PIC 9(6)    VALUE 26.
     05  PARSER-MSN-ERROR             PIC 9(6)    VALUE 29.
     05  PARSER-TYPE-ERROR            PIC 9(6)    VALUE 30.
     05  PARSER-PDM-ERROR             PIC 9(6)    VALUE 31.
     05  PARSER-SID-ERROR             PIC 9(6)    VALUE 32.
     05  PARSER-PN-ERROR              PIC 9(6)    VALUE 33.
     05  PARSER-KEY-ERROR             PIC 9(6)    VALUE 34.
     05  PARSER-APID-ERROR            PIC 9(6)    VALUE 35.
     05  PARSER-ORG-DT-ERROR          PIC 9(6)    VALUE 38.
     05  PARSER-ORIG-MSN-ERROR        PIC 9(6)    VALUE 39.
     05  PARSER-BODY-ERROR            PIC 9(6)    VALUE 40.
     05  PARSER-STATUS-ERROR          PIC 9(6)    VALUE 41.
     05  PARSER-LENGTH-ERROR          PIC 9(6)    VALUE 42.
     05  MCCONN-ERROR                 PIC 9(6)    VALUE 51.
     05  MQOPEN-ERROR                 PIC 9(6)    VALUE 52.
     05  MQGET-ERROR                  PIC 9(6)    VALUE 53.
     05  MQPUT-ERROR                  PIC 9(6)    VALUE 54.
     05  MQPT1-ERROR                  PIC 9(6)    VALUE 55.
     05  MQCLOSE-ERROR                PIC 9(6)    VALUE 56.
     05  MQDISC-ERROR                 PIC 9(6)    VALUE 57.
     05  QM-OTHER-ERROR               PIC 9(6)    VALUE 60.
     05  RECV-RETURN-LON-STATUS       PIC 9(6)    VALUE 80.
     05  RECV-RETURN-LON-TYPE         PIC 9(6)    VALUE 81.
     05  SIDRC-RETURN-MLP-FORMAT      PIC 9(6)    VALUE 91.

*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
* ENVIRONMENT
*-----------------------------------------------------------------*
 01  WS-ENVIR-INFO.
*     COPY   MQICENV.
*-----------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQICENV   ***          - BEGIN - *
*-----------------------------------------------------------------*
*   ENVIRONMENT VALUE            - SYSTEM   (ENV)                 *
*-----------------------------------------------------------------*

     02 ENV-DEFINITION.
     03 ENV-DATA-FOR-SYSTEM.
        05 ENV-PRODUCT-INSTALLED       PIC  X(4) VALUE 'MQM '.
          88  ENV-PRODUCT-MQM         VALUE 'MQM '.
        05 ENV-PRODUCT-RUNTIME         PIC  X(4) VALUE 'MQM '.
          88  ENV-PRODUCT-RT-MQM      VALUE 'MQM '.

        05 ENV-LANG-INFO.
           10 ENV-LANGUAGE-FILE-CODE   PIC  99 VALUE 01.
           10 ENV-LANGUAGE             PIC  X(24)
                                       VALUE 'ENGLISH'.
        05 ENV-DATE-FORMAT             PIC  99 VALUE 01.
          88 ENV-DATE-MMDDYY                  VALUE 01.
          88 ENV-DATE-YYMMDD                  VALUE 02.
          88 ENV-DATE-YYDDMM                  VALUE 03.
          88 ENV-DATE-YYDDD                   VALUE 04.
          88 ENV-DATE-DDMMYY                  VALUE 05.


     03 ENV-DATA-FOR-TRAN.

        05 ENV-MASTER-TERMINAL-TRAN.
           10 ENV-MT-MASTER-TASK-ID    PIC  X(4) VALUE 'MQMT'.
           10 ENV-MT-CONFIG-TASK-ID    PIC  X(4) VALUE 'MQMC'.
           10 ENV-MT-MONITOR-TASK-ID   PIC  X(4) VALUE 'MQMM'.
           10 ENV-MT-OPER-TASK-ID      PIC  X(4) VALUE 'MQMO'.
           10 ENV-MT-DISP-TASK-ID      PIC  X(4) VALUE 'MQBQ'.
           10 ENV-MT-QUEUE-TASK-ID     PIC  X(4) VALUE 'MQMQ'.
           10 ENV-MT-QUEUEI-TASK-ID    PIC  X(4) VALUE 'MQDQ'.
           10 ENV-MT-COM-TASK-ID       PIC  X(4) VALUE 'MQMH'.
           10 ENV-MT-COMI-TASK-ID      PIC  X(4) VALUE 'MQDH'.
           10 ENV-MT-SYS-TASK-ID       PIC  X(4) VALUE 'MQMS'.
           10 ENV-MT-SYSI-TASK-ID      PIC  X(4) VALUE 'MQDS'.
           10 ENV-MT-MONQ-TASK-ID      PIC  X(4) VALUE 'MQQM'.
           10 ENV-MT-MONC-TASK-ID      PIC  X(4) VALUE 'MQCM'.
           10 ENV-MT-SS-TASK-ID        PIC  X(4) VALUE 'MQMA'.
           10 ENV-MT-SC-TASK-ID        PIC  X(4) VALUE 'MQMB'.
           10 ENV-MT-SI-TASK-ID        PIC  X(4) VALUE 'MQMI'.
           10 ENV-MT-SR-TASK-ID        PIC  X(4) VALUE 'MQMR'.
           10 ENV-MT-SD-TASK-ID        PIC  X(4) VALUE 'MQMD'.
           10 FILLER                   PIC  X(4) VALUE SPACES.
           10 FILLER                   PIC  X(4) VALUE SPACES.
           10 FILLER                   PIC  X(4) VALUE SPACES.

        05 ENV-INTERNAL-ITEMS-TRAN.
           10 ENV-II-MONITOR           PIC  X(4) VALUE 'MQSM'.
           10 ENV-II-M-RECOVERY        PIC  X(4) VALUE 'MQSR'.
           10 ENV-II-Q-RECOVERY        PIC  X(4) VALUE 'MQSQ'.
           10 ENV-II-START-STOP        PIC  X(4) VALUE 'MQSS'.
           10 ENV-II-TRAN-AIP2         PIC  X(4) VALUE 'MQ02'.
           10 ENV-II-TRAN-COM-CHECKP   PIC  X(4) VALUE 'MQCP'.
           10 ENV-II-TRAN-QUE-DELETE   PIC  X(4) VALUE 'MQQD'.
           10 ENV-II-TRAN-QUE-DEL-ALL  PIC  X(4) VALUE 'MQQA'.
           10 FILLER                   PIC  X(4) VALUE SPACES.
           10 FILLER                   PIC  X(4) VALUE SPACES.
           10 FILLER                   PIC  X(4) VALUE SPACES.


     03 ENV-DATA-FOR-PROGRAMS.

        05 ENV-MASTER-TERMINAL-PROGRAMS.
           10 ENV-MT-MASTER-PROGRAM    PIC  X(8) VALUE 'MQPMTP'.
           10 ENV-MT-CONFIG-PROGRAM    PIC  X(8) VALUE 'MQPMCFG'.
           10 ENV-MT-MONITOR-PROGRAM   PIC  X(8) VALUE 'MQPMMON'.
           10 ENV-MT-OPER-PROGRAM      PIC  X(8) VALUE 'MQPMOPR'.
           10 ENV-MT-DISP-PROGRAM      PIC  X(8) VALUE 'MQPDISP'.
           10 ENV-MT-QUEUE-PROGRAM     PIC  X(8) VALUE 'MQPMQUE'.
           10 ENV-MT-QUEUEI-PROGRAM    PIC  X(8) VALUE 'MQPMQUE'.
           10 ENV-MT-COM-PROGRAM       PIC  X(8) VALUE 'MQPMCOM'.
           10 ENV-MT-COMI-PROGRAM      PIC  X(8) VALUE 'MQPMCOM'.
           10 ENV-MT-SYS-PROGRAM       PIC  X(8) VALUE 'MQPMSYS'.
           10 ENV-MT-SYSI-PROGRAM      PIC  X(8) VALUE 'MQPMSYS'.
           10 ENV-MT-MONQ-PROGRAM      PIC  X(8) VALUE 'MQPMMOQ'.
           10 ENV-MT-MONC-PROGRAM      PIC  X(8) VALUE 'MQPMMOC'.
           10 ENV-MT-SS-PROGRAM        PIC  X(8) VALUE 'MQPMSS'.
           10 ENV-MT-SC-PROGRAM        PIC  X(8) VALUE 'MQPMSC'.
           10 ENV-MT-SI-PROGRAM        PIC  X(8) VALUE 'MQPMSI'.
           10 ENV-MT-SR-PROGRAM        PIC  X(8) VALUE 'MQPMMSN'.
           10 ENV-MT-SD-PROGRAM        PIC  X(8) VALUE 'MQPMDEL'.
           10 ENV-MT-CMD-PROGRAM       PIC  X(8) VALUE 'MQPCMD'.
           10 FILLER                   PIC  X(8) VALUE SPACES.
           10 FILLER                   PIC  X(8) VALUE SPACES.

        05 ENV-INTERNAL-ITEMS-PROGRAMS.
           10 ENV-II-LINK-ERROR        PIC  X(8) VALUE 'MQPERR  '.
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           10 ENV-II-LINK-EIB1         PIC  X(8) VALUE 'MQPEIB1 '.
           10 ENV-II-LINK-AIP0         PIC  X(8) VALUE 'MQPAIP0 '.
           10 ENV-II-LINK-AIP1         PIC  X(8) VALUE 'MQPAIP1 '.
           10 ENV-II-LINK-AIP2         PIC  X(8) VALUE 'MQPAIP2 '.

           10 ENV-II-LINK-ECHO         PIC  X(8) VALUE 'MQPECHO '.
           10 ENV-II-LINK-FINDQ        PIC  X(8) VALUE 'MQPFINDQ'.
           10 ENV-II-LINK-QUE1         PIC  X(8) VALUE 'MQPQUE1 '.
           10 ENV-II-LINK-QUE2         PIC  X(8) VALUE 'MQPQUE2 '.
           10 ENV-II-LINK-INIT1        PIC  X(8) VALUE 'MQPINIT1'.
           10 ENV-II-LINK-INIT2        PIC  X(8) VALUE 'MQPINIT2'.
           10 ENV-II-LINK-SSQ          PIC  X(8) VALUE 'MQPSSQ  '.
           10 ENV-II-LINK-SCHK         PIC  X(8) VALUE 'MQPSCHK '.
           10 ENV-II-LINK-SREC         PIC  X(8) VALUE 'MQPSREC '.
           10 ENV-II-LINK-QRECOVERY    PIC  X(8) VALUE 'MQPQREC '.
           10 ENV-II-LINK-SENDER       PIC  X(8) VALUE 'MQPSEND '.
           10 ENV-II-LINK-RECIEVER     PIC  X(8) VALUE 'MQPRECV '.
           10 ENV-II-LINK-COM-CHECKP   PIC  X(8) VALUE 'MQPCCKPT'.
           10 ENV-II-LINK-QUE-DELETE   PIC  X(8) VALUE 'MQPQDEL'.
           10 ENV-II-LINK-SET-MAP      PIC  X(8) VALUE 'MQPSMAP'.
           10 ENV-II-LINK-LU21         PIC  X(8) VALUE 'MQPLU21'.
           10 ENV-II-LINK-LU33         PIC  X(8) VALUE 'MQPLU33'.
           10 FILLER                   PIC  X(8) VALUE SPACES.
           10 FILLER                   PIC  X(8) VALUE SPACES.
           10 FILLER                   PIC  X(8) VALUE SPACES.

        03 ENV-DATA-FOR-MAPS.

           05 ENV-MASTER-TERMINAL-MAPS.
              10 ENV-MT-MASTER-MAPSCREEN  PIC  X(8) VALUE 'MQMMTP'.
              10 ENV-MT-CONFIG-MAPSCREEN  PIC  X(8) VALUE 'MQMMCFG'.
              10 ENV-MT-MONITOR-MAPSCREEN PIC  X(8) VALUE 'MQMMMON'.
              10 ENV-MT-OPER-MAPSCREEN    PIC  X(8) VALUE 'MQMMOPR'.
              10 ENV-MT-DISP-MAPSCREEN    PIC  X(8) VALUE 'MQMDISP'.
              10 ENV-MT-QUEUE-MAPSCREEN   PIC  X(8) VALUE 'MQMMQUE'.
              10 ENV-MT-QUEUEI-MAPSCREEN  PIC  X(8) VALUE 'MQMMQUE'.
              10 ENV-MT-COM-MAPSCREEN     PIC  X(8) VALUE 'MQMMCOM'.
              10 ENV-MT-COMI-MAPSCREEN    PIC  X(8) VALUE 'MQMMCOM'.
              10 ENV-MT-SYS-MAPSCREEN     PIC  X(8) VALUE 'MQMMSYS'.
              10 ENV-MT-SYSI-MAPSCREEN    PIC  X(8) VALUE 'MQMMSYS'.
              10 ENV-MT-MONQ-MAPSCREEN    PIC  X(8) VALUE 'MQMMMOQ'.
              10 ENV-MT-MONC-MAPSCREEN    PIC  X(8) VALUE 'MQMMMOC'.
              10 ENV-MT-SS-MAPSCREEN      PIC  X(8) VALUE 'MQMMSS'.
              10 ENV-MT-SC-MAPSCREEN      PIC  X(8) VALUE 'MQMMSC'.
              10 ENV-MT-SI-MAPSCREEN      PIC  X(8) VALUE 'MQMMSI'.
              10 ENV-MT-SR-MAPSCREEN      PIC  X(8) VALUE 'MQMMMSN'.
              10 ENV-MT-SD-MAPSCREEN      PIC  X(8) VALUE 'MQMMDEL'.
              10 FILLER                   PIC  X(8) VALUE SPACES.
              10 FILLER                   PIC  X(8) VALUE SPACES.
              10 FILLER                   PIC  X(8) VALUE SPACES.


        03 ENV-DATA-FOR-CONSTANTS.

           05 ENV-CONFIG-DDNAME           PIC  X(8) VALUE 'MQFCNFG'.
           05 ENV-SYSTEM-NUMBER           PIC  9(4) VALUE 1.
           05 ENV-MASTER-TERMINAL-CONS.
              10 ENV-MT-TITLE             PIC  X(40) VALUE
           '   IBM MQSeries for VSE/ESA Version 2 '.

           05 ENV-INTERNAL-ITEMS-CONS.
              10 ENV-II-ERROR-TD          PIC  X(4) VALUE 'MQER'.
              10 ENV-II-ERROR-CSMT        PIC  X(4) VALUE 'CSMT'.
              10 ENV-II-SYSTEM-ANCHOR     PIC  X(8) VALUE 'MQTAQM'.
              10 ENV-II-SYSTEM-PREFIX     PIC  X(4) VALUE 'MQI '.
              10 ENV-II-DUMPCODE          PIC  X(4) VALUE 'MQ??'.
              10 ENV-II-ENQ-INIT1         PIC  X(8) VALUE 'MQPINIT1'.
              10 ENV-II-SYSTEM-ENVIR      PIC  X(8) VALUE 'MQTENV  '.
              10 ENV-IT-UN-INIT-MSG       PIC  X(80) VALUE
            'MQ900000: MQSERIES VSE ENVIRONMENT not initialized.'.
              10 FILLER                   PIC  X(80) VALUE SPACES.

*-------------------------------------------------------------*
* - END   -      ***  COPYBOOK: MQICENV   ***          - END   - *
*-------------------------------------------------------------*

*-------------------------------------------------------------*
* USER PROCESS DEFINITON
*-------------------------------------------------------------*
 01  WS-PROC.
*     COPY CMQTMV.
*************************************************************
**                                                         **
```

```
**  FILE NAME:        CMQTMV                                 **
**                                                           **
**  DESCRIPTIVE NAME: COBOL copy file for MQTM structure     **
**                                                           **
**  VERSION 1.3.0                                          **
**                                                           **
**  FUNCTION:         This file declares the MQTM structure, **
**                    which forms part of the IBM Message    **
**                    Queue Interface (MQI).                 **
**                                                           **
*************************************************************

**   MQTM structure
  10 MQTM.
**    Structure identifier
   15 MQTM-STRUCID      PIC X(4) VALUE 'TM  '.
**    Structure version number
   15 MQTM-VERSION      PIC S9(9) BINARY   VALUE 1.
**    Name of triggered queue
   15 MQTM-QNAME.
     25  MQI-PROC-LOCAL-QUEUE-NAME PIC  X(48) VALUE SPACE.

**    Name of process object
   15 MQTM-PROCESSNAME  PIC X(48) VALUE SPACES.

**    Trigger data
   15 MQTM-TRIGGERDATA  PIC X(64) VALUE SPACES.
   15 MQTM-TRIGGERDATA-RED  REDEFINES MQTM-TRIGGERDATA.
     25  MQI-PROC-TRANS-ID         PIC  X(4).
     25  MQI-PROC-PROGRAM-ID       PIC  X(8).

     25  MQI-PROC-TRIGGER-EVENT    PIC  X.
       88 MQI-PROC-TRIGGER-FIRST       VALUE 'F'.
       88 MQI-PROC-TRIGGER-EVERY       VALUE 'E'.

**    Application type
   15 MQTM-APPLTYPE     PIC S9(9) BINARY   VALUE 0.
**    Application identifier
   15 MQTM-APPLID       PIC X(256) VALUE SPACES.
**    Environment data
   15 MQTM-ENVDATA      PIC X(128) VALUE SPACES.
**    User data
   15 MQTM-USERDATA     PIC X(128) VALUE SPACES.
   15 MQTM-USERDATA-RED  REDEFINES  MQTM-USERDATA.
     25  MQI-PROC-CHANNEL-NAME     PIC  X(20).

*-------------------------------------------------------------*

*-------------------------------------------------------------*
 01  MQI-VALUES.
*-------------------------------------------------------------*
*     COPY    CMQV.
*************************************************************
**                                                         **
**  FILE NAME:        CMQV                                 **
**                                                         **
**  DESCRIPTIVE NAME: COBOL copy file for MQI constants    **
**                                                         **
**  VERSION 1.3.0                                        **
**                                                         **
**  FUNCTION:         This file declares the constants     **
**                    which form part of the IBM Message   **
**                    Queue Interface (MQI).               **
**                                                         **
*************************************************************

*************************************************************
**  Values Related to MQDLH Structure                      **
*************************************************************
**   Structure Identifier
  10 MQDLH-STRUC-ID PIC X(4) VALUE 'DLH '.

**   Structure Version Number
  10 MQDLH-VERSION-1 PIC S9(9) BINARY  VALUE 1.


*************************************************************
**  Values Related to MQGMO Structure                      **
*************************************************************

**   Structure Identifier
  10 MQGMO-STRUC-ID PIC X(4) VALUE 'GMO '.
```

```
**   Structure Version Number
  10 MQGMO-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Get-Message Options
  10 MQGMO-WAIT                     PIC S9(9) BINARY  VALUE 1.
  10 MQGMO-NO-WAIT                  PIC S9(9) BINARY  VALUE 0.
  10 MQGMO-BROWSE-FIRST             PIC S9(9) BINARY  VALUE 16.
  10 MQGMO-BROWSE-NEXT              PIC S9(9) BINARY  VALUE 32.
  10 MQGMO-ACCEPT-TRUNCATED-MSG     PIC S9(9) BINARY  VALUE 64.
  10 MQGMO-SET-SIGNAL               PIC S9(9) BINARY  VALUE 8.
  10 MQGMO-SYNCPOINT                PIC S9(9) BINARY  VALUE 2.
  10 MQGMO-NO-SYNCPOINT             PIC S9(9) BINARY  VALUE 4.
  10 MQGMO-MSG-UNDER-CURSOR         PIC S9(9) BINARY  VALUE 256.
  10 MQGMO-LOCK                     PIC S9(9) BINARY  VALUE 512.
  10 MQGMO-UNLOCK                   PIC S9(9) BINARY  VALUE 1024.

**   Wait Interval
  10 MQWI-UNLIMITED PIC S9(9) BINARY  VALUE -1.


****************************************************************
**  Values Related to MQMD Structure                          **
****************************************************************

**   Structure Identifier
  10 MQMD-STRUC-ID PIC X(4) VALUE 'MD  '.

**   Structure Version Number
  10 MQMD-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Report Options
  10 MQRO-NONE PIC S9(9) BINARY  VALUE 0.

**   Message Types
  10 MQMT-REQUEST  PIC S9(9) BINARY  VALUE 1.
  10 MQMT-REPLY    PIC S9(9) BINARY  VALUE 2.
  10 MQMT-DATAGRAM PIC S9(9) BINARY  VALUE 8.
  10 MQMT-REPORT   PIC S9(9) BINARY  VALUE 4.

**   Expiry Value
  10 MQEI-UNLIMITED PIC S9(9) BINARY  VALUE -1.

**   Feedback Values
  10 MQFB-NONE         PIC S9(9) BINARY  VALUE 0.
  10 MQFB-QUIT         PIC S9(9) BINARY  VALUE 256.
  10 MQFB-SYSTEM-FIRST PIC S9(9) BINARY  VALUE 1.
  10 MQFB-SYSTEM-LAST  PIC S9(9) BINARY  VALUE 65535.
  10 MQFB-APPL-FIRST   PIC S9(9) BINARY  VALUE 65536.
  10 MQFB-APPL-LAST    PIC S9(9) BINARY  VALUE 999999999.

* format
  10 MQFMT-NONE                  PIC  X(8) VALUE SPACES.
  10 MQFMT-DEAD-LETTER-Q-HEADER  PIC  X(8) VALUE 'MQDLQH'.
  10 MQFMT-TRIGGER               PIC  X(8) VALUE 'MQTRIG'.
  10 MQFMT-XMIT-Q-HEADER         PIC  X(8) VALUE 'MQXMIT'.

**   Encoding Value
  10 MQENC-NATIVE PIC S9(9) BINARY  VALUE 785.

**   Encoding Masks
  10 MQENC-INTEGER-MASK  PIC S9(9) BINARY  VALUE 15.
  10 MQENC-DECIMAL-MASK  PIC S9(9) BINARY  VALUE 240.
  10 MQENC-FLOAT-MASK    PIC S9(9) BINARY  VALUE 3840.
  10 MQENC-RESERVED-MASK PIC S9(9) BINARY  VALUE -4096.

**   Encodings for Binary Integers
  10 MQENC-INTEGER-UNDEFINED PIC S9(9) BINARY  VALUE 0.
  10 MQENC-INTEGER-NORMAL    PIC S9(9) BINARY  VALUE 1.
  10 MQENC-INTEGER-REVERSED  PIC S9(9) BINARY  VALUE 2.

**   Encodings for Packed-Decimal Integers
  10 MQENC-DECIMAL-UNDEFINED PIC S9(9) BINARY  VALUE 0.
  10 MQENC-DECIMAL-NORMAL    PIC S9(9) BINARY  VALUE 16.
  10 MQENC-DECIMAL-REVERSED  PIC S9(9) BINARY  VALUE 32.

**   Encodings for Floating-Point Numbers
  10 MQENC-FLOAT-UNDEFINED     PIC S9(9) BINARY  VALUE 0.
  10 MQENC-FLOAT-IEEE-NORMAL   PIC S9(9) BINARY  VALUE 256.
  10 MQENC-FLOAT-IEEE-REVERSED PIC S9(9) BINARY  VALUE 512.
  10 MQENC-FLOAT-S390          PIC S9(9) BINARY  VALUE 768.

**   Coded Character-Set Identifier
  10 MQCCSI-Q-MGR PIC S9(9) BINARY  VALUE 0.

**   Persistence Values
  10 MQPER-PERSISTENT           PIC S9(9) BINARY  VALUE 1.
  10 MQPER-PERSISTENCE-AS-Q-DEF PIC S9(9) BINARY  VALUE 2.

**   Message Id Value
  10 MQMI-NONE PIC X(24) VALUE LOW-VALUES.

**   Correllation Id Value
  10 MQCI-NONE PIC X(24) VALUE LOW-VALUES.


****************************************************************
**  Values Related to MQOD Structure                          **
****************************************************************

**   Structure Identifier
  10 MQOD-STRUC-ID PIC X(4) VALUE 'OD  '.

**   Structure Version Number
  10 MQOD-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Object Types
  10 MQOT-Q PIC S9(9) BINARY  VALUE 1.


****************************************************************
**  Values Related to MQPMO Structure                         **
****************************************************************

**   Structure Identifier
  10 MQPMO-STRUC-ID PIC X(4) VALUE 'PMO '.

**   Structure Version Number
  10 MQPMO-VERSION-1 PIC S9(9) BINARY  VALUE 1.

**   Put-Message Options
  10 MQPMO-SYNCPOINT            PIC S9(9) BINARY  VALUE 2.
  10 MQPMO-NO-SYNCPOINT         PIC S9(9) BINARY  VALUE 4.

****************************************************************
**  Values Related to MQTM Structure                          **
****************************************************************

**   Structure Identifier
  10 MQTM-STRUC-ID PIC X(4) VALUE 'TM  '.

**   Structure Version Number
  10 MQTM-VERSION-1 PIC S9(9) BINARY  VALUE 1.


****************************************************************
**  Values Related to MQCLOSE Call                            **
****************************************************************

**   Close Options
  10 MQCO-NONE PIC S9(9) BINARY  VALUE 0.


****************************************************************
**  Values Related to MQINQ Call                              **
****************************************************************

**   Character-Attribute Selectors
  10 MQCA-BASE-Q-NAME       PIC S9(9) BINARY  VALUE 2002.
  10 MQCA-CREATION-DATE     PIC S9(9) BINARY  VALUE 2004.
  10 MQCA-CREATION-TIME     PIC S9(9) BINARY  VALUE 2005.
  10 MQCA-FIRST             PIC S9(9) BINARY  VALUE 2001.
  10 MQCA-INITIATION-Q-NAME PIC S9(9) BINARY  VALUE 2008.
  10 MQCA-LAST              PIC S9(9) BINARY  VALUE 4000.
  10 MQCA-PROCESS-NAME      PIC S9(9) BINARY  VALUE 2012.
  10 MQCA-Q-DESC            PIC S9(9) BINARY  VALUE 2013.
  10 MQCA-Q-NAME            PIC S9(9) BINARY  VALUE 2016.
  10 MQCA-REMOTE-Q-MGR-NAME PIC S9(9) BINARY  VALUE 2017.
  10 MQCA-REMOTE-Q-NAME     PIC S9(9) BINARY  VALUE 2018.

**   Integer-Attribute Selectors
  10 MQIA-CURRENT-Q-DEPTH   PIC S9(9) BINARY  VALUE 3.
  10 MQIA-DEF-PERSISTENCE   PIC S9(9) BINARY  VALUE 5.
  10 MQIA-DEFINITION-TYPE   PIC S9(9) BINARY  VALUE 7.
```

```
  10 MQIA-FIRST             PIC S9(9) BINARY  VALUE 1.
  10 MQIA-INHIBIT-GET       PIC S9(9) BINARY  VALUE 9.
  10 MQIA-INHIBIT-PUT       PIC S9(9) BINARY  VALUE 10.
  10 MQIA-LAST              PIC S9(9) BINARY  VALUE 2000.
  10 MQIA-MAX-MSG-LENGTH    PIC S9(9) BINARY  VALUE 13.
  10 MQIA-MAX-Q-DEPTH       PIC S9(9) BINARY  VALUE 15.
  10 MQIA-OPEN-INPUT-COUNT  PIC S9(9) BINARY  VALUE 17.
  10 MQIA-OPEN-OUTPUT-COUNT PIC S9(9) BINARY  VALUE 18.
  10 MQIA-Q-TYPE            PIC S9(9) BINARY  VALUE 20.
  10 MQIA-SHAREABILITY      PIC S9(9) BINARY  VALUE 23.
  10 MQIA-TRIGGER-CONTROL   PIC S9(9) BINARY  VALUE 24.
  10 MQIA-TRIGGER-TYPE      PIC S9(9) BINARY  VALUE 28.
  10 MQIA-USAGE             PIC S9(9) BINARY  VALUE 12.

**   Integer Attribute Value Denoting 'Not Applicable'
  10 MQIAV-NOT-APPLICABLE PIC S9(9) BINARY  VALUE -1.


****************************************************************
**  Values Related to MQOPEN Call                             **
****************************************************************

**   Open Options
  10 MQOO-INPUT-SHARED    PIC S9(9) BINARY  VALUE 2.
  10 MQOO-INPUT-EXCLUSIVE PIC S9(9) BINARY  VALUE 4.
  10 MQOO-BROWSE          PIC S9(9) BINARY  VALUE 8.
  10 MQOO-OUTPUT          PIC S9(9) BINARY  VALUE 16.
  10 MQOO-INQUIRE         PIC S9(9) BINARY  VALUE 32.


****************************************************************
**  Values Related to All Calls                               **
****************************************************************

**   String Lengths
  10 MQ-CREATION-DATE-LENGTH     PIC S9(9) BINARY  VALUE 12.
  10 MQ-CREATION-TIME-LENGTH     PIC S9(9) BINARY  VALUE 8.
  10 MQ-PROCESS-APPL-ID-LENGTH   PIC S9(9) BINARY  VALUE 256.
  10 MQ-PROCESS-DESC-LENGTH      PIC S9(9) BINARY  VALUE 64.
  10 MQ-PROCESS-ENV-DATA-LENGTH  PIC S9(9) BINARY  VALUE 128.
  10 MQ-PROCESS-NAME-LENGTH      PIC S9(9) BINARY  VALUE 48.
  10 MQ-PROCESS-USER-DATA-LENGTH PIC S9(9) BINARY  VALUE 128.
  10 MQ-Q-DESC-LENGTH            PIC S9(9) BINARY  VALUE 64.
  10 MQ-Q-NAME-LENGTH            PIC S9(9) BINARY  VALUE 48.
  10 MQ-Q-MGR-DESC-LENGTH        PIC S9(9) BINARY  VALUE 64.
  10 MQ-Q-MGR-NAME-LENGTH        PIC S9(9) BINARY  VALUE 48.
  10 MQ-TRIGGER-DATA-LENGTH      PIC S9(9) BINARY  VALUE 64.

**   Completion Codes
  10 MQCC-OK      PIC S9(9) BINARY  VALUE 0.
  10 MQCC-WARNING PIC S9(9) BINARY  VALUE 1.
  10 MQCC-FAILED  PIC S9(9) BINARY  VALUE 2.

**   Reason Codes
  10 MQRC-NONE                       PIC S9(9) BINARY  VALUE 0.
  10 MQRC-ACCESS-RESTRICTED          PIC S9(9) BINARY  VALUE 2000.
  10 MQRC-ALIAS-BASE-Q-TYPE-ERROR    PIC S9(9) BINARY  VALUE 2001.
  10 MQRC-ALREADY-CONNECTED          PIC S9(9) BINARY  VALUE 2002.
  10 MQRC-BUFFER-ERROR               PIC S9(9) BINARY  VALUE 2004.
  10 MQRC-BUFFER-LENGTH-ERROR        PIC S9(9) BINARY  VALUE 2005.
  10 MQRC-CHAR-ATTR-LENGTH-ERROR     PIC S9(9) BINARY  VALUE 2006.
  10 MQRC-CHAR-ATTRS-ERROR           PIC S9(9) BINARY  VALUE 2007.
  10 MQRC-CHAR-ATTRS-TOO-SHORT       PIC S9(9) BINARY  VALUE 2008.
  10 MQRC-CONNECTION-BROKEN          PIC S9(9) BINARY  VALUE 2009.
  10 MQRC-DATA-LENGTH-ERROR          PIC S9(9) BINARY  VALUE 2010.
  10 MQRC-EXPIRY-ERROR               PIC S9(9) BINARY  VALUE 2013.
  10 MQRC-FEEDBACK-ERROR             PIC S9(9) BINARY  VALUE 2014.
  10 MQRC-GET-INHIBITED              PIC S9(9) BINARY  VALUE 2016.
  10 MQRC-HANDLE-NOT-AVAILABLE       PIC S9(9) BINARY  VALUE 2017.
  10 MQRC-HCONN-ERROR                PIC S9(9) BINARY  VALUE 2018.
  10 MQRC-HOBJ-ERROR                 PIC S9(9) BINARY  VALUE 2019.
  10 MQRC-INT-ATTR-COUNT-ERROR       PIC S9(9) BINARY  VALUE 2021.
  10 MQRC-INT-ATTR-COUNT-TOO-SMALL   PIC S9(9) BINARY  VALUE 2022.
  10 MQRC-INT-ATTRS-ARRAY-ERROR      PIC S9(9) BINARY  VALUE 2023.
  10 MQRC-MAX-CONNS-LIMIT-REACHED    PIC S9(9) BINARY  VALUE 2025.
  10 MQRC-MD-ERROR                   PIC S9(9) BINARY  VALUE 2026.
  10 MQRC-MISSING-REPLY-TO-Q         PIC S9(9) BINARY  VALUE 2027.
  10 MQRC-MSG-TYPE-ERROR             PIC S9(9) BINARY  VALUE 2029.
  10 MQRC-MSG-TOO-BIG-FOR-Q          PIC S9(9) BINARY  VALUE 2030.
  10 MQRC-NO-MSG-AVAILABLE           PIC S9(9) BINARY  VALUE 2033.
  10 MQRC-NO-MSG-UNDER-CURSOR        PIC S9(9) BINARY  VALUE 2034.
  10 MQRC-NOT-AUTHORIZED             PIC S9(9) BINARY  VALUE 2035.
  10 MQRC-NOT-OPEN-FOR-BROWSE        PIC S9(9) BINARY  VALUE 2036.
  10 MQRC-NOT-OPEN-FOR-INPUT         PIC S9(9) BINARY  VALUE 2037.
  10 MQRC-NOT-OPEN-FOR-INQUIRE       PIC S9(9) BINARY  VALUE 2038.
  10 MQRC-NOT-OPEN-FOR-OUTPUT        PIC S9(9) BINARY  VALUE 2039.
  10 MQRC-OBJECT-CHANGED             PIC S9(9) BINARY  VALUE 2041.
  10 MQRC-OBJECT-IN-USE              PIC S9(9) BINARY  VALUE 2042.
  10 MQRC-OBJECT-TYPE-ERROR          PIC S9(9) BINARY  VALUE 2043.
  10 MQRC-OD-ERROR                   PIC S9(9) BINARY  VALUE 2044.
  10 MQRC-OPTION-NOT-VALID-FOR-TYPE  PIC S9(9) BINARY  VALUE 2045.
  10 MQRC-OPTIONS-ERROR              PIC S9(9) BINARY  VALUE 2046.
  10 MQRC-PERSISTENCE-ERROR          PIC S9(9) BINARY  VALUE 2047.
  10 MQRC-PRIORITY-EXCEEDS-MAXIMUM   PIC S9(9) BINARY  VALUE 2049.
  10 MQRC-PRIORITY-ERROR             PIC S9(9) BINARY  VALUE 2050.
  10 MQRC-PUT-INHIBITED              PIC S9(9) BINARY  VALUE 2051.
  10 MQRC-Q-FULL                     PIC S9(9) BINARY  VALUE 2053.
  10 MQRC-Q-SPACE-NOT-AVAILABLE      PIC S9(9) BINARY  VALUE 2056.
  10 MQRC-Q-MGR-NAME-ERROR           PIC S9(9) BINARY  VALUE 2058.
  10 MQRC-Q-MGR-NOT-AVAILABLE        PIC S9(9) BINARY  VALUE 2059.
  10 MQRC-REPORT-OPTIONS-ERROR       PIC S9(9) BINARY  VALUE 2061.
  10 MQRC-SECURITY-ERROR             PIC S9(9) BINARY  VALUE 2063.
  10 MQRC-SELECTOR-COUNT-ERROR       PIC S9(9) BINARY  VALUE 2065.
  10 MQRC-SELECTOR-LIMIT-EXCEEDED    PIC S9(9) BINARY  VALUE 2066.
  10 MQRC-SELECTOR-ERROR             PIC S9(9) BINARY  VALUE 2067.
  10 MQRC-SELECTOR-NOT-FOR-TYPE      PIC S9(9) BINARY  VALUE 2068.
  10 MQRC-SIGNAL-OUTSTANDING         PIC S9(9) BINARY  VALUE 2069.
  10 MQRC-SIGNAL-REQUEST-ACCEPTED    PIC S9(9) BINARY  VALUE 2070.
  10 MQRC-STORAGE-NOT-AVAILABLE      PIC S9(9) BINARY  VALUE 2071.
  10 MQRC-SYNCPOINT-NOT-AVAILABLE    PIC S9(9) BINARY  VALUE 2072.
  10 MQRC-TRUNCATED-MSG-ACCEPTED     PIC S9(9) BINARY  VALUE 2079.
  10 MQRC-TRUNCATED-MSG-FAILED       PIC S9(9) BINARY  VALUE 2080.
  10 MQRC-UNEXPECTED-CONNECT-ERROR   PIC S9(9) BINARY  VALUE 2081.
  10 MQRC-UNKNOWN-ALIAS-BASE-Q       PIC S9(9) BINARY  VALUE 2082.
  10 MQRC-UNKNOWN-OBJECT-NAME        PIC S9(9) BINARY  VALUE 2085.
  10 MQRC-UNKNOWN-OBJECT-Q-MGR       PIC S9(9) BINARY  VALUE 2086.
  10 MQRC-UNKNOWN-REMOTE-Q-MGR       PIC S9(9) BINARY  VALUE 2087.
  10 MQRC-WAIT-INTERVAL-ERROR        PIC S9(9) BINARY  VALUE 2090.
  10 MQRC-XMIT-Q-TYPE-ERROR          PIC S9(9) BINARY  VALUE 2091.
  10 MQRC-XMIT-Q-USAGE-ERROR         PIC S9(9) BINARY  VALUE 2092.
  10 MQRC-PMO-ERROR                  PIC S9(9) BINARY  VALUE 2173.
  10 MQRC-GMO-ERROR                  PIC S9(9) BINARY  VALUE 2186.

  10 MQRC-UNEXPECTED-ERROR           PIC S9(9) BINARY  VALUE 2195.
  10 MQRC-MSG-ID-ERROR               PIC S9(9) BINARY  VALUE 2206.
  10 MQRC-CORREL-ID-ERROR            PIC S9(9) BINARY  VALUE 2207.

  10 MQRC-FILE-SYSTEM-ERROR          PIC S9(9) BINARY  VALUE 2208.
  10 MQRC-NO-MSG-LOCKED              PIC S9(9) BINARY  VALUE 2209.


****************************************************************
**  Values Related to Queue Attributes                        **
****************************************************************

**   Queue Types
  10 MQQT-LOCAL  PIC S9(9) BINARY  VALUE 1.
  10 MQQT-ALIAS  PIC S9(9) BINARY  VALUE 3.
  10 MQQT-REMOTE PIC S9(9) BINARY  VALUE 6.

**   Queue Definition Types
  10 MQQDT-PREDEFINED PIC S9(9) BINARY  VALUE 1.

**   Inhibit Get
  10 MQQA-GET-INHIBITED PIC S9(9) BINARY  VALUE 1.
  10 MQQA-GET-ALLOWED   PIC S9(9) BINARY  VALUE 0.

**   Inhibit Put
  10 MQQA-PUT-INHIBITED PIC S9(9) BINARY  VALUE 1.
  10 MQQA-PUT-ALLOWED   PIC S9(9) BINARY  VALUE 0.

**   Queue Shareability
  10 MQQA-SHAREABLE     PIC S9(9) BINARY  VALUE 1.
  10 MQQA-NOT-SHAREABLE PIC S9(9) BINARY  VALUE 0.

**   Message Delivery Sequence
  10 MQMDS-FIFO PIC S9(9) BINARY  VALUE 1.

**   Trigger Control
  10 MQTC-OFF PIC S9(9) BINARY  VALUE 0.
  10 MQTC-ON  PIC S9(9) BINARY  VALUE 1.

**   Trigger Types
  10 MQTT-NONE  PIC S9(9) BINARY  VALUE 0.
  10 MQTT-FIRST PIC S9(9) BINARY  VALUE 1.
```

```
  10 MQTT-EVERY PIC S9(9) BINARY  VALUE 2.

**   Queue Usage
  10 MQUS-NORMAL       PIC S9(9) BINARY  VALUE 0.
  10 MQUS-TRANSMISSION PIC S9(9) BINARY  VALUE 1.


*****************************************************************
**  Values Related to Process-Definition Attributes            **
*****************************************************************

**   Application Type
  10 MQAT-USER-FIRST PIC S9(9) BINARY  VALUE 65536.
  10 MQAT-USER-LAST  PIC S9(9) BINARY  VALUE 999999999.


*
  10 MQAT-OS2        PIC S9(9) BINARY VALUE 4.
  10 MQAT-DOS        PIC S9(9) BINARY VALUE 5.
  10 MQAT-AIX        PIC S9(9) BINARY VALUE 6.
  10 MQAT-OS400      PIC S9(9) BINARY VALUE 8.
  10 MQAT-WINDOWS    PIC S9(9) BINARY VALUE 9.
  10 MQAT-CICS-VSE   PIC S9(9) BINARY VALUE 10.
  10 MQAT-VMS        PIC S9(9) BINARY VALUE 12.
  10 MQAT-GUARDIAN   PIC S9(9) BINARY VALUE 13.
  10 MQAT-VOS        PIC S9(9) BINARY VALUE 14.


*****************************************************************
**  Values Related to Queue-Manager Attributes                 **
*****************************************************************

**   Syncpoint Availability
  10 MQSP-AVAILABLE PIC S9(9) BINARY  VALUE 1.

*---------------------------------------------------------------*

*---------------------------------------------------------------*
* API
*---------------------------------------------------------------*
*     COPY   MQIAIP1.
*---------------------------------------------------------------*
* - BEGIN -      ***  COPYBOOK: MQIAIP1   ***          - BEGIN - *
*---------------------------------------------------------------*
*   9/ 1/93   REV:                                              *
*---------------------------------------------------------------*
*   APPL. INTERFACE PARM FOR SSI STUBS                          *
*---------------------------------------------------------------*

     05 API-CALL-PARM.
        10 API-FUNCTION                 PIC X(4).
           88 API-CONNECT               VALUE 'CONN', 'CONI'
                                              'MCCO'.
           88 API-CONNECT-VIA-APPL      VALUE 'CONN', 'CONI'.
           88 API-CONNECT-VIA-INTERFACE VALUE 'CONI'.
           88 API-MCP-CONNECT           VALUE 'MCCO'.
           88 API-OPEN                  VALUE 'OPEN'.
           88 API-PUT                   VALUE 'PUT '.
           88 API-INQ                   VALUE 'INQ '.
           88 API-GET                   VALUE 'GET '.
           88 API-GET-QSN               VALUE 'GETQ'.
           88 API-CLOSE                 VALUE 'CLOS'.
           88 API-DISCONNECT            VALUE 'DISC'.

        10 API-RETURN-CODE-INFO.
           15  API-CCODE-ADDR        USAGE POINTER.
           15  API-RCODE-ADDR        USAGE POINTER.

        10 API-VARIABLE-PARM-INFO.
           15  API-HCONN-ADDR        USAGE POINTER.
           15  API-HOBJ-ADDR         USAGE POINTER.
           15  API-PARM-NUM          PIC S9(4) COMP.
           15  FILLER                PIC  XX.
           15  API-PARM-ADDR-LIST.
             20  API-PARM-ADDR  OCCURS 50 TIMES
                                    USAGE POINTER.

*---------------------------------------------------------------*
* - END -        ***  COPYBOOK: MQIAIP1   ***           - END - *
*---------------------------------------------------------------*

*---------------------------------------------------------------*
*     COPY     MQIENQ.
*---------------------------------------------------------------*
*  "MQIENQ"                                                     *
*---------------------------------------------------------------*
*      ENQ/DEQ  DEFINITIONS        FOR QUEUEING/COM. HANDLERS    *
*---------------------------------------------------------------*
 01  ENQ-INFO.

*--GLOBAL ENVIRONMENT TS QUEUE ID
     05  ENQ-ENVIR-TS-INFO.
         10  ENQ-ENVIR-TS-ITEM     PIC S9(4) COMP VALUE +1.
         10  ENQ-ENVIR-TS-SIZE     PIC S9(4) COMP VALUE ZERO.
         10  ENQ-ENVIR-TS-QID      PIC  X(8) VALUE 'MQSERIES'.

*--ENQ KEY FOR LOCKING
     05  ENQ-RECORD.
         10  ENQ-QSN               PIC  9(10) VALUE ZERO.
         10  ENQ-OBJ-NAME          PIC  X(48) VALUE SPACES.

     05  QSN-BUSY-FLAG             PIC  X   VALUE SPACE.
        88 QSN-BUSY                         VALUE 'Y'.
        88 QSN-BUSY-OK                      VALUE 'N'.

*--QUE RECORD RIB  KEY
     05  QUEUE-KEY.
         10  QUEUE-KEY-OBJ         PIC  X(48) VALUE SPACES.
         10  QUEUE-KEY-QSN         PIC S9(8) COMP VALUE ZERO.

*--DRQ TS QUEUE ID
     05  ENQ-RT-QUEUE-ID.
         10  ENQ-RT-CONSTANT       PIC  X(3) VALUE 'MQT'.
         10  ENQ-RT-TYPE           PIC  X   VALUE 'O'.
         10  ENQ-RT-HHHH           PIC  9999 VALUE ZERO.
         10  ENQ-RT-ITEM           PIC  9999 VALUE ZERO.

*--DRQ WAIT REQID
     05  ENQ-RT-REQID-ID.
         10  ENQ-RT-R-CONSTANT     PIC  X(3) VALUE 'MQT'.
         10  ENQ-RT-R-TYPE         PIC  X   VALUE 'O'.
         10  ENQ-RT-R-HHHH         PIC  9999 COMP VALUE ZERO.
         10  ENQ-RT-R-ITEM         PIC  9999 COMP VALUE ZERO.

*--DELETE QUEUE  TS QUEUE ID
     05  ENQ-DQ-QUEUE-ID.
         10  ENQ-DQ-CONSTANT       PIC  X(3) VALUE 'MQT'.
         10  ENQ-DQ-TYPE           PIC  X   VALUE 'D'.
         10  ENQ-DQ-HHHH           PIC  9999 VALUE ZERO.
         10  ENQ-DQ-ITEM           PIC  9999 COMP VALUE ZERO.


*--ENQ FOR COMMUNICATION HANDLERS - SENDERS
     05  ENQ-COMH-ID.
         10  ENQ-COMH-CONSTANT       PIC  X(3) VALUE 'MQT'.
         10  ENQ-COMH-ENTRY          PIC  9(5) VALUE ZERO.

*---------------------------------------------------------------*



*---------------------------------------------------------------*
*--OPEN    PARM
 01  WS-Q-NAME-AREA.
*    COPY  CMQODV.
*****************************************************************
**                                                             **
**  FILE NAME:        CMQODV                                   **
**                                                             **
**  DESCRIPTIVE NAME: COBOL copy file for MQOD structure       **
**                                                             **
**  VERSION 1.3.0                                            **
**                                                             **
**  FUNCTION:         This file declares the MQOD structure,   **
**                    which forms part of the IBM Message      **
**                    Queue Interface (MQI).                   **
**                                                             **
*****************************************************************

**   MQOD structure
  10 MQOD.
**    Structure identifier
   15 MQOD-STRUCID         PIC X(4) VALUE 'OD  '.
**    Structure version number
   15 MQOD-VERSION         PIC S9(9) BINARY   VALUE 1.
**    Object type
```

```
   15 MQOD-OBJECTTYPE      PIC S9(9) BINARY   VALUE 1.
**    Object name
   15 MQOD-OBJECTNAME      PIC X(48) VALUE SPACES.
**    Object queue manager name
   15 MQOD-OBJECTQMGRNAME  PIC X(48) VALUE SPACES.
**    Dynamic queue name
   15 MQOD-DYNAMICQNAME    PIC X(48) VALUE '*'.
**   Alternate user identifier
   15 MQOD-ALTERNATEUSERID PIC X(12) VALUE SPACES.


*--INQ
 01  MQI-SELECTOR-COUNT.
     05  WS-SELECTOR-COUNT          PIC S9(8) COMP.
 01  MQI-SELECTOR.
     05  WS-SELECTOR                PIC XXXX.

 01  MQI-IN-ATTR-COUNT.
     05  WS-IN-ATTR-COUNT           PIC S9(8) COMP.
 01  MQI-IN-ATTR.
     05  WS-IN-ATTR                 PIC XXXX.

 01  MQI-CHAR-ATTR-LENGTH.
     05  WS-CHAR-ATTR-LENGTH        PIC S9(8) COMP.
 01  MQI-CHAR-ATTR.
     05  WS-CHAR-ATTR               PIC XXXX.


*--PUT/GET PARM
 01  WS-MSG-DESCRIPTOR.
*    COPY   CMQMDV.

****************************************************************
**                                                            **
**  FILE NAME:        CMQMDV                                  **
**                                                            **
**  DESCRIPTIVE NAME: COBOL copy file for MQMD structure      **
**                                                            **
**  VERSION 1.3.0                                           **
**                                                            **
**  FUNCTION:         This file declares the MQMD structure,  **
**                    which forms part of the IBM Message     **
**                    Queue Interface (MQI).                  **
**                                                            **
****************************************************************

**   MQMD structure
  10 MQMD.
**    Structure identifier
   15 MQMD-STRUCID           PIC X(4) VALUE 'MD  '.
**    Structure version number
   15 MQMD-VERSION           PIC S9(9) BINARY  VALUE 1.
**    Reserved
   15 MQMD-REPORT            PIC S9(9) BINARY  VALUE 0.
**    Message type
   15 MQMD-MSGTYPE           PIC S9(9) BINARY  VALUE 8.
**    Reserved
   15 MQMD-EXPIRY            PIC S9(9) BINARY  VALUE -1.
**    Feedback code
   15 MQMD-FEEDBACK          PIC S9(9) BINARY  VALUE 0.
**    Data encoding
   15 MQMD-ENCODING          PIC S9(9) BINARY  VALUE 785.
**    Coded character set identifier
   15 MQMD-CODEDCHARSETID    PIC S9(9) BINARY  VALUE 0.
**    Format name
   15 MQMD-FORMAT            PIC X(8) VALUE SPACES.
**    Reserved
   15 MQMD-PRIORITY          PIC S9(9) BINARY  VALUE 0.
**    Message persistence
   15 MQMD-PERSISTENCE       PIC S9(9) BINARY  VALUE 2.
**    Message identifier
   15 MQMD-MSGID             PIC X(24) VALUE LOW-VALUES.
**    Correlation identifier
   15 MQMD-CORRELID          PIC X(24) VALUE LOW-VALUES.
**    Reserved
   15 MQMD-BACKOUTCOUNT      PIC S9(9) BINARY  VALUE 0.
**    Name of reply queue
   15 MQMD-REPLYTOQ          PIC X(48) VALUE SPACES.
**    Name of reply queue manager
   15 MQMD-REPLYTOQMGR       PIC X(48) VALUE SPACES.
**    Reserved
   15 MQMD-USERIDENTIFIER    PIC X(12) VALUE SPACES.
**    Reserved
   15 MQMD-ACCOUNTINGTOKEN   PIC X(32) VALUE LOW-VALUES.
**    Reserved
   15 MQMD-APPLIDENTITYDATA  PIC X(32) VALUE SPACES.
**    Reserved
   15 MQMD-PUTAPPLTYPE       PIC S9(9) BINARY  VALUE 0.
**    Reserved
   15 MQMD-PUTAPPLNAME       PIC X(28) VALUE SPACES.
**    Reserved
   15 MQMD-PUTDATE           PIC X(8) VALUE SPACES.
**    Reserved
   15 MQMD-PUTTIME           PIC X(8) VALUE SPACES.
**    Reserved
   15 MQMD-APPLORIGINDATA    PIC X(4) VALUE SPACES.

 01  WS-PUT-OPTIONS.
*    COPY   CMQPMOV.
****************************************************************
**                                                            **
**  FILE NAME:        CMQPMOV                                 **
**                                                            **
**  DESCRIPTIVE NAME: COBOL copy file for MQPMO structure     **
**                                                            **
**  VERSION 1.3.0                                           **
**                                                            **
**  FUNCTION:         This file declares the MQPMO structure, **
**                    which forms part of the IBM Message     **
**                    Queue Interface (MQI).                  **
**                                                            **
****************************************************************

**   MQPMO structure
  10 MQPMO.
**    Structure identifier
   15 MQPMO-STRUCID          PIC X(4) VALUE 'PMO '.
**    Structure version number
   15 MQPMO-VERSION          PIC S9(9) BINARY   VALUE 1.
**    Reserved
   15 MQPMO-OPTIONS          PIC S9(9) BINARY   VALUE 0.
**    Reserved
   15 MQPMO-TIMEOUT          PIC S9(9) BINARY   VALUE -1.
**    Reserved
   15 MQPMO-CONTEXT          PIC S9(9) BINARY   VALUE 0.
**    Reserved
   15 MQPMO-KNOWNDESTCOUNT   PIC S9(9) BINARY   VALUE 0.
**    Reserved
   15 MQPMO-UNKNOWNDESTCOUNT PIC S9(9) BINARY   VALUE 0.
**    Reserved
   15 MQPMO-INVALIDDESTCOUNT PIC S9(9) BINARY   VALUE 0.
**    Resolved name of destination queue
   15 MQPMO-RESOLVEDQNAME    PIC X(48) VALUE SPACES.
**    Resolved name of destination queue manager
   15 MQPMO-RESOLVEDQMGRNAME PIC X(48) VALUE SPACES.


 01  WS-GET-OPTIONS.
*    COPY    CMQGMOV.
****************************************************************
**                                                            **
**  FILE NAME:        CMQGMOV                                 **
**                                                            **
**  DESCRIPTIVE NAME: COBOL copy file for MQGMO structure     **
**                                                            **
**  VERSION 1.3.0                                           **
**                                                            **
**  FUNCTION:         This file declares the MQGMO structure, **
**                    which forms part of the IBM Message     **
**                    Queue Interface (MQI).                  **
**                                                            **
****************************************************************

**   MQGMO structure
  10 MQGMO.
**    Structure identifier
   15 MQGMO-STRUCID        PIC X(4) VALUE 'GMO '.
**    Structure version number
   15 MQGMO-VERSION        PIC S9(9) BINARY   VALUE 1.
**    Options
   15 MQGMO-OPTIONS        PIC S9(9) BINARY   VALUE 0.
**    Wait interval
   15 MQGMO-WAITINTERVAL   PIC S9(9) BINARY   VALUE 0.
**    Signal
   15 MQGMO-SIGNAL1        PIC S9(9) BINARY   VALUE 0.
```

```
**    Reserved
   15 MQGMO-SIGNAL2        PIC S9(9) BINARY   VALUE 0.
**    Resolved name of destination queue
   15 MQGMO-RESOLVEDQNAME  PIC X(48) VALUE SPACES.

*----------------------------------------------------------------*
* COMMON PARMS
 01  WS-PARMS.
     05  WS-HCONN-VALUE             USAGE POINTER.
     05  WS-HOBJ-VALUE              USAGE POINTER.
     05  WS-PUT-HOBJ-VALUE          USAGE POINTER.
     05  WS-CCODE-VALUE             PIC S9(8) COMP.
     05  WS-RCODE-VALUE             PIC S9(8) COMP.
     05  WS-QM-NAME-CONNECT         PIC  X(48).
     05  WS-Q-OPEN-OPTIONS-VALUE    PIC S9(8) COMP.
     05  WS-DATA-LENGTH-USER        PIC S9(8) COMP.
     05  WS-BUFFER-LENGTH           PIC S9(8) COMP.

     05  WS-BUFFER-AREA.
         10 FILLER                  PIC X(8000).


*    COPY  MQWEOWS.
*----------------------------------------------------------------*
*Debugging eyecatcher information for end of WORKING-STORAGE.
*----------------------------------------------------------------*
 01  FILLER                      PIC X(16)  VALUE
      '================'.
 01  WS-RWS-PROGRAM-NAME2        PIC X(8).
 01  FILLER                      PIC X(16) VALUE
      ' Version V2.1.0'.
*----------------------------------------------------------------*
*----------------------------------------------------------------*
 LINKAGE SECTION.
*----------------------------------------------------------------*
 01  DFHCOMMAREA.
     05  FILLER                    PIC X(1000).

*----------------------------------------------------------------*

*----------------------------------------------------------------*
 PROCEDURE DIVISION.
*----------------------------------------------------------------*

 0000-MAIN-LINE.
     MOVE 'MQPECHO'  TO WS-RWS-PROGRAM-NAME1
                        WS-RWS-PROGRAM-NAME2.
     MOVE WHEN-COMPILED TO WS-RWS-WHEN-COMPILED.

*--INITIALIZE
     PERFORM 1000-INITIALIZE
        THRU 1000-EXIT.

*--CONNECT AND OPEN GET QUEUE
     PERFORM 2000-CONNECT.
     PERFORM 3100-GET-OPEN.

*----------------------------------------------------------------*
     SET  WS-MORE-DATA   TO TRUE.
     PERFORM
          UNTIL (WS-NOMORE-DATA)

*--GET MESSAGE
          PERFORM 3500-GET-MESSAGES

     END-PERFORM.


*--CLOSE AND DISC
     PERFORM 3900-GET-CLOSE.
     PERFORM 5000-DISCONNECT.

*----------------------------------------------------------------*
 0000-RETURN.
     EXEC CICS RETURN
          END-EXEC.

     GOBACK.

*----------------------------------------------------------------*
 1000-INITIALIZE.
*----------------------------------------------------------------*
* PURPOSE: SETUP DATA AREAS
*----------------------------------------------------------------*

*--GET ENVIRONMENT INFO
     PERFORM 1015-GET-ENVRIR-RECORD
        THRU 1015-GET-ENVRIR-EXIT.

*--SET UP ERROR AREA
     PERFORM   1050-SET-ERROR-INFO.
*
*--CHECK IF QUEUE PRESENT
     IF EIBCALEN   <   LENGTH OF MQTM
      THEN
          GO TO  0000-RETURN.

*--MOVE QUEUE NAME
     MOVE  DFHCOMMAREA    TO  MQTM.

*----------------------------------------------------------------*
 1000-EXIT.
     EXIT.

*----------------------------------------------------------------*
 1015-GET-ENVRIR-RECORD.
*----------------------------------------------------------------*
* PURPOSE: READ ENVIRONMENT RECORD
*----------------------------------------------------------------*
*--SET HANDLE
     EXEC CICS HANDLE CONDITION
                     QIDERR  (9900-NO-ENVIR-SETUP)
                     ITEMERR (9900-NO-ENVIR-SETUP)
     END-EXEC.


*--READ  ANCHOR FOR QM
     MOVE  LENGTH OF ENV-DEFINITION   TO ENQ-ENVIR-TS-SIZE.
     EXEC CICS READQ TS
         QUEUE  (ENQ-ENVIR-TS-QID)
         INTO   (ENV-DEFINITION)
         LENGTH (ENQ-ENVIR-TS-SIZE)
         ITEM   (ENQ-ENVIR-TS-ITEM)
     END-EXEC.

*--CHECK IF GOOD SIZE
     IF  LENGTH OF ENV-DEFINITION
                 NOT EQUAL  ENQ-ENVIR-TS-SIZE
         GO TO  9900-NO-ENVIR-SETUP
     END-IF.

*----------------------------------------------------------------*
 1015-GET-ENVRIR-EXIT.
     EXIT.

*----------------------------------------------------------------*
 1050-SET-ERROR-INFO.
*----------------------------------------------------------------*
* PURPOSE: SET DEFAULT ERROR INFO
*----------------------------------------------------------------*
*--SET CSMT DATE AND TIME
     EXEC CICS ASKTIME
               ABSTIME(WS-ABSTIME)
     END-EXEC.

     MOVE EIBTIME           TO WS-UNPACK-TIME-9.
     MOVE WS-TIME-HH        TO WS-FORMAT-TIME-HH
     MOVE WS-TIME-MM        TO WS-FORMAT-TIME-MM.
     MOVE WS-TIME-SS        TO WS-FORMAT-TIME-SS.

     EXEC CICS FORMATTIME
               ABSTIME (WS-ABSTIME)
               MMDDYY  (WS-FORMATTED-DATE)
               DATESEP ('/')
     END-EXEC.
*
     EXEC  CICS FORMATTIME
                ABSTIME(WS-ABSTIME)
                YYMMDD (WS-DATE-YYMMDD)
     END-EXEC.

*-- --SET CENTURY
     IF WS-DATE-YY >  50
         MOVE  19                 TO  WS-DATE-CC
     ELSE
```

```
         MOVE  20                 TO  WS-DATE-CC
     END-IF.

*--SET COMMON ERROR INFO
     MOVE  ZERO         TO  ERR-CODE.
     MOVE  ENV-II-LINK-ECHO  TO  ERR-PROGRAM.

*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
 2000-CONNECT.
*-----------------------------------------------------------------*
* PURPOSE: CONNECT
*-----------------------------------------------------------------*
*--MQCONNECT TO QM
     MOVE  'CONNECT' TO   WS-FUNCTION.
     MOVE  SPACES    TO   WS-QM-NAME-CONNECT.
     MOVE MQCC-OK                      TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE                    TO   WS-RCODE-VALUE.
     SET WS-HCONN-VALUE  TO NULL.
     CALL 'MQCONN'  USING  WS-QM-NAME
                           WS-HCONN-VALUE
                           WS-CCODE-VALUE
                           WS-RCODE-VALUE.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        GO TO  9900-ERR-DISPLAY
     END-IF.
*
*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
 3100-GET-OPEN.
*-----------------------------------------------------------------*
* PURPOSE: OPEN
*-----------------------------------------------------------------*
*--MQOPEN   QUEUE TO QM
     MOVE  'OPEN'    TO   WS-FUNCTION.
     MOVE MQOO-INPUT-SHARED TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE SPACES            TO   MQOD-OBJECTQMGRNAME.
     MOVE MQI-PROC-LOCAL-QUEUE-NAME
                            TO   MQOD-OBJECTNAME.
     MOVE MQCC-OK           TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE         TO   WS-RCODE-VALUE.
     SET WS-HOBJ-VALUE  TO NULL.
     CALL 'MQOPEN'  USING  WS-HCONN-VALUE
                           WS-Q-NAME-AREA
                           WS-Q-OPEN-OPTIONS-VALUE
                           WS-HOBJ-VALUE
                           WS-CCODE-VALUE
                           WS-RCODE-VALUE.

*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        GO TO  9900-ERR-DISPLAY
     END-IF.

*
*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
 3500-GET-MESSAGES.
*-----------------------------------------------------------------*
*--MQGET TO QUEUE TO QM
     MOVE  'GET'     TO   WS-FUNCTION.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     MOVE LOW-VALUES TO  MQMD-MSGID
                         MQMD-CORRELID.
     MOVE LENGTH OF WS-BUFFER-AREA  TO   WS-BUFFER-LENGTH.
     MOVE MQGMO-ACCEPT-TRUNCATED-MSG
                              TO  MQGMO-OPTIONS.

     CALL 'MQGET'   USING  WS-HCONN-VALUE
                           WS-HOBJ-VALUE
                           WS-MSG-DESCRIPTOR
                           WS-GET-OPTIONS
                           WS-BUFFER-LENGTH
                           WS-BUFFER-AREA
                           WS-DATA-LENGTH
                           WS-CCODE-VALUE
                           WS-RCODE-VALUE.
*
     IF  (WS-CCODE-VALUE   NOT EQUAL  ZERO)
     AND (WS-RCODE-VALUE   NOT EQUAL MQRC-TRUNCATED-MSG-ACCEPTED)
         IF WS-RCODE-VALUE EQUAL MQRC-NO-MSG-AVAILABLE
            SET WS-NOMORE-DATA  TO TRUE
         ELSE
            GO TO  9900-ERR-DISPLAY
         END-IF
     END-IF.

*--SEND QUEUE RECORDS
     IF WS-MORE-DATA
*-- --FIRST CHECK IF ANY REPLY
          PERFORM 4000-PUT1-MESSAGES
             THRU 4000-EXIT
     END-IF.


*--SYNCPOINT
     EXEC CICS SYNCPOINT
     END-EXEC.
*
*
*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
 3900-GET-CLOSE.
*-----------------------------------------------------------------*
* PURPOSE: CLOSE
*-----------------------------------------------------------------*
*--MQCLOSE  QUEUE TO QM
     MOVE  'CLOSE'   TO   WS-FUNCTION.
     MOVE  ZERO      TO   WS-Q-OPEN-OPTIONS-VALUE.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQCLOSE' USING  WS-HCONN-VALUE
                           WS-HOBJ-VALUE
                           WS-Q-OPEN-OPTIONS-VALUE
                           WS-CCODE-VALUE
                           WS-RCODE-VALUE.
*
*
     IF  WS-CCODE-VALUE   NOT EQUAL  ZERO
         GO TO  9900-ERR-DISPLAY
     END-IF.


*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
 4000-PUT1-MESSAGES.
*-----------------------------------------------------------------*
* PURPOSE: PUT1
*-----------------------------------------------------------------*
*--MQPUT1   QUEUE TO QM
     MOVE  'PUT1'    TO   WS-FUNCTION.
     MOVE MQOO-OUTPUT    TO     WS-Q-OPEN-OPTIONS-VALUE.
     IF MQMD-REPLYTOQMGR    EQUAL SPACES OR LOW-VALUES
          MOVE SPACES   TO   MQOD-OBJECTQMGRNAME
      ELSE
          MOVE MQMD-REPLYTOQMGR
                        TO   MQOD-OBJECTQMGRNAME
     END-IF.
*
*--IF NOT REPLY QUEUE - SET DEFAULT
     IF MQMD-REPLYTOQ     EQUAL SPACES OR LOW-VALUES
          MOVE WS-R-Q-NAME
                        TO   MQOD-OBJECTNAME
      ELSE
          MOVE MQMD-REPLYTOQ
                        TO   MQOD-OBJECTNAME
     END-IF.

*
     MOVE MQCC-OK        TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE      TO   WS-RCODE-VALUE.
     MOVE WS-DATA-LENGTH-USER   TO WS-BUFFER-LENGTH.
     CALL 'MQPUT1'  USING  WS-HCONN-VALUE
                           WS-Q-NAME-AREA
                           WS-MSG-DESCRIPTOR
                           WS-PUT-OPTIONS
                           WS-BUFFER-LENGTH
```

```
                         WS-BUFFER-AREA
                         WS-CCODE-VALUE
                         WS-RCODE-VALUE.
*
     IF WS-CCODE-VALUE   NOT EQUAL  ZERO
        GO TO  9900-ERR-DISPLAY
     END-IF.

*-----------------------------------------------------------------*
 4000-EXIT.
     EXIT.

*-----------------------------------------------------------------*
 5000-DISCONNECT.
*-----------------------------------------------------------------*
* PURPOSE:  DISCON                                                *
*-----------------------------------------------------------------*
*--MQDISC  FROM QM
     MOVE  'DISCONN' TO   WS-FUNCTION.
     MOVE MQCC-OK    TO   WS-CCODE-VALUE.
     MOVE MQRC-NONE  TO   WS-RCODE-VALUE.
     CALL 'MQDISC'  USING
                         WS-HCONN-VALUE
                         WS-CCODE-VALUE
                         WS-RCODE-VALUE.
*

*-----------------------------------------------------------------*

*-----------------------------------------------------------------*
 9900-ERR-DISPLAY.
*-----------------------------------------------------------------*
*--ERROR IN "MQ" VERB
*
     MOVE ERR-INT-RETURN-ERROR        TO ERR-CODE.
     MOVE MQI-PROC-LOCAL-QUEUE-NAME   TO ERR-QUEUE.
     PERFORM 9999-CONVERT-ERROR-INFO.

*--WRITE ERROR
     PERFORM 9999-ERROR-WRITE.
*
```

```
*--ALWAYS DISCONNECT (NOTE NO ERROR CHECKING IN DISCONNECT)

*--SYNCPOINT - ROLLBACK
     EXEC CICS SYNCPOINT
          ROLLBACK
     END-EXEC.
*
     PERFORM      5000-DISCONNECT.
     GO TO  0000-RETURN.
*

*-----------------------------------------------------------------*
 9900-CICS-PGMIDERR.
*-----------------------------------------------------------------*

*--SET MESSAGE AND CODE
     MOVE ERR-CICS-PGMIDERR  TO ERR-CODE.

*--CONVERT ERROR CODE
     PERFORM 9999-CONVERT-ERROR-INFO.

*--WRITE ERROR
     PERFORM 9999-ERROR-WRITE.

*--RETURN
     GO TO  0000-RETURN.


*-----------------------------------------------------------------*
* ERROR PROCESSING
*-----------------------------------------------------------------*
*    COPY     MQIERRCD.
/INCLUDE MQIERRCD

*--ADDED CODE FOR ABEND CONDITION

*--RETURN
     GO TO  0000-RETURN.

 9900-NO-ENVIR-SETUP.
     GO TO  0000-RETURN.
```

Appendix F. Example configuration - MQSeries for VSE/ESA Version 2.1.1

This appendix gives an example of how to set up communication links from MQSeries for VSE/ESA to MQSeries products on the following platforms:

- OS/2
- Windows NT
- AIX®
- HP-UX
- AT&T GIS UNIX[2]
- Sun Solaris
- OS/400®
- MVS/ESA without CICS

It describes the parameters needed for an LU 6.2 and TCP/IP connection. Once the connection is established, you need to define some channels to complete the configuration. This is described in “MQSeries for VSE/ESA configuration” on page 214.

Configuration parameters for an LU 6.2 connection

Table 11 on page 210 presents a worksheet listing all the parameters needed to set up communication from VSE/ESA to one of the other MQSeries platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the *MQSeries Intercommunication* book for the platform to which you are connecting.

Configuration worksheet

Use the following worksheet to record the values you will use for this configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet in the *MQSeries Intercommunication* book. The examples that follow in this chapter refer back to the values in the ID column of this table. The entries in the Parameter Name column are explained in “Explanation of terms” on page 211.

[2] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

Table 11 (Page 1 of 2). Configuration worksheet for VSE/ESA using APPC				
ID	**Parameter Name**	**Reference**	**Example Used**	**User Value**
Definition for local node				
1	Network ID		**NETID**	
2	Node name		**VSEPU**	
3	Local LU name		**VSELU**	
4	Local Transaction Program name		**MQ01**	**MQ01**
5	LAN destination address		**400074511092**	
Connection to an OS/2 system The values in this section of the table must match those used in the table for OS/2 in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**OS2**	
7	Group name		**EXAMPLE**	
8	Session name		**OS2SESS**	
9	Netname	6	**OS2LU**	
Connection to a Windows NT system The values in this section of the table must match those used in the table for Windows NT in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**WNT**	
7	Group name		**EXAMPLE**	
8	Session name		**WNTSESS**	
9	Netname	5	**WINNTLU**	
Connection to an AIX system The values in this section of the table must match those used in the table for AIX in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**AIX**	
7	Group name		**EXAMPLE**	
8	Session name		**AIXSESS**	
9	Netname	4	**AIXLU**	
Connection to an HP-UX system The values in this section of the table must match those used in the table for HP-UX in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**HPUX**	
7	Group name		**EXAMPLE**	
8	Session name		**HPUXSESS**	
9	Netname	5	**HPUXLU**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in the table for GIS UNIX in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**GIS**	
7	Group name		**EXAMPLE**	
8	Session name		**GISSESS**	
9	Netname	4	**GISLU**	

Table 11 (Page 2 of 2). Configuration worksheet for VSE/ESA using APPC				
ID	**Parameter Name**	**Reference**	**Example Used**	**User Value**
Connection to a Sun Solaris system The values in this section of the table must match those used in the table for Sun Solaris in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**SOL**	
7	Group name		**EXAMPLE**	
8	Session name		**SOLSESS**	
9	Netname	5	**SOLARLU**	
Connection to an AS/400 system The values in this section of the table must match those used in the table for AS/400 in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**AS4**	
7	Group name		**EXAMPLE**	
8	Session name		**AS4SESS**	
9	Netname	3	**AS400LU**	
Connection to an MVS/ESA system without CICS The values in this section of the table must match those used in the table for MVS/ESA in the *MQSeries Intercommunication* book, as indicated.				
6	Connection name		**MVS**	
7	Group name		**EXAMPLE**	
8	Session name		**MVSSESS**	
9	Netname	4	**MVSLU**	

Explanation of terms

1 Network ID
This is the unique ID of the network to which you are connected. Your system administrator will tell you this value.

2 Node name
This is the name of the SSCP which owns the CICS/VSE region.

3 Local LU name
This is the unique VTAM APPLID of this CICS/VSE region.

4 Transaction Program name
MQSeries applications trying to converse with this queue manager will specify a transaction name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. MQSeries for VSE/ESA uses a name of MQ01.

5 LAN destination address
This is the LAN destination address that your partner nodes will use to communicate with this host. It is usually the address of the 3745 on the same LAN as the partner node.

6 Connection name
This is a 4-character name by which each connection will be individually known in CICS RDO.

7 Group name
You choose your own 8-character name for this value. Your system may already have a group defined for connections to partner nodes. Your system administrator will give you a value to use.

8 Session name
This is an 8-character name by which each session will be individually known. For clarity we use the connection name, concatenated with 'SESS'.

9 Netname
This is the LU name of the MQSeries queue manager on the system with which you are setting up communication.

Establishing an LU 6.2 connection

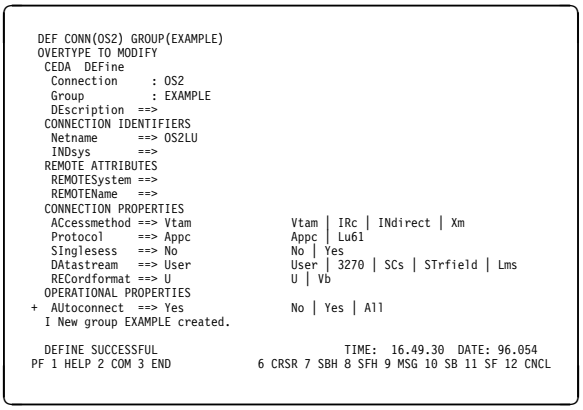
This example is for a connection to an OS/2 system. The steps are the same whatever platform you are using; change the values as appropriate.

Defining a connection

1. At a CICS command line type `CEDA DEF CONN(`*connection name*`)` **6** `GROUP(`*group name*`)` **7** . For example:

   ```
   CEDA DEF CONN(OS2) GROUP(EXAMPLE)
   ```

2. Press Enter to define a connection to CICS.



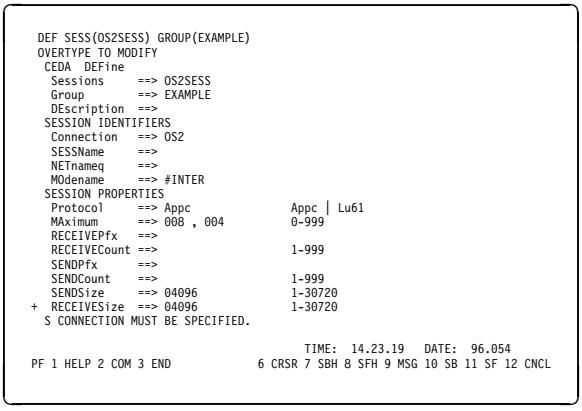
3. On the panel change the **Netname** field in the CONNECTION IDENTIFIERS section to be the LU name (**9**) of the target system.
4. In the CONNECTION PROPERTIES section set the **ACcessmethod** field to `Vtam` and the **Protocol** to `Appc`.
5. Press Enter to make the change.

Defining a session

1. At a CICS command line type `CEDA DEF SESS(`*session name*`)` **8** `GROUP(`*group name*`)` **7** . For example:

   ```
   CEDA DEF SESS(OS2SESS) GROUP(EXAMPLE)
   ```

2. Press Enter to define a session for the connection.



3. In the SESSION IDENTIFIERS section of the panel specify the Connection name (**6**) in the **Connection** field and set the **MOdename** to `#INTER`.
4. In the SESSION PROPERTIES section set the **Protocol** to `Appc` and the **MAximum** field to `008 , 004`.

Installing the new group definition

1. At a CICS command line type `CEDA INS GROUP(`*group name*`)` **7** .
2. Press Enter to install the new group definition.

   Note: If this connection group is already in use you may get severe errors reported. If this happens, take the existing connections out of service, retry the above group installation, and then set the connections in service using the following commands:

   a. `CEMT I CONN`
   b. `CEMT S CONN(*) OUTS`
   c. `CEDA INS GROUP(`*group name*`)`
   d. `CEMT S CONN(*) INS`

What next?

The LU 6.2 connection is now established. You are ready to complete the configuration. Go to “MQSeries for VSE/ESA configuration” on page 214.

Establishing a TCP/IP connection

TCP/IP connections do not require the configuration of additional profiles as does the LU 6.2 protocol. Instead, MQSeries for VSE/ESA processes the MQSeries listener program during MQSeries startup.

The MQSeries listener program waits for remote TCP/IP connection requests. As these are received, the listener starts the receiver MCA to process the remote connection. When the remote connection is received from a client program, the receiver MCA starts the MQSeries server program.

Note: There is one MQSeries server process for each client connection.

Provided that the MQ Listener is active and TCP/IP is active in a VSE partition, TCP/IP connections can be established.

MQSeries for VSE/ESA configuration

Configuring MQSeries for VSE/ESA involves the following tasks:

- Configuring channels
- Defining a local queue
- Defining a remote queue
- Defining a sender channel
- Defining a receiver channel

Note: MQSeries for VSE/ESA does not understand the format of the MQSeries channel ping command. The only way to verify your MQSeries definitions is to start the channels and put messages onto remote queues.

Configuring channels

Examples are given for connecting MQSeries for VSE/ESA and MQSeries for OS/2 Warp. If you wish connect to another MQSeries platform use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of MQSeries objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Refer to the sections “Defining a local queue” on page 218 and “Defining a remote queue” on page 219 for details of how to create queue definitions, and “Defining a SNA LU6.2 sender channel” on page 219 and “Defining a SNA LU6.2 receiver channel” on page 220 for details of how to create channels.

Table 12 (Page 1 of 3). Configuration worksheet for MQSeries for VSE/ESA

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**VSEP**	
B	Local queue name		**VSE.LOCALQ**	

Table 12 (Page 2 of 3). Configuration worksheet for MQSeries for VSE/ESA				
ID	**Parameter Name**	**Reference**	**Example Used**	**User Value**
Connection to MQSeries for OS/2 Warp				
The values in this section of the table must match those used in the worksheet table for OS/2 in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name	A	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	B	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender channel name		**VSE.OS2.SNA**	
I	Receiver channel name	G	**OS2.VSE.SNA**	
Connection to MQSeries for Windows NT				
The values in this section of the table must match those used in the worksheet table for Windows NT in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender channel name		**VSE.WINNT.SNA**	
I	Receiver channel name	G	**WINNT.VSE.SNA**	
Connection to MQSeries for AIX				
The values in this section of the table must match those used in the worksheet table for AIX in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name		**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender channel name		**VSE.AIX.SNA**	
I	Receiver channel name	G	**AIX.VSE.SNA**	
Connection to MQSeries for HP-UX				
The values in this section of the table must match those used in the worksheet table for HP-UX in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name		**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	B	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender channel name		**VSE.HPUX.SNA**	
I	Receiver channel name	G	**HPUX.VSE.SNA**	
Connection to MQSeries for AT&T GIS UNIX				
The values in this section of the table must match those used in the worksheet table for GIS UNIX in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name		**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	B	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender channel name		**VSE.GIS.SNA**	
I	Receiver channel name	G	**GIS.VSE.SNA**	

Table 12 (Page 3 of 3). Configuration worksheet for MQSeries for VSE/ESA

ID	Parameter Name	Reference	Example Used	User Value
Connection to MQSeries for Sun Solaris The values in this section of the table must match those used in the worksheet table for Sun Solaris in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name		**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender channel name		**VSE.SOLARIS.SNA**	
I	Receiver channel name	G	**SOLARIS.VSE.SNA**	
Connection to MQSeries for AS/400 The values in this section of the table must match those used in the worksheet table for AS/400 in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name		**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender channel name		**VSE.AS400.SNA**	
I	Receiver channel name	G	**AS400.VSE.SNA**	
Connection to MQSeries for OS/390 without CICS The values in this section of the table must match those used in the worksheet table for MVS/ESA in the *MQSeries Intercommunication* book, as indicated.				
C	Remote queue manager name		**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender channel name		**VSE.MVS.SNA**	
I	Receiver channel name	G	**MVS.VSE.SNA**	

For TCP/IP, the sender channel name **G** and the receiver channel name **I**, in the preceding table, can be `VSE.sys.tcp` and `sys.VSE.TCP` respectively.

In both cases `sys` represents the remote system name, for example, `OS2`. Therefore, in this case, **G** becomes `VSE.OS2.TCP` and **I** becomes `OS2.VSE.TCP`.

MQSeries for VSE/ESA sender-channel definitions

```
Local Queue
       Object Type :   L
       Object Name :   OS2              F
         Usage Mode:   T (Transmission)

Remote Queue
       Object Type :   R
       Object Name :   OS2.REMOTEQ      D
 Remote QUEUE Name :   OS2.LOCALQ       E
 Remote QM    Name :   OS2               C
 Transmission Name :   OS2               F

Sender Channel
```

```
          Channel name :   VSE.OS2.SNA        G
          Channel type :   S (Sender)
Transmission queue name :   OS2               F
         Remote Task ID :   MQTP
        Connection name :   OS2               6
```

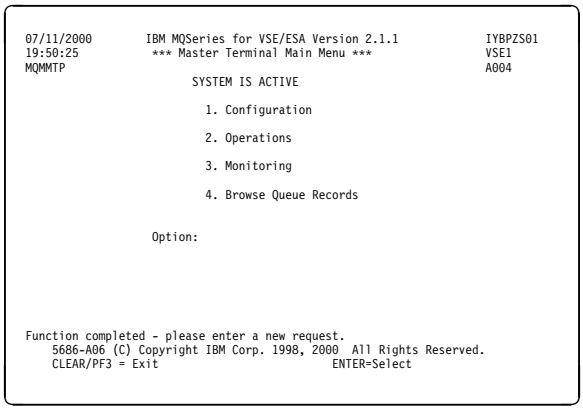
MQSeries for VSE/ESA receiver-channel definitions

```
     Local Queue
           Object type :   QLOCAL
           Object Name :   VSE.LOCALQ         B
            Usage Mode :   N (Normal)

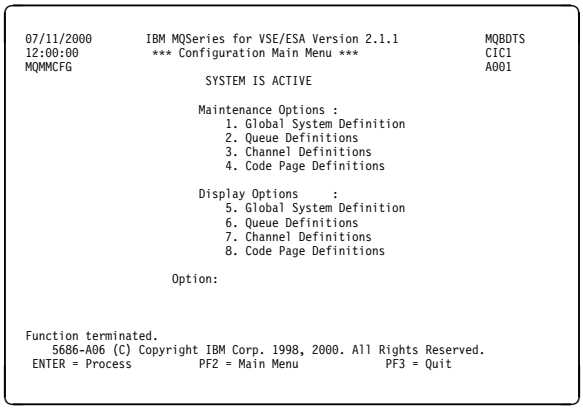
     Receiver Channel
           Channel name :   OS2.VSE.SNA       I
           Channel type :   R (Receiver)
```

Defining a local queue

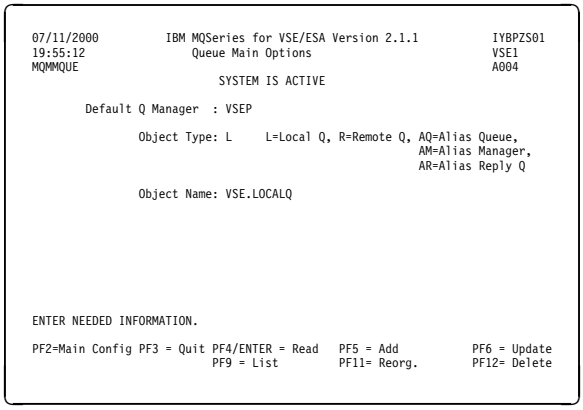
1. Run the MQSeries master terminal transaction MQMT.



2. Select option 1 to configure.

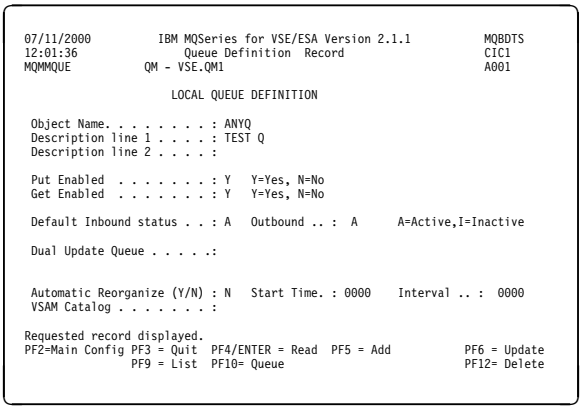


3. Select option 2 to work with queue definitions.

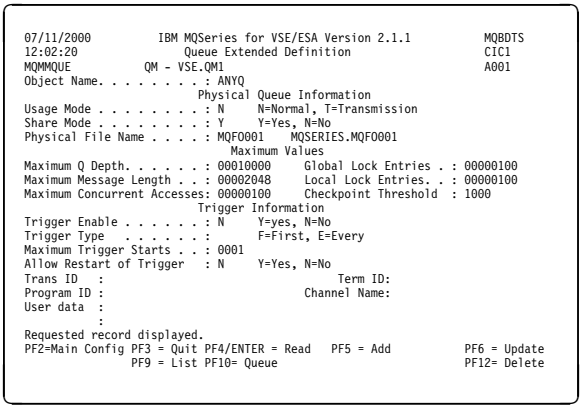


4. Select an Object type of L and specify the name of the queue.

5. Press PF5.



6. Press PF5 again.



7. Specify the name of a CICS file to store messages for this queue.

8. If you are creating a transmission queue, specify a **Usage Mode** of `T`, a **Program ID** of `MQPSEND`, and a **Channel Name**< **G** >.

   For a normal queue specify a **Usage Mode** of `N`.

9. Press PF5 again.

Defining a remote queue

1. Run the MQSeries master terminal transaction MQMT.

```
07/11/2000        IBM MQSeries for VSE/ESA Version 2.1.1            IYBPZS01
19:50:25           *** Master Terminal Main Menu ***                VSE1
MQMMTP                                                              A004
                         SYSTEM IS ACTIVE

                           1. Configuration

                           2. Operations

                           3. Monitoring

                           4. Browse Queue Records


                         Option:




Function completed - please enter a new request.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000  All Rights Reserved.
    CLEAR/PF3 = Exit                          ENTER=Select
```

2. Select option 1 to configure.

```
07/11/2000        IBM MQSeries for VSE/ESA Version 2.1.1            MQBDTS
12:00:00           *** Configuration Main Menu ***                  CIC1
MQMMCFG                                                             A001
                          SYSTEM IS ACTIVE

                        Maintenance Options :
                            1. Global System Definition
                            2. Queue Definitions
                            3. Channel Definitions
                            4. Code Page Definitions

                        Display Options     :
                            5. Global System Definition
                            6. Queue Definitions
                            7. Channel Definitions
                            8. Code Page Definitions

                       Option:



Function terminated.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

3. Select option 2 to work with queue definitions.

```
07/11/2000          IBM MQSeries for VSE/ESA Version 2.1.1           IYBPZS01
19:59:30                Queue Main Options                           VSE1
MQMMQUE                                                              A004
                            SYSTEM IS ACTIVE

        Default Q Manager  : VSEP

                Object Type: R     L=Local Q, R=Remote Q, AQ=Alias Queue,
                                                          AM=Alias Manager,
                                                          AR=Alias Reply Q

                Object Name: OS2.REMOTEQ







 ENTER NEEDED INFORMATION.

 PF2=Main Config PF3 = Quit PF4/ENTER = Read   PF5 = Add           PF6 = Update
                            PF9 = List         PF11= Reorg.       PF12= Delete
```

4. Select an **Object type** of **R** and specify the name of the queue.
5. Press PF5.

```
07/11/2000          IBM MQSeries for VSE/ESA Version 2.1.1           IYBPZS01
20:00:25                Queue Definition  Record                     VSE1
MQMMQUE           QM - VSEP                                          A004
                          REMOTE QUEUE DEFINITION

 Object Name. . . . . . . . : OS2.REMOTEQ
 Description line 1 . . . . :
 Description line 2 . . . . :

 Put Enabled  . . . . . . . : Y      Y=Yes, N=No
 Get Enabled  . . . . . . . : Y      Y=Yes, N=No



 Remote Queue Name . . . . .: OS2.LOCALQ
 Remote QM Name. . . . . . .: OS2
 Transmission Q Name . . . .: OS2


Record being added   - Press ADD key again.

PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add           PF6 = Update
                PF9 = List  PF10= Queue       PF11= Reorg.       PF12= Delete
```

6. Specify a remote queue name, remote queue manager name, and transmission queue name.
7. Press PF5.

Defining a SNA LU6.2 sender channel

1. Run the MQSeries master terminal transaction MQMT.

```
07/11/2000        IBM MQSeries for VSE/ESA Version 2.1.1            IYBPZS01
19:50:25           *** Master Terminal Main Menu ***                VSE1
MQMMTP                                                              A004
                         SYSTEM IS ACTIVE

                           1. Configuration

                           2. Operations

                           3. Monitoring

                           4. Browse Queue Records


                         Option:




Function completed - please enter a new request.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000  All Rights Reserved.
    CLEAR/PF3 = Exit                          ENTER=Select
```

2. Select option 1 to configure.

```
07/11/2000        IBM MQSeries for VSE/ESA Version 2.1.1            MQBDTS
12:00:00           *** Configuration Main Menu ***                  CIC1
MQMMCFG                                                             A001
                          SYSTEM IS ACTIVE

                        Maintenance Options :
                            1. Global System Definition
                            2. Queue Definitions
                            3. Channel Definitions
                            4. Code Page Definitions

                        Display Options     :
                            5. Global System Definition
                            6. Queue Definitions
                            7. Channel Definitions
                            8. Code Page Definitions

                       Option:



Function terminated.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

3. Select option 3 to work with channel definitions.

```
07/11/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
12:02:56                    Channel Record           DISPLAY        CIC1
MQMMCHN     Last Check Point               Last Update  00000000    A001
MSN 00000000  Time 00:00:00  Interv 000000  Create Date  20000711
Name :  VSEP.OS2.SNA
Protocol :  L   (L/T)  Port :   0000   Type :   S  (S/R/C)
Partner :  OS2

       Allocation Retries               Get Retries
    Number of Retries: 00000003       Number of Retries : 00000003
    Delay Time - fast: 00000001       Delay Time        : 00000005
    Delay Time - slow: 00000005

  Max Messages per Batch : 000050         Max Transmission Size   : 030000
  Message Sequence Wrap  : 999999         Max Message Size        : 0008192

   Mess Seq Req(Y/N): Y     Convert Msgs(Y/N): N      Split  Msg(Y/N): N

 Transmission Queue Name  : OS2
 TP Name: AMQRCS6A
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) Y      Dead Letter Store(Y/N) N
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

4. Complete the parameter fields as indicated, specifically the fields **Channel name**< **G** >, **Channel type**, **Connection ID**, **Remote task ID**, and **Transmit queue name**< **F** >.

   All other parameters can be entered as shown.

   Note that the default value for **sequence number wrap** is 999999, whereas for Version 2 MQSeries products, this value defaults to 999999999.

5. Press PF5.

Defining a SNA LU6.2 receiver channel

1. Run the MQSeries master terminal transaction MQMT.

```
07/11/2000        IBM MQSeries for VSE/ESA Version 2.1.1            IYBPZS01
19:50:25           *** Master Terminal Main Menu ***                VSE1
MQMMTP                                                              A004
                       SYSTEM IS ACTIVE

                         1. Configuration

                         2. Operations

                         3. Monitoring

                         4. Browse Queue Records

                      Option:




Function completed - please enter a new request.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000  All Rights Reserved.
    CLEAR/PF3 = Exit                          ENTER=Select
```

2. Select option 1 to configure.

```
07/11/2000        IBM MQSeries for VSE/ESA Version 2.1.1            MQBDTS
12:00:00           *** Configuration Main Menu ***                  CIC1
MQMMCFG                                                             A001
                        SYSTEM IS ACTIVE

                       Maintenance Options :
                           1. Global System Definition
                           2. Queue Definitions
                           3. Channel Definitions
                           4. Code Page Definitions

                       Display Options     :
                           5. Global System Definition
                           6. Queue Definitions
                           7. Channel Definitions
                           8. Code Page Definitions

                     Option:



Function terminated.
    5686-A06 (C) Copyright IBM Corp. 1998, 2000. All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

3. Select option 3 to work with channel definitions.

```
07/11/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
12:04:31                    Channel Record           DISPLAY        CIC1
MQMMCHN     Last Check Point               Last Update  00000000    A001
MSN 00000000  Time 00:00:00  Interv 000000  Create Date  20000711
Name :  OS2.VSEP.SNA
Protocol :  L   (L/T)  Port :   0000   Type :   R  (S/R/C)
Partner :

       Allocation Retries               Get Retries
    Number of Retries: 00000003       Number of Retries : 00000003
    Delay Time - fast: 00000001       Delay Time        : 00000005
    Delay Time - slow: 00000005

  Max Messages per Batch : 000050         Max Transmission Size   : 030000
  Message Sequence Wrap  : 999999         Max Message Size        : 0008192

   Mess Seq Req(Y/N): Y     Convert Msgs(Y/N): N      Split  Msg(Y/N): N

 Transmission Queue Name  :
 TP Name:
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) Y      Dead Letter Store(Y/N) Y
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

4. Complete the parameter fields as indicated, specifically the field **Channel name**< **L** >.

   All other parameters can be entered as shown.

5. Press PF5.

Defining a TCP/IP sender channel

To define a TCP/IP sender channel, carry out the following procedure:

1. Run the MQSeries master terminal transaction MQMT.
2. Select option 1 to configure.
3. Select option 3 to work with channel definitions. The screen shown in Figure 47 is displayed:

```
07/11/2000          IBM MQSeries for VSE/ESA Version 2.1.1          MQBDTS
12:05:01                    Channel Record          DISPLAY         CIC1
MQMMCHN     Last Check Point               Last Update  00000000    A001
MSN 00000000  Time 00:00:00  Interv 000000  Create Date  20000711
Name :  VSEP.NT.TCP
Protocol :  T   (L/T)  Port :   1414   Type :   S  (S/R/C)
Partner :  NTSERV1

        Allocation Retries               Get Retries
    Number of Retries: 00000003       Number of Retries : 00000003
    Delay Time - fast: 00000001       Delay Time        : 00000005
    Delay Time - slow: 00000005

  Max Messages per Batch : 000050         Max Transmission Size   : 030000
  Message Sequence Wrap  : 999999         Max Message Size        : 0008192

   Mess Seq Req(Y/N): Y     Convert Msgs(Y/N): N      Split  Msg(Y/N): N

 Transmission Queue Name  : VSEP.XQ3
 TP Name:
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) Y      Dead Letter Store(Y/N) Y
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

Figure 47. Channel configuration panel

4. Complete the parameter fields as follows:
   - Channel name – **G** on the configuration worksheet.
   - Partner – should contain either the domain name or the IP address of the remote host, for example NTSERV1 or 1.20.33.44.
   - Port – the port number must match the port number configured for the remote host. This is configured in the global system definition of the remote host. The default port number for MQSeries for VSE/ESA is 1414.
   - Transmission queue name – **F** on the configuration worksheet.
   - Protocol – enter `T` for TCP/IP
   - Channel type – enter `S` for sender

   Notes:

   a. The TP Name is not used by TCP/IP channels.

   b. Ensure that the parameter field values match the values of the receiver channel definition of the same name on the remote host.
5. Press PF5 (Add) to add the new channel definition.

Defining a TCP/IP receiver channel

To define a TCP/IP receiver channel, carry out the following procedure:

1. Run the MQSeries master terminal transaction MQMT.
2. Select option 1 to configure.
3. Select option 3 to work with channel definitions. The screen shown in Figure 47 on page 221 is displayed.
4. Complete the parameter fields as follows:
   - Channel name – **G** on the configuration worksheet.
   - Protocol – enter `T` for TCP/IP
   - Channel type – enter `R` for receiver.

   Notes:

   a. The Partner and Port are not required for a TCP/IP receiver channel.

   b. The TP Name is not used by TCP/IP channels.

   c. Ensure that the parameter field values match the values of the sender channel definition of the same name on the remote host.
5. Press PF5 (Add) to add the new channel definition.

Appendix G. MQSeries clients

An MQSeries client is an MQSeries system that does not include a queue manager. The MQSeries client code directs MQI calls from applications running on the client system to a queue manager on an MQSeries server system to which it is connected.

This appendix provides information about MQSeries clients that is specific to MQSeries for VSE/ESA V2.1. It should be used in conjunction with the *MQSeries Clients* book.

Client support

MQSeries for VSE/ESA V2.1 can function as an MQSeries server system to all MQSeries clients that can connect to the server using the TCP/IP protocol. However, there is no MQSeries for VSE/ESA V2.1 client.

All current clients are available from the MQSeries Web site at :

```
http://www.ibm.com/software/mqseries/
```

When an MQSeries client connects to a queue manager on MQSeries for VSE/ESA V2.1, the client can issue MQI calls as if the queue manager were local to the client program. Valid MQI calls are:

MQCONN	Connect queue manager
MQOPEN	Open message queue
MQGET	Get message
MQPUT	Put message
MQPUT1	Put one message
MQINQ	Inquire about object attributes
MQCLOSE	Close object
MQDISC	Disconnect queue manager

Security considerations

If MQSeries for VSE/ESA Version 2.1.1 is installed without the security feature, client connections are not authenticated. Channel security exits are not supported by Version 2.1.1.

If MQSeries for VSE/ESA Version 2.1.1 is installed with the security feature, MQSeries authenticates client connections via the MQ_USER_ID and MQ_PASSWORD environment variables defined under the client environment session. This means that MQSeries for VSE/ESA only provides security for clients that support these environment variables.

Once a client connection is established, all MQI calls are verified as if they were executed by the user identified by the MQ_USER_ID variable. See Chapter 8, “Security” on page 121 for more information.

Client code-page conversion tables

For client/server code-page conversion, the MQSeries server uses the Language Environment (LE) code set conversion facilities:

genxlt utility
Generates a translation table for use by the iconv utility and the iconv functions to perform code page conversion.

iconv utility
Converts a file from one code set encoding to another.

iconv functions
Functions used by the MQSeries server to perform all code-page conversions.

The `genxlt` utility generates object output that is link-edited to produce a phase. Each phase represents a translation table between two code pages. Consequently, the range of supported client/server code pages is determined by the number of phases generated using the `genxlt` utility.

The `genxlt` and `iconv` language environment utilities are fully documented in the *C Run-Time Programming Guide*, which documents all the supplied code-set converters.

You are **strongly recommended** to read the section on code-page conversion in the *C Run-Time Programming Guide*. If you need code conversion for pages that are not provided, you can edit the appropriate source-code modules and build the converters.

Appendix H. System messages

This appendix describes the messages issued by MQSeries.

MQSeries generates both internal and external messages. Internal messages are generated when an application program activates MQSeries and an abnormal condition occurs.

These messages are stored on the system log queue when it is available; otherwise, the CICS CSMT Transient Data (TD) queue is used.

API system messages

These messages consist of five lines of text, each with a maximum of 78 characters, together with two lines of error code information as follows:

Line 1 –

```
MQInnnnnn PRG:pppppppp TRN:tttt TRM:rrrr TSK:ccccc mm/dd/yy hh:mm:ss
```

Where:

`nnnnnn`	MQSeries message code – see “MQSeries message codes” on page 227
`pppppppp`	CICS Program name
`tttt`	CICS Transaction code
`rrrr`	CICS Term ID
`ccccc`	CICS Task ID
`mm/dd/yy`	Date
`hh:mm:ss`	Time

Line 2 – Textual description of message

Line 3 – Queue name, if available

Line 4 – Channel name, if available

Line 5 – Detail of message (optional)

Line 6 –

```
EIBFN:fff EIBRCODE:rrrrrrrrrrr EXEC LINE: lllll
```

Where:

`fff`	EIBFN value at time of condition
`rrrrrrrr`	EIBRCODE
`lllll`	The DEBUG CICS command number

Line 7 –

```
EIBRESP: rrrrrrr EIBRESP2: ssssssss EIBRSRCE:cccccccc ABCODE: aaaa
```

Where:

`rrrrrrrr`	EIBRESP
`ssssssss`	EIBRESP2

`cccccccc`	EIBRSRCE
`aaaa`	CICS ABENDCODE

MQSeries message definitions

Each MQSeries message provides the following information:

Explanation: This section explains what the message or code means, why it occurred, and what caused it.

Function This section indicates which modules issued the message, to assist in diagnosing problems.

Severity Severity values have the following meanings:

0 An information message. No error has occurred.

4 A warning message. A condition has been detected of which you should be aware. You may need to take further action.

8 An error message. An error has been detected that the system typically corrects. However, you may have to intervene.

10 A severe error message. An error has been detected that may severely affect user or system operation. This requires your immediate intervention.

12 A fatal error message. An error has been detected that is so severe that it causes one of the system components to end. This requires your immediate intervention.

Operator action If an operator response is necessary, this section describes what the appropriate responses are, and what their effect is. If this information is omitted, no operator response is required.

System action This part describes what is happening as a result of the condition causing the message or code. If this information is omitted, no system action is taken.

MQSeries messages

MQSeries system messages are numbered 000000 through 900000, and they are listed in this book in numeric order. However, not all numbers have been used, therefore, the list is not continuous.

MQSeries console messages are numbered from MQI0001 onwards, and they are listed in this book in numeric order; see “Console Messages” on page 242.

MQSeries message codes

000000 SYSTEM STARTED
Explanation: System has been Initialized.
Function: Master Terminal, Sender, Receiver
Severity: 0
Operator action: None
System action: None

000003 CHANNEL MESSAGE SEQUENCE NUMBER ERROR
Explanation: The received MSN does not match the expected MSN.
Function: Receiver
Severity: 8
Operator action:

1. Review the EXPECT MSN and the RECEIVED MSN in the detail portion of the message.
2. Identify the cause (proper running should preclude this occurrence).
3. Reset the appropriate MSN so that the sender and receiver channel MSNs are equal.
4. Restart communication.

System action: Fatal error – communication is ended.

000004 SYNCH MSG DUP
Explanation: The received message may be duplicated.
Function: Receiver
Severity: 0
Operator action: None
System action: Continue negotiating.

000007 LU62 SESSION STARTED
Explanation: A communication session was established by MQPRECV.
Function: Receiver
Severity: 0
Operator action: None
System action: None.

000010 LU62 FREE ERROR
Explanation: For Program MQPRECV, upon completion of a RECEIVE command neither the EIBFREE nor the EIBERR fields has low values.

For Program MQPSEND as a Server, upon completion of a RECEIVE command at least one of EIBERR, EIBRECV and EIBFREE is not equal to a low value.

As a Server or Sender, upon receipt of an acknowledgment of messages sent, the EIBFREE is not equal to a low value and the EIBERR is equal to a low value.
Function: Sender, Receiver
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message. TRM in the error message contains the EIBTRMID, which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct the problem and restart communication.

System action: Fatal error – Communication is ended.

000011 LU62 EIB ERROR
Explanation:

1. As a Server, upon completion of a RECEIVE, the EIBERR is not equal to a low values.
2. As a Server or Sender, upon receipt of an acknowledgment of messages sent, the EIBERR is not equal to a low value.

Function: Sender, Server
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message. TRM in the error message contains the EIBTRMID which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct the problem and restart communication.

System action: Fatal error – Communication is ended.

000012 LU62 STAT ERROR
Explanation: As a Server or Sender, upon receipt of an acknowledgment of messages sent, the EIBRECV is not equal to a low value.
Function: Sender, Server
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message. TRM in the error message contains the EIBTRMID which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct the problem and restart communication.

System action: Fatal error – communication is ended.

000013 LU62 ALLOC ERROR
Explanation: As a Sender, upon completion of an ALLOCATE command, EIBRCODE is not equal to a low value and all retries have been performed.
Function: Sender
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message. TRM in the error message contains the

EIBTRMID which is the principal facility associated with this error. Locate any messages associated with this principal facility.

2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct problem and restart communication.

System action: Fatal error – communication is ended.

000014 LU62 ALLOC RETRY ERROR

Explanation: As a Sender upon completion of an ALLOCATE command, EIBRCODE is not equal to low values and all retry attempts have not been performed.
Function: Sender
Severity: 10
Operator action:

1. Review System log or error TD queue for messages prior to this message. TRM in the error message contains the EIBTRMID which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.

System action: Severe error – allocation is retried until allocation is successful or the retry count equals zero.

000015 LU62 CONN ERROR

Explanation: As a Sender, upon completion of a CONNECT PROCESS command, EIBRCODE is not equal to low values.
Function: Sender
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message. TRM in the error message contains the EIBTRMID which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct the problem and restart communication.

System action: Fatal error – communication is ended.

000016 LU62 SEND ERROR

Explanation: As a Sender or Server, upon completion of a SEND command, EIBRCODE is not equal to a low value.
Function: Sender, Server
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message. TRM in the error message contains the EIBTRMID which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct the problem and restart communication.

System action: Fatal error – communication is ended.

000017 REMOTE SITE DEALLOCATED CONVERSATION

Explanation: As a Server, if a get request returns a “no message available response”, a RECEIVE command is processed. Any of the following conditions can cause this response:

1. EIBRECV is equal to a low value, or
2. EIBFREE is equal to a low value, or
3. EIBERR is equal to a low value.

Function: Sender
Severity: 8
Operator action: This is an informational message and no additional user action is normally required. The requester, by deallocating the conversation (in response to no messages being available) has caused the server to end communication.
System action: Communication is ended.

000023 INVLD RESP TYPE

Explanation: The SENDER received a response message that does not conform to the format expected.
Function: Sender
Severity: 8
Operator action: Review System log or error TD queue for messages prior to this message. Proper running should preclude this occurrence. Investigate the receiver and requester processes for programming errors.
System action: Fatal error – Communication is ended.

000024 INVLD RESP MSN

Explanation: (Reserved)

000025 FATAL RESP TYPE

Explanation: (Reserved)

000026 RECOVERABLE RESP TYPE

Explanation: (Reserved)

000029 PARSER MSN ERROR

Explanation: (Reserved)

000030 PARSER TYPE ERROR

Explanation: (Reserved)

000031 PARSER PDM ERROR

Explanation: (Reserved)

000032 PARSER SID ERROR

Explanation: (Reserved)

000033 PARSER PN ERROR

Explanation: (Reserved)

000034 PARSER KEY ERROR
Explanation: (Reserved)

000035 PARSER APID ERROR
Explanation: (Reserved)

000038 PARSER ORG DT ERROR
Explanation: (Reserved)

000039 PARSER ORIG MSN ERROR
Explanation: (Reserved)

000040 PARSER BODY ERROR
Explanation: (Reserved)

000041 PARSER STATUS ERROR
Explanation: The received message does not have the proper status value.
Function: Sender, Receiver
Severity: 8
Operator action: Review System log or error TD queue for messages prior to this message. Proper running should preclude this occurrence. Investigate the sender process for programming errors.
System action: Fatal error – communication is ended.

000042 PARSER LENGTH ERROR
Explanation: The received message does not have the proper length value.
Function: Sender, Server
Severity: 8
Operator action: Review System log or error TD queue for messages prior to this message. Proper running should preclude this occurrence. Investigate the sender process for programming errors.
System action: Fatal error – communication is ended.

000051 QUEUE CONNECTION ERROR
Explanation: The queue manager cannot be connected.
Function: Sender, Server
Severity: 12
Operator action: Review the System log or error TD queue for messages prior to this message. Proper running should preclude this occurrence. Investigate the sender process for programming errors.
System action: Fatal error – communication is ended.

000052 QUEUE OPEN ERROR
Explanation: The Server or Sender could not open the associated transmission queue.
Function: Sender, Server
Severity: 12
Operator action:

1. Review the following fields in the error message:

   QUEUE ID - Transmission queue name that failed.

   CHANNEL ID - channel name that was connected. This channel identifies the corresponding transmission queue.

   Last line of error message - Reason code returned from queuer and corresponding description.

2. Correct the problem and restart communications.

System action: Fatal error – communication is ended.

000053 QUEUE GET ERROR
Explanation: The Server or Sender could not get a message from the associated transmission queue even if there are messages in the transmission queue.
Function: Sender, Server
Severity: 12
Operator action:

1. Review the following fields in the error message:

   QUEUE ID - Transmission queue name that failed.

   CHANNEL ID - channel name that was connected. This channel identifies the corresponding transmission queue.

   Last line of error message - Reason code returned from queuer and corresponding description.

2. Correct the problem and restart communications.

System action: Fatal error – communication is ended.

000054 QUEUE PUT ERROR
Explanation: The RECEIVER could not put a message to an application queue.
Function: Receiver
Severity: 12

1. Review the following fields in the error message:

   QUEUE ID - application queue name that failed.

   CHANNEL ID - channel name that was connected.

   Last line of error message - Reason code returned from queuer and corresponding description.

2. User action is based upon returned reason code.

   For reason code MQRC-Q-FULL (2053) or MQRC-Q-SPACE-NOT-AVAILABLE (2056). The destination application queue was full and the message was placed on the dead letter queue. Determine if the destination queue should be expanded to accommodate more messages or an alternate destination used.

   All other reason codes, correct the problem and restart communications.

System action: There are two possible system actions based upon the reason code returned:

1. Reason code of MQRC-Q-FULL or MQRC-Q-SPACE-NOT-AVAILABLE. Communication proceeds normally after the first MQPUT call failed to put a message on the dead-letter queue.
2. All other reason codes constitute a fatal error and communication is ended.

000055 QUEUE PUT1 ERROR
Explanation: The RECEIVER could not put a message to the dead-letter queue.
Function: Receiver
Severity: 12
Operator action:

1. Review the following fields in the error message:

   QUEUE ID - Dead-letter queue name that failed.

   CHANNEL ID - channel name that was connected.

Last line of error message - Reason code returned from queuer and corresponding description.

2. Correct the problem and restart communications.

System action: Fatal error – communication is ended.

000056 QUEUE CLOSE ERROR
Explanation: The RECEIVER could not close an application queue.
Function: Receiver
Severity: 0
Operator action:

1. Review the following fields in the error message:

   QUEUE ID - Application queue name that failed.

   CHANNEL ID - channel name that was connected.

   Last line of error message - Reason code returned from queuer and corresponding description.

2. Correct the problem and restart communications.

System action: Communication proceeds normally, however, the resources that remain open will be closed at an appropriate time.

000057 QUEUE DISC ERROR
Explanation: An error has occurred to DISCONNECT the connecting Queue Manager.
Function: Sender, Receiver
Severity: 12
Operator action: Review the System log or error TD queue for messages prior to this message. Proper running should preclude this occurrence. Investigate the sender process for programming errors.
System action: Fatal error – communication is ended.

000060 UNDEFINED QUEUE ERROR
Explanation: (Reserved)

000080 RECV RETURN LON STATUS
Explanation: (Reserved)

000081 RECV RETURN LON TYPE
Explanation: (Reserved)

000091 SIDRC RETURN FORMAT
Explanation: (Reserved)

000100 FUNCTION STARTED
Explanation: The requested function has been started
Function: Master Terminal
Severity: 0
Operator action: none
System action: Function is started

001000 FUNCTION DONE
Explanation: The requested function has been completed
Function: Master Terminal
Severity: 0
Operator action: none
System action: Function is completed.

001090 FUNCTION NOT DONE
Explanation: The requested function was ended because of an error. The function was not completed.
Function: Master Terminal
Severity: 0
Operator action: Review the associated message prior to this one.
System action: Function is ended with an error.

005000 CHANNEL CONNECTED
Explanation: Channel connection is successful.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: Platform negotiation begins.

005001 CHANNEL NEGOTIATIONS ACCEPTED
Explanation: Channel has completed negotiation with the other platform.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: Message queue is opened.

005002 CHANNEL QUEUE OPENED
Explanation: Channel queue has been opened successfully.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: Message transfer begins.

005003 CHANNEL LU 6.2 CONNECTED
Explanation: LU 6.2 connection established.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: LU 6.2 conversation begins.

005004 CHANNEL RECEIVER ALLOCATED
Explanation: (Reserved)

005005 CHANNEL QUEUE EMPTY.
Explanation: (Reserved)

005006 CHANNEL QUEUE CLOSED
Explanation: Channel has successfully closed queue.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: Channel is disconnected.

005007 CHANNEL DISCONNECTED
Explanation: Channel has been disconnected from the other platform.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: Channel is shutdown.

005008 CHANNEL SHUTDOWN
Explanation: Channel has been completely shutdown.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: Channel is marked INACTIVE.

005009 CHANNEL SHUTDOWN REQUEST SEND
Explanation: (Reserved)

006003 CHANNEL TCP/IP CONNECTED
Explanation: TCP/IP connection established.
Function: Sender, Receiver
Severity: 0
Operator action: None
System action: TCP/IP conversation will begin.

006007 TCP/IP SESSION STARTED
Explanation: A communication session was started by the Receiver MCA.
Function: Receiver
Severity: 0
Operator action: None
System action: None

006010 TCP/IP FREE ERROR
Explanation: A TCP/IP connection terminated prematurely, possibly due to incomplete data from a remote connection.
Function: Sender, Receiver
Severity: 12
Operator action:

1. Review system log or error TD Queue for messages prior to this message. TRM in the error message contains the EIBTRMID which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Correct the problem and restart communication.

System action: Fatal error - communication is ended.

006013 TCP/IP ALLOC ERROR for program MQPTCPSV
Explanation: The MQ/Server program was unable to allocate memory.
Function: Server
Severity: 12
Operator action: This error occurs when there is insufficient memory resource available. Check that other processes are not erroneously allocating memory, or rerun the client/server conversation when the VSE host is less busy.
System action: Fatal error - Communication is ended.

006015 TCP/IP CONN ERROR for Program MQPSEND
Explanation: As a Sender upon completion of a CONNECT request, received an invalid return code.
Function: Sender
Severity: 12
Operator action:

1. Review system log or error TD Queue for messages prior to this message.
2. Produce an auxiliary trace to determine the return code returned from the connect.
3. Correct problem and restart communication.

System action: Fatal error - communication is not established.

006016 TCP/IP SEND ERROR for Program MQPSEND
Explanation: As a Sender or Server upon completion of a SEND request received an invalid return code.
Function: Sender, Server
Severity: 12
Operator action:

1. Review the system log or error TD Queue for messages prior to this message.
2. Produce an auxiliary trace to determine the return code returned from the send.
3. Correct the problem and restart communication.

System action: Fatal error - Communication is ended.

006017 TCP/IP RECV/RESP ERROR
Explanation: An attempt to receive TCP/IP data failed or the response was other than as expected.
Function: Sender, Receiver
Severity: 12
Operator action:

1. Review the system log or error TD Queue for messages prior to this message.
2. Produce an auxiliary trace to determine the return code returned from the receive.
3. Correct the problem and restart communication.

System action: Fatal error - Communication is ended.

006020 TCP/IP SOCKET ERROR
Explanation: An error occurred when opening or setting the attributes of a TCP/IP socket.
Function: Server
Severity: 12
Operator action:

1. Check that TCP/IP is installed and running.
2. Check that the TCP/IP phase is cataloged in a library that is concatenated ahead of SCEEBASE in the LIBDEF of the CICS startup JCL.

System action: Fatal error - communication cannot start.

006021 TCP/IP COMMS ERROR
Explanation: A TCP/IP conversation ended due to a transport protocol error, or an the use of a conversation was attempted before it was established.
Function: Server
Severity: 12
Operator action:

1. Check that TCP/IP is running.
2. Attempt to restart the conversation.

System action: Fatal error - communication is ended.

006022 TCP/IP LISTENER BIND ERROR
Explanation: The MQSeries Listener program attempted to bind a port number to a TCP/IP socket and was unsuccessful.
Function: Listener
Severity: 12
Operator action:

1. Check that the listener is not already running.
2. Check that another application is not using the port number configured for the Listener.

System action: Fatal error - Listener cannot start.

006023 TCP/IP LISTENER ACCEPT ERROR
Explanation: The MQSeries listener program attempted to accept a remote conversation and failed.

This is not an error if the remote program ended before the conversation was accepted.
Function: Listener
Severity: 8
Operator action:

1. Check that TCP/IP is running.
2. Restart the Listener.

System action: Error - Listener is ended.

006024 TCP/IP LISTENER ERROR
Explanation: The MQSeries listener program ended due to an unexpected error.
Function: Listener
Severity: 12
Operator action:

1. Check that TCP/IP is running.
2. Restart the listener.

System action: Fatal error - listener is ended.

006025 TCP/IP LISTENER STOPPED
Explanation: The MQSeries Listener program ended normally, or due to an error.
Function: Listener
Severity: 0
Operator action:

1. Check the previous log entries for error messages. If there are no previous error messages the listener ended normally.
2. Restart the listener when appropriate.

System action: Listener program ends.

006026 TCP/IP INVALID CHANNEL TYPE
Explanation: The channel type value in a channel definition is not valid.
Function: Server
Severity: 8
Operator action: Check the channel definition documentation for valid channel type values and update the channel definition appropriately.
System action: Error - Channel cannot be started.

006027 TCP/IP NEGOTIATE FAILED
Explanation: The conversation initial negotiation failed.
Function: Server
Severity: 8
Operator action: Check that the local and remote channel definitions are compatible.
System action: Error - channel cannot be started.

006028 TCP/IP PROTOCOL ERROR
Explanation: The protocol type value in a channel definition is not valid.
Function: Server
Severity: 8
Operator action: Check the channel definition documentation for valid protocol type values and update the channel definition appropriately.
System action: Error - Channel cannot be started.

006029 TCP/IP CONNECT FAILED
Explanation: An attempt to establish a TCP/IP connection failed.
Function: Server
Severity: 12
Operator action: Check the channel definition to ensure that the IP address and port number are valid for the intended remote host.
System action: Fatal error - conversation cannot be started.

006030 TCP/IP UNKNOWN REMOTE CHANNEL ID
Explanation: The channel name used in a remote conversation does not exist on the remote host.
Function: Server
Severity: 8
Operator action: Create the channel definition on the remote host.
System action: Error - communication is ended.

006031 TCP/IP REMOTE QMGR NOT AVAILABLE
Explanation: The queue manager identified in for a remote host is currently unavailable.
Function: Server
Severity: 8
Operator action: Start the remote queue manager on the remote host
System action: Error - communication is ended.

006032 TCP/IP CHANNEL STOPPED BY USER
Explanation: The channel being used in a remote conversation has been disabled by a user.
Function: Server
Severity: 8
Operator action: Restart the channel when appropriate.
System action: Error - communication is ended.

006033 TCP/IP CHANNEL NOT ACTIVE
Explanation: An attempt was made to use a channel that is not currently started.
Function: Server
Severity: 8
Operator action: Start the channel when appropriate.
System action: Error - communication is ended.

006034 TCP/IP CHANNEL STOPPED
Explanation: The channel stopped normally, or due to an error
Function: Server
Severity: 8
Operator action:

1. Check previous log messages for errors. If there are no errors, the channel stopped normally.
2. Restart the channel when appropriate.

System action: Channel activity is ended.

006035 TCP/IP SYNCPOINT FAILED
Explanation: An attempt to perform a CICS SYNCPOINT failed.
Function: Server
Severity: 12
Operator action: Check the system log for previous error messages.
System action: Transaction changes are rolled back.

006036 TCP/IP MESSAGE PUT TO DLQ
Explanation: A message could not be delivered and was written instead to a dead-letter queue.
Function: Server
Severity: 8
Operator action: Examine the dead-letter queue for the undelivered message.
System action: Message written to dead letter queue.

006037 TCP/IP INVALID REMOTE CHANNEL TYPE
Explanation: The channel type value in a channel definition on a remote host is not valid.
Function: Server
Severity: 8
Operator action: Check the channel definition documentation for valid channel type values and update the channel definition on the remote host appropriately.
System action: Error - Channel cannot be started.

006038 TCP/IP XMITQ GET INHIBITED
Explanation: The transmission queue identified by a channel definition has GET INHIBIT enabled.
Function: Server
Severity: 8
Operator action: Disable GET INHIBIT on the transmission queue.
System action: Error - messages cannot be read.

006039 TCP/IP REMOTE CHANNEL UNAVAILABLE
Explanation: The channel identified for a remote conversation is unavailable.
Function: Server
Severity: 8
Operator action: Start the channel on the remote host.
System action: Error - channel cannot be started.

006040 TCP/IP CHANNEL ABEND
Explanation: The channel involved in a current conversation was ended due to an error.
Function: Server
Severity: 12
Operator action: Check the system log for previous error messages.
System action: Fatal error - communication is ended.

006041 TCP/IP LISTENER STARTED
Explanation: The MQSeries Listener program started.
Function: Listener
Severity: 0
Operator action: None
System action: Listener ready to accept remote connections.

006042 TCP/IP SERVER STARTED
Explanation: The MQSeries Server program started.
Function: Server
Severity: 0
Operator action: None
System action: MQSeries Server ready to process client requests.

006043 TCP/IP SERVER STOPPED
Explanation: The MQSeries Server program stopped.
Function: Server
Severity: 4
Operator action: Check previous system log messages to determine whether this is normal or due to an error
System action: MQSeries server-client conversation ended.

006044 TCP/IP BAD SERVER COMMAREA
Explanation: The MQSeries Server program was started with a commarea that is not valid.
Function: Server
Severity: 12
Operator action: Check that the MQSeries Server is not being started by a program other than the MQSeries receiver MCA.
System action: Fatal error - MQSeries server program ended.

006045 TCP/IP SERVER ERROR
Explanation: An error occurred while the MQSeries server was processing a client conversation.
Function: Server
Severity: 8
Operator action: Check the system log for previous error messages and respond to these.
System action: MQSeries server program completed with errors.

006047 DATA CONVERSION CODE PAGE ERROR
Explanation: Data conversion from source code page to target code page is not supported.
Function: Sender
Severity: 8
Operator action: Check the requested code pages are compatible and change if necessary.
System action: The Message Data is not converted.

006050 DATA CONVERSION SOURCE CODE PAGE ERROR.
Explanation: The value in the source code page is an unknown value.
Function: Sender
Severity: 8
Operator action: Check the source code page is valid.
System action: The Message Data is not converted.

006053 DATA CONVERSION TARGET CODE PAGE ERROR
Explanation: The value in the target code page is an unknown value.
Function: Sender
Severity: 8
Operator action: Check the target code page is valid.
System action: The Message Data is not converted.

006054 DEFAULT DATA CONVERSION CODE PAGE ERROR
Explanation: Default data conversion between the specified code pages is not supported.
Function: Sender
Severity: 8
Operator action: Check the default code pages specified in the code page definition panel are compatible.
System action: The Message Data is not converted.

006054 DEFAULT DATA CONVERSION CODE PAGE ERROR
Explanation: Default data conversion between the specified code pages is not supported.
Function: Sender
Severity: 8
Operator action: Check the default code pages specified in the code page definition panel are compatible.
System action: The Message Data is not converted.

006055 DATA CONVERSION IMS STRING ERROR
Explanation: The passed IMS string is the wrong length.
Function: Sender
Severity: 8
Operator action: Change the IMS string length.
System action: The IMS message data is not converted.

006057 DATA CONVERSION PCF HEADER BAD LENGTH
Explanation: The passed PCF header is the wrong length.
Function: Sender
Severity: 8
Operator action: Change the PCF header string length. The buffer is too small for a complete PCF header.
System action: The PCF message data is not converted.

006058 DATA CONVERSION BAD ICONV RETURN CODE FOR LE CONVERSION
Explanation: Data Conversion Failed.
Function: Sender
Severity: 8
Operator action:

1. Ensure the LE/VSE code page is available.
2. Trace Data should be meaningful to MQ Support.

System action: The Message Data is not converted.

006059 DATA CONVERSION TARGET CODE PAGE SET TO SOURCE CODE PAGE
Explanation: The target code was set to null.
Function: Sender
Severity: 4
Operator action: Ensure the target code page is correctly set.
System action: Data Conversion continues.

006060 DATA CONVERSION IS NOT SUPPORTED
Explanation: Data conversion is not supported between specified code pages.
Function: Sender
Severity: 8
Operator action: Change the code pages to a pair that are supported for Data Conversion.
System action: Conversion Fails.

006063 DATA CONVERSION ERROR FINDING MQ ANCHOR RECORD
Explanation: MQ is not initialized correctly.
Function: Sender
Severity: 12
Operator action: Try restarting MQSeries
System action: Data conversion ends.

006999 TCP/IP UNEXPECTED ERROR
Explanation: An unexpected error has occurred.
Function: Server
Severity: 8
Operator action:

1. Check the system log for previous error messages.
2. Check the QCODE in this error message, which is a numeric code that is meaningful to MQ system support.

System action: Error - Server will probably end.

010000 SYSTEM STARTED W/ ERRORS
Explanation: System being initialized but some queue or channel definitions had errors.
Function: Initialization of system
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message to identify problem definition.
2. Correct the appropriate definitions.
3. Shut down and reinitialize the system.

System action: Erroneous queues or channels are marked as DISABLED.

010001 SYSTEM STARTED W/ FILE ERRORS
Explanation: System being initialized but some queue files had errors.
Function: Initialization of system
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message to identify problem definition.
2. Correct the appropriate definitions.
3. Shut down and reinitialize the system.

System action: Erroneous queues are marked DISABLED.

010002 SYSTEM STARTED W/ CHANNEL ERRORS
Explanation: System being initialized but some channel definitions had errors.
Function: Initialization of system
Severity: 12
Operator action:

1. Review System log or error TD queue for messages prior to this message to identify problem definition.
2. Correct the appropriate definitions.
3. Shut down and reinitialize the system.

System action: Erroneous channels are marked DISABLED.

010003 SYSTEM STARTED BUT SYSTEM CHANGED
Explanation: System being initialized but some definitions have been added or deleted while initialization is underway.
Function: Initialization of system
Severity: 8
Operator action: Do not perform configuration changes while the system is being initialized. Shut down and then reinitialize the system.
System action: If definitions were added then some of these definitions may not have been used.

100000 SYSTEM STOPPED
Explanation: System being stopped while application is running.
Function: System Shutdown
Severity: 0
Operator action: All applications and channels should be ended before the system is shutdown.
System action: End request.

100010 SYSTEM ACTIVE
Explanation: System being initialized but it is already active.
Function: Initialization of system
Severity: 0
Operator action: Shut down the system and initialize it again.
System action: System initialization not performed.

100011 SYSTEM STARTED W/ NO QUEUES
Explanation: System being initialized but no queue definitions found.
Function: Initialization of system
Severity: 4
Operator action: Add queue definitions and reinitialize system.
System action: System initialized.

100012 SYSTEM STARTED W/ TOO MANY QUEUES
Explanation: System being initialized but too many queues have been defined.
Function: Initialization of system
Severity: 12
Operator action: Delete some queue definitions and reinitialize the system.
System action: System initialized with some queue definitions.

100013 SYSTEM STARTED W/ TOO MANY CHANNELS
Explanation: System being Initialized but too many channel definitions found.
Function: Initialization of system
Severity: 12
Operator action: Delete some channel definitions and initialize the system.
System action: System initialized with some Channels.

100090 SYSTEM STARTED W/ NO SYSTEM DEFINITION
Explanation: System being Initialized but no System Definition found.
Function: Initialization of system
Severity: 12
Operator action: Define Global System Definition and then initialize the system.
System action: System initialization ended.

101000 QUEUE QDEPTH EXCEEDED
Explanation: The queue QDEPTH would have been exceeded if the PUT request had been performed.
Function: General (I/O modules MQPQUE1 and MQPQUE2)
Severity: 8
Operator action: Perform one of the following:

1. Empty this queue either through an application or the queue maintenance facility.
2. Expand the QDEPTH number in the QUEUE definition and refresh the information for this queue.

System action: The PUT request was ended and the problem queue marked as “MAX”.

101010 QUEUE CONCURRENT UPDATE HAS OCCURRED
Explanation: Two or more update requests were being received at one time for the same QSN record.
Function: General (I/O modules MQPQUE1 and MQPQUE2)
Severity: 8
Operator action:
1. Review all ended requests.
2. Reprocess any legitimate requests.

System action: The first request was served and the remaining were rejected.

101015 QUEUE NOT FOUND
Explanation: MQPSSQ, a subroutine to start and stop a queue, reported that the queue to be processed was not defined in the system.
Function: Start and stop queue
Severity: 8
Operator action: Reprocess any ended requests.
System action: The request was ended unsuccessfully.

101090 QUEUE STOPPED
Explanation: A request has been processed against a STOPPED queue.
Function: Start and stop queue
Severity: 4
Operator action: START the problem queue
System action: End the request.

101091 QUEUE DISABLED
Explanation: Queue had errors during initialization.
Function: Initialization of system
Severity: 8
Operator action:

1. Examine the queue definition and file allocation for problems.
2. Reinitialize System.

System action: The problem queue is marked STOPPED.

102090 QUEUE QSN NUMBER LIMIT HAS BEEN REACHED
Explanation: MQPQUE1, a subroutine serving all input-output requests for queues, detected that QSN would exceed the full word limitation of 99,999,999.
Function: General (Input-output modules MQPQUE1 and MQPQUE2)
Severity: 8
Operator action: Perform one of the following:

1. Perform file maintenance on this problem queue, for example, running the batch job MQPREORG.
2. Process the online queue maintenance facility to delete messages using “Delete by Date/time”.

System action: The PUT request for this queue was rejected.

102091 QUEUE NO SPACE AVAILABLE FOR PUT
Explanation: Queue encountered a NOSPACE condition for a PUT request.
Function: General (Input-output modules MQPQUE1 and MQPQUE2)
Severity: 8
Operator action: Perform one of the following:

1. Perform file maintenance on this problem queue, for example, running the batch job MQPREORG.
2. Process the online queue maintenance facility to delete messages using “Delete by Date/time”.

System action: End the request and mark queue “FULL”.

102092 QUEUE NO SPACE AVAILABLE
Explanation: Queue encountered errors for an UPDATE request, NOSPACE condition occurred.
Function: General (Input-output modules MQPQUE1 and MQPQUE2)
Severity: 8
Operator action: Perform one of the following:

1. Perform file maintenance on this problem queue, for example, running the batch job MQPREORG.
2. Process the online queue maintenance facility to delete messages using “Delete by Date/time”.

System action: End the request and mark queue “FULL”.

104021 DUAL QUEUE ERROR
Explanation: Dual destination queue has been STOPPED or was not initialized properly.
Function: General (Input-output modules MQPQUE1 and MQPQUE2)
Severity: 8
Operator action: Perform one of the following:

1. Try to restart the dual queue.
2. Examine and correct the queue and file definition for this queue. Refresh the queue or reinitialize system.

System action: Marked dual queue as “recovery needed”.

104022 DUAL QUEUE FILE ERROR
Explanation: Dual destination queue had file error or was not initialized properly.
Function: General (Input-output modules MQPQUE1 and MQPQUE2)
Severity: 8
Operator action: Perform one of the following:

1. Try to restart the dual queue.
2. Examine and correct the queue and file definition for this queue. Refresh the queue or reinitialize system.

System action: Marked dual queue as “recovery needed”.

104023 DUAL QUEUE LOGIC ERROR
Explanation: Dual destination queue does not match Source queue.
Function: Master Terminal
Severity: 8
Operator action: Examine and correct the queue and file definition for this queue. Refresh the queue or reinitialize system.
System action: Marked dual queue as “recovery needed”.

105090 QUEUE TRIGGER ERROR
Explanation: MQPSSQ, a subroutine to start and stop a queue, encountered an error to start MQ02, a transaction that handles the trigger function.
Function: Start and stop queue
Severity: 12
Operator action: Examine the CICS tables to correct the problem.
System action: The request was ended unsuccessfully.

105091 QUEUE TRIGGER DATA ERROR
Explanation: MQPAIP2, a program handling trigger function, received erroneous data and could not fulfil the request.
Function: Application Interface
Severity: 12
Operator action: Contact system support for MQSeries for VSE.
System action: The request was ended unsuccessfully.

109000 ACTION NOT AUTHORIZED
Explanation: NOAUTH condition flagged by CICS when a resource security check failed.
Function: General (CICS Interface)
Severity: 12
Operator action: Review security mechanism.
System action: The request was ended unsuccessfully.

300000 ACTION NOT SUPPORTED
Explanation: Module has been LINKed with an incorrect function.
Function: General (CICS Interface)
Severity: 12
Operator action: Review application for call format.
System action: End the request.

300010 PROGRAM STARTED INCORRECTLY
Explanation: Module has been STARTed with incorrect function.
Function: General (CICS Interface)
Severity: 12
Operator action: Review application for call format.
System action: End the request.

300020 PROGRAM HAS REPEATED ERRORS
Explanation: MAPFAIL condition raised in Master Terminal (MQMT) panels.
Function: General (CICS Interface)
Severity: 12
Operator action: Review PPT for MAP modules and correct the problem.
System action: End the request.

300030 QUEUE LOCK TABLE IS FULL
Explanation: Insufficient queue lock entries present to insert a new entry.
Function: General (Control Module MQPLOCK)
Severity: 12
Operator action: Review application for multiple message retrieval without a SYNCPOINT. If there is not an application problem, increase the queue lock count to a higher value. Note that this value is used to calculate an incore table.
System action: End the request.

301000 EXPECTED RECORD IS MISSING
Explanation: An expected message was found missing. This normally occurs during a Deletion request.
Function: Master Terminal
Severity: 8
Operator action: Restart the application.
System action: End the request.

301010 DUPLICATE RECORD HAS OCCURRED
Explanation: A duplicate message was found. This normally occurs during a PUT request.
Function: General (MQPQUE1)
Severity: 8
Operator action: Restart the application.
System action: End the request.

309010 QUEUE CHECKPOINT RECORD MISSING
Explanation: A queue checkpoint was requested but no checkpoint record was found on this queue.
Function: Master Terminal
Severity: 12
Operator action: Initialize the system and restart the application.
System action: End the request.

400000 LINK ERROR
Explanation: Unable to perform a LINK request.
Function: General (CICS Interface)
Severity: 12
Operator action: Examine any prior messages for actual problem.
System action: End the request.

400001 LINK DFHCOMMAREA SIZE INCORRECT
Explanation: Expected DFHCOMMAREA length was incorrect.
Function: General (CICS Interface)
Severity: 12
Operator action: Examine any prior messages for the actual problem.
System action: End the request.

400002 LINK DFHCOMMAREA DATA INCORRECT
Explanation: Expected DFHCOMMAREA data is incorrect.
Function: General (CICS Interface)
Severity: 12
Operator action: Examine any prior messages for actual problem.
System action: End the request.

400003 RETURN FROM LINK ERROR
Explanation: A LINK request ended in an abnormal condition.
Function: General (CICS Interface)
Severity: 12
Operator action: Examine any prior messages for actual problem.
System action: End the request.

400010 MOVE ERROR
Explanation: Internal MOVE of data has found corrupt data.
Function: General
Severity: 12
Operator action: Examine any prior messages for actual problem.
System action: End the request.

402000 INTERNAL STRUCTURE MISSING
Explanation: Internal Structure was found missing.
Function: General
Severity: 12
Operator action: Examine any prior messages for actual problem.
System action: End the request.

402090 INTERNAL STRUCTURE HAS ERRORS
Explanation: Internal Structure corrupted.
Function: General
Severity: 12
Operator action: Examine any prior messages for the actual problem.
System action: End the request.

501001 CHANNEL FREE ERROR
Explanation: (Reserved)

501002 EIB ERROR
Explanation: RECEIVER encounters an error:

1. Upon completion of a GETMAIN command, the EIBRCODE was not equal to low values, or
2. Upon completion of a RECEIVE command:

   RESP not equal to TERMERR, and
   EIBFREE equal to low values, and
   EIBERR not equal to low values.

Function: Receiver
Severity: 12
Operator action:

1. Review the system log or error TD queue for messages prior to this message. TRM in the error message contained the EIBTRMID, which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct the problem and restart communications.

System action: Fatal error – communication was ended.

501003 CHANNEL STAT ERROR
Explanation: (Reserved)

501004 CHANNEL ALLOC ERROR
Explanation: (Reserved)

501005 CHANNEL ALLOC RETRY ERROR
Explanation: (Reserved)

501006 CHANNEL CONNECT ERROR
Explanation: RECEIVER or SENDER cannot connect a channel.
Function: Sender, Receiver
Severity: 12
Operator action:

1. Review the following fields in the error message:

   CHANNEL ID - channel name that was being connected.

   Last line of error message - Reason code returned from queue and corresponding description.
2. Correct problem and restart communication.

System action: Fatal error – communication was ended.

501008 CHANNEL SEND ERROR
Explanation: RECEIVER issued a SEND command and its EIBRCODE is not normal (zeros).
Function: Receiver
Severity: 12
Operator action:

1. Review the system log or error TD queue for messages prior to this message. TRM in the error message contained the EIBTRMID, which is the principal facility associated with this error. Locate any messages associated with this principal facility.
2. Review the EIBRCODE, EIBRESP, and EIBRESP2 fields in the detail portion of the message. They contain information about the cause of the problem. Refer to the CICS/ESA Application Programming Reference manual for an explanation of these values.
3. Correct the problem and restart communications.

System action: Fatal error – communication was ended.

501009 RECEIVER RESPONSES WITH ERROR
Explanation: SENDER received a rejection from RECEIVER to end communication.
Function: Sender
Severity: 12
Operator action: Review the error reason code to determine the reason of the rejection and restart the communication after correction.
System action: Fatal error – communication was ended.

501010 INVALID RESPONSE TYPE
Explanation: Unsupported Message Segment Type received.
Function: Sender
Severity: 12
Operator action: Review the Segment type and restart communications without the problem type.
System action: Fatal error – communication was ended.

501011 CHANNEL RESPONSE MSN ERROR
Explanation: (Reserved)

501012 CHANNEL RESPONSE HAS FATAL ERROR
Explanation: (Reserved)

501013 CHANNEL RE-NEGOTIATION
Explanation: RECEIVER rejects a channel parameter and makes a counter proposal for renegotiation
Function: Receiver
Severity: 4
Operator action: No action is needed unless remote platform can not accept the conflicting parameter. If this happens then the conflicting parameter must be changed on this or the remote platform.
System action: Reject this proposal and continue on negotiation.

501014 UNKNOWN ENCODING
Explanation: Transmission Segment Header contains unknown encoding.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Disregard the error and continue on initiation.

501015 INVALID TRANSMISSION SEGMENT HEADER
Explanation: Transmission Segment Header contains either wrong type or invalid format.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Disregard the error and continue on initiation.

501016 UNSUPPORTED CODED CHARACTER SET ID (CCSID)
Explanation: Coded character set ID in used is not supported.
Function: Sender, Receiver
Severity: 4
Operator action: none
System action: Disregard the error and try another CCSID if any.

501017 INVALID MESSAGE SEGMENT HEADER
Explanation: Message Segment Header is invalid.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Disregard the error and re-try.

501018 INVALID TRANSMISSION QUEUE HEADER
Explanation: Transmission queue header is invalid.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Disregard the error and re-try.

501019 INITIATION ERROR
Explanation: Error encountered during initiation.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Disregard the error and continue initiation.

501020 INVALID FAP LEVEL
Explanation: The protocol in use was not supported.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Disregard the error and continue initiation.

501021 MESSAGE SIZE TOO BIG
Explanation: The message size was too large to be processed.
Function: Receiver
Severity: 4
Operator action: None
System action: Select a smaller message size and continue negotiation.

501022 MESSAGE WRAP ERROR
Explanation: The message sequence number wrap around value could not be accepted.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Select a smaller value and continue negotiation.

501023 QUEUE MANGER DOWN DURING ACCESSING DLQ
Explanation: The message was not put into the Dead Letter Queue because the system was not running.
Function: Receiver
Severity: 8
Operator action: Initiate the system using MQIT or, through the MQMT panels.
System action: Process was ended.

501024 QUEUE MANAGER IS DOWN
Explanation: Communication could not be established because the queue manager is not running.
Function: Sender, Receiver
Severity: 8
Operator action: Initiate the system using MQIT or, through the MQMT panels.
System action: Process is terminated.

501025 UNKNOWN CHANNEL ID (INBOUND)
Explanation: The communication cannot be established because the channel id received from the remote system is not defined locally.
Function: Sender, Receiver
Severity: 8
Operator action: Check the channel id to see if it is correct. Define this in the local definitions or correct the remote system as necessary.
System action: The communication session is terminated.

501026 CHANNEL ERROR
Explanation: (Reserved)

501027 CHANNEL BUSY
Explanation: SENDER reported there was a message waiting to be queued on the channel name.
Function: Sender
Severity: 12
Operator action:

1. Review the CHANNEL ID field in the error message.
2. Determine why a second channel was started.
3. Validate channel configuration.

System action: Fatal error – communication was ended.

501028 CHANNEL RE-SYNC ERROR
Explanation: Expected TCF-Confirm-Request flag was not turned on in the received initiation message.
Function: Sender, Receiver
Severity: 4
Operator action: none
System action: Disregard the error and continue on initiation.

501029 CHANNEL STATUS ERROR
Explanation: (RESERVED)

501030 MESSAGE LENGTH ERROR
Explanation: RECEIVER encountered one of the following:

1. The length of the application portion of the message specified in the header exceeded the maximum length defined for this channel.
2. The length of the application portion of the message received was not equal to the length specified in the header.

Function: Receiver
Severity: 8
Operator action: For the first explanation:

1. Review the Max Transmission Size and the Max Message Size in the detail portion of the message.
2. Check the configuration of the Receiver channel to ensure that the maximum message size was set correctly.
3. Check the configuration of the Sender.
4. Reconfigure if necessary and restart communication.

For the second explanation:

1. Review the Max Transmission Size and the Max Message Size in the detail portion of the message.
2. Proper running should preclude this occurrence. Investigate the sender and server process for programming errors.
3. Correct the problem and restart communications.

System action: Fatal error – communication was ended.

501031 MESSAGE-PER-BATCH TOO BIG
Explanation: The maximum number of messages allowed in a batch was too large to be handled.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Select a smaller size and continue negotiation.

501032 MAX TRANSMISSION SIZE TOO BIG
Explanation: The maximum transmission size was too large to be handled.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Select a smaller size and continue negotiation.

501050 RESET MSN
Explanation: Remote platform Message Sequence Number was reset.
Function: Sender, Receiver
Severity: 4
Operator action: None
System action: Validate that the MSN was within one of the current MSN on this platform.

All messages starting with 6000 are severe messages displayed on the CICS terminals from which MQSeries Administrator Dialogs (MQMT) have been started.

These messages indicate failures in the MQSeries code itself. Each message number is followed by the program name in which the failure occurred.

If after checking, and making any possible corrections, the problem persists, report this to your IBM support organization. You should include the message number, together with the names of the modules and any other information.

600001 Prog: xxxxxxxx Error detected. Contact Support.
Explanation: CICS has detected an error condition not handled by a specific routine.
Severity: 8
Operator action: Report to IBM
System action: The dialog was ended.

600005 Prog: xxxxxxxx ABEND Code zzzz Contact Support.
Explanation: The program ended due to a CICS problem and the ABEND code *zzzz* was returned to a HANDLE ABEND routine.
Severity: 8
Operator action: Report to IBM
System action: The dialog was ended.

600007 Prog: xxxxxxxx File: yyyyyyy Not Found. Contact Support.
Explanation: A request has been issued against the file *yyyyyyyy*, but it was not defined in the FCT
Severity: 8
Operator action: Contact your system administrator and check whether all MQSeries files were defined in the CICS File Control Table (FCT), and physically allocated by VSAM.
System action: The dialog was ended.

600009 Prog: xxxxxxxx File: yyyyyyy DISABLED. Contact Support.
Explanation: CICS tried to access the file *yyyyyyy* which was not enabled.
Severity: 8
Operator action: Use “CEMT S DATA” to set the file ENABLED. If the DISABLED status persists, check with the System Administrator.
System action: The dialog was ended.

600011 Prog: xxxxxxxx File: yyyyyyy ILLOGIC error. Contact Support.
Explanation: Usually this is related to file input and output. This condition is returned by CICS when the error does not fall within one of the other CICS response categories.
Severity: 8
Operator action: Report to IBM
System action: The dialog was ended.

600017 Prog: xxxxxxxx File: yyyyyyy I/O error. Contact Support.
Explanation: Normally this is due to hardware errors.
Severity: 8
Operator action: Check the System console for more details.
System action: The dialog was ended.

600019 Prog: xxxxxxxx File: yyyyyyy Record not found. Contact Support.
Explanation: The program tried to read a record but the request failed.
Severity: 8
Operator action: Report to IBM.
System action: The dialog was ended.

600021 Prog: xxxxxxxx File: yyyyyyy is not open. Contact Support.
Explanation: CICS tried to access a file which had not been opened, and was unable to open it. This can happen when the file is already in use by another partition.
Severity: 8
Operator action: Use “CEMT I DATA” and try to open it manually.
System action: The dialog was ended.

600023 Prog: xxxxxxxx INVREQ error Contact Support.
Explanation: A request was received by CICS and cannot be processed for various reasons.
Severity: 8
Operator action: Report to IBM
System action: The dialog was ended.

600025 Prog: xxxxxxxx MAPFAIL error Contact Support.
Explanation: CICS was unable to display a BMS map on the terminal.
Severity: 8
Operator action: Report to IBM
System action: The dialog was ended.

600027 Prog: xxxxxxxx TRANSID error Contact Support.
Explanation: MQseries tried to initiate a transaction, but this transaction was not found in the CICS tables.
Severity: 8
Operator action: This is probably an installation error. Check whether the MQSeries group has been correctly installed in the DFHCSD file, and activated. Use CEMT I TRAN(MQ*) to verify this. If everything appears to be correct, report the problem to IBM.
System action: The dialog was ended.

800000 CICS ERROR CONDITION REACHED
Explanation: ERROR condition of CICS occurred.
Function: General (CICS Interface)
Severity: 12
Operator action: Investigate the error.
System action: End the request.

800010 INVALID REQUEST CONDITION
Explanation: INVREQ (Invalid Request) condition of CICS reached.
Function: General (CICS Interface)
Severity: 12
Operator action: Investigate the error.
System action: End the request.

800011 ILLOGIC CONDITION
Explanation: ILLOGIC condition of CICS occurred.
Function: General (CICS Interface)
Severity: 12
Operator action: Investigate the error.
System action: End the request.

800090 ERROR CONDITION DURING CHECKPOINT PROCESSING
Explanation: A general error occurred while processing the checkpoint record of a queue file.
Function: General (I/O modules MQPQUE1 and MQPQUE2)
Severity: 12
Operator action: Use LISTCAT to review the VSAM file containing this queue file.
System action: End the request.

800099 CICS ABEND CONDITION REACHED
Explanation: ABEND condition of CICS occurred.
Function: General (CICS Interface)
Severity: 12
Operator action: Investigate the error.
System action: End the request.

801012 FILE NOTOPEN CONDITION
Explanation: A CICS file entry has been CLOSED.
Function: General (CICS Interface)
Severity: 12
Operator action: Check install of CICS table.
System action: End the request.

801019 DISABLE CONDITION
Explanation: A CICS table entry has been DISABLED.
Function: General (CICS Interface)
Severity: 12
Operator action: Check install of CICS table.
System action: End the request.

802000 NO STORAGE CONDITION
Explanation: A CICS storage is not available.
Function: General (CICS Interface)
Severity: 12
Operator action: Check that the user task has not freed storage.
System action: End the request.

803001 LENGTH ERROR CONDITION
Explanation: A record was larger than expected.
Function: General (CICS Interface)
Severity: 12
Operator action: Check that the product has been correctly installed.
System action: End the request.

808000 MAPFAIL CONDITION
Explanation: A CICS transaction is missing.
Function: General (CICS Interface)
Severity: 12
Operator action: Check install of CICS PPT table for maps.
System action: End the request.

809000 PGMIDERR CONDITION
Explanation: A CICS program id is missing.
Function: General (CICS Interface)
Severity: 12
Operator action: Check install of CICS PPT table.
System action: End the request.

809010 FILEID CONDITION
Explanation: No file was available to process.
Function: General (CICS Interface)
Severity: 12
Operator action: Check install for CICS FCT table.
System action: End the request.

809011 NOFILE CONDITION
Explanation: No file was available to process.
Function: General (CICS Interface)
Severity: 12
Operator action: Check install for CICS FCT table.
System action: End the request.

809012 IO ERROR CONDITION
Explanation: A CICS I/O error has occurred.
Function: General (CICS Interface)
Severity: 12
Operator action: Check CICS log and EIB codes.
System action: End the request.

809050 TRANIDERR CONDITION
Explanation: A CICS transaction is missing.
Function: General (CICS Interface)
Severity: 12
Operator action: Check install of CICS PCT table.
System action: End the request.

900000 ENVIRONMENT RECORD
Explanation: Setup of Environment has not been performed.
Function: Set up system
Severity: 8
Operator action: Process Transaction MQSE to setup Environment.
System action: End the request.

Console Messages

The following messages are informational only.

MQI0001I MQSeries for VSE/ESA starting initialization.
MQI0003I MQSeries initialization is complete.
MQI0005I FILE: QUEUE: (*nnnnnn*)
Explanation: *nnnnnn* can be one of:
Not found
Cannot enable
Cannot open

MQI0011I MQSeries for VSE/ESA ending.
MQI0013I MQSeries termination is complete.
MQI0021I MQSeries for VSE/ESA environment initializing.
MQI0023I MQSeries for VSE/ESA environment complete.
MQI0025I MQSeries for VSE/ESA shutdown complete.

Appendix I. Security implementation

This appendix provides a sample security configuration. The sample includes configuration for:

- MQSeries datasets
- MQSeries transactions
- MQSeries system users
- Application users
- Connections
- Queues
- Batch users
- Clients
- MQSeries startup
- MQSeries shutdown

The examples in this appendix use CA-Top Secret® as the External Security Manager (ESM).

Note: The examples in this appendix are only a sample security configuration, and are not intended to define how you should secure your VSE/ESA to CICS TS systems.

Before you install

Before installation, you need to make several decisions regarding security. The first is whether to install security or not. If you do want to install security, as this appendix assumes, you need to:

- modify the MQCICDCT sample JCL
- modify the SYSIN installation parameter file

These two steps are described in Chapter 2, “Installation” on page 9.

The MQCICDCT.Z sample DCT definition file must be modified if you want a user other than the CICS default user to log messages to the SYSTEM.LOG. Remember that logging messages requires CONNECT and QUEUE authority.

This example uses a user other than the CICS default user. The DCT definition should be changed as follows:

```
MQER     DFHDCT TYPE=INTRA,
                RSL=PUBLIC,
                DESTID=MQER,
                DESTFAC=FILE,
                USERID=MQADMIN,  <--- Note insertion
                TRANSID=MQER,
                TRIGLEV=1
```

The SYSIN.Z installation configuration file contains default settings for security, where the default is DISABLED. You must change this default to ENABLED before installation. However, you cannot do this until you have installed the MQSeries library from tape.

The relevant entries in the SYSIN parameter file follow the QMDEF heading and should be changed from:

```
QM-STATUS-SECURITY       DISABLED
QM-AUDIT-SECURITY        DISABLED
```

To:

```
QM-STATUS-SECURITY       ENABLED
QM-AUDIT-SECURITY        ENABLED
```

Note that the AUDIT parameter is not implemented in Version 2.1.1, but is reserved for future expansion. It is enabled in this example for consistency.

External security manager configuration

For MQSeries security to work, certain facilities must be available with your ESM. For CA-Top Secret®, you need to ensure the following settings exist in the system parameter file:

```
FACILITY(CICSPROD=MODE=FAIL)
FACILITY(CICSPROD=FACMATRX=YES)
FACILITY(CICSPROD=EXTSEC=YES)
FACILITY(CICSPROD=XFCT=YES)
FACILITY(CICSPROD=XDEF)
FACILITY(CICSPROD=XUSER=YES)
FACILITY(CICSPROD=RES)
```

These parameters assume that the facility of the MQSeries CICS region will be CICSPROD. If you are using CICSTEST, or a different facility, you should make the appropriate changes to the parameter file.

The `CICSPROD=RES` parameter ensures the standard MQSeries classes are available. If you change the parameter file, you also need to stop and restart your CA-Top Secret® system.

System and application users

This example uses the following system users:

CICSP1	CICS region user
CICSP1DF	CICS default user
MQM	Owner of all MQSeries resources
MQADMIN	MQSeries Startup and Administrative user

The example also uses the following application users:

JOHNS	Application user
JANED	Application user
SHELLYS	Client user
STEVEJ	Batch user

To create these users, you might use the following TSS commands:

```
--  CICS & MQ Departments
TSS CREATE(CICSP1G)  NAME('CICSP1 GROUP')         TYPE(DEPARTMENT)
TSS CREATE(MQ)       NAME('MQSERIES 2.1.1 GROUP') TYPE(DEPARTMENT)

--  CICS System Users
TSS CREATE(CICSP1)   NAME('CICSP1 REGION') TYPE(USER) FAC(BATCH)  +
                     DEPT(CICSP1G) PAS(P1CICS,0)                  +
                     MASTFAC(CICSPROD) NORESCHK NOLCFCHK NODSNCHK
TSS CREATE(CICSP1DF) NAME('CICSP1 DEFAULT USER')  TYPE(USER)      +
                     DEPT(CICSP1G) PAS(NOPW,0) FAC(CICSPROD)

--  MQ System Users
TSS CREATE(MQM)      NAME('MQM OWNER')            TYPE(USER)      +
                     DEPT(MQ) PAS(MQSER1ES,0) FAC(CICSPROD)
TSS CREATE(MQADMIN)  NAME('MQSERIES ADMIN USER')  TYPE(USER)      +
                     DEPT(CICSP1G) PAS(ADM1N,0) FAC(CICSPROD)

--  MQ Application Users
TSS CREATE(JOHNS)    NAME('JOHN SMITH')           TYPE(USER)      +
                     DEPT(MQ) PAS(SM1TH,0)   FAC(CICSPROD)
TSS CREATE(JANED)    NAME('JANE DOE')             TYPE(USER)      +
                     DEPT(MQ) PAS(D0E,0)     FAC(CICSPROD)
TSS CREATE(SHELLYS)  NAME('SHELLY SIMPSON')       TYPE(USER)      +
                     DEPT(MQ) PAS(SIMPS0N,0) FAC(CICSPROD)
TSS CREATE(STEVEJ)   NAME('STEVEN JONES')         TYPE(USER)      +
                     DEPT(MQ) PAS(J0NES,0)   FAC(BATCH,CICSPROD)
```

MQSeries datasets

Before you start up your CICS and MQSeries systems, you should consider MQSeries dataset security. There is little point in protecting MQSeries resources, but then allowing unrestricted access to the MQSeries datasets in which such objects reside.

To protect your datasets in CICS, assuming they use the default names provided with the sample JCL, you could use the following TSS commands:

```
-- Assign ownership
TSS ADD(MQM) FCT(MQFCNFG)
TSS ADD(MQM) FCT(MQFLOG)
TSS ADD(MQM) FCT(MQFMON)
TSS ADD(MQM) FCT(MQFERR)
TSS ADD(MQM) FCT(MQFREOR)
TSS ADD(MQM) FCT(MQFSSET)
TSS ADD(MQM) FCT(MQFI001)
TSS ADD(MQM) FCT(MQFI002)
TSS ADD(MQM) FCT(MQFI003)
TSS ADD(MQM) FCT(MQFO001)
TSS ADD(MQM) FCT(MQFO002)
TSS ADD(MQM) FCT(MQFO003)

-- Assign permissions to Admin user
TSS PER(MQADMIN) FCT(MQFCNFG) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFLOG)  ACC(ALL)
TSS PER(MQADMIN) FCT(MQFMON)  ACC(ALL)
TSS PER(MQADMIN) FCT(MQFERR)  ACC(ALL)
```

```
TSS PER(MQADMIN) FCT(MQFREOR) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFSSET) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFI001) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFI002) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFI003) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFO001) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFO002) ACC(ALL)
TSS PER(MQADMIN) FCT(MQFO003) ACC(ALL)
```

At this point, because the facilities matrix for CICSPROD has `XFCT= YES`, no users other than MQM and MQADMIN have access to the MQSeries datasets under CICS. Appropriate permissions for other users are described later.

You should also protect your datasets outside CICS. To do this, you might use the following:

```
TSS ADD(MQM) DSN(MQSERIES)
```

This command establishes generic ownership of all datasets that are prefixed with MQSERIES.

Protecting transactions

The `CICSPROD=XDEF` facility matrix setting ensures that users cannot run transactions without explicit permission. In this example, you grant full access to the MQADMIN user, and restricted access to application users:

```
TSS ADD(MQADMIN) TRANS(CICSPROD,MQ(G),TST(G))
```

By default, with CA-Top Secret®, transactions beginning with TS are in the protection bypass list. Because MQSeries uses TST1, TST2, and TST3 transactions, to introduce protection, you should issue the following command:

```
TSS MODIFY FAC(CICSPROD=PROTADD(TRANID=TST))
```

You should also consider protecting programs. In this example, restricting access to transactions in CICS should be sufficient, and the protection of programs is omitted.

Resource ownership

The ESM classes that are relevant to MQSeries for VSE/ESA are:

- MQADMIN
- MQCONN
- MQQUEUE

Resources defined to these classes must first have ownership. For this example, all such resources will be owned by user MQM. You can assign ownership as follows:

```
TSS ADD(MQM) MQADMIN(VSE.QM1)
TSS ADD(MQM) MQCONN(VSE.QM1)
TSS ADD(MQM) MQQUEUE(VSE.QM1)
```

Because these classes are generic, all resources prefixed VSE.QM1 are owned automatically by user MQM. At this point, no specific resources have been defined. Appropriate user permissions for class resources are described later.

Resource protection

At this point, MQSeries datasets and transactions are protected. You are now ready to grant users access to MQSeries resources. These include:

- Connections
- Queues

This example makes the following assumptions:

- All application users have authority to connect to the MQSeries queue manager.
- Queue TEST.Q1 is defined in file MQFI001.
- Queue TEST.Q2 is defined in file MQFI002.
- Queue TEST.Q3 is defined in file MQFI003.
- Application user JOHNS requires read/write authority to all three application queues.
- Application user JANED requires read/write authority to TEST.Q1 and TEST.Q2.
- Application user SHELLYS is a client user and requires authority to read/write to TEST.Q3.
- Application user STEVEJ is a batch user and requires authority to browse TEST.Q3.

To grant authority to all users to connect to the MQSeries queue manager, issue the following commands:

```
TSS PER(MQADMIN) MQCONN(VSE.QM1.CICS) ACC(READ)

TSS PER(JOHNS)   MQCONN(VSE.QM1.CICS) ACC(READ)
TSS PER(JANED)   MQCONN(VSE.QM1.CICS) ACC(READ)
TSS PER(SHELLYS) MQCONN(VSE.QM1.CICS) ACC(READ)
TSS PER(STEVEJ)  MQCONN(VSE.QM1.CICS) ACC(READ)
```

Note that the MQADMIN user is also the user assigned to the MQER DCT entry. This user must have CONNECT authority and must be able to write to the SYSTEM.LOG queue.

To grant authority to each user to access specific queues, using the assumptions listed earlier, issue the following commands:

```
TSS PER(MQADMIN) MQQUEUE(VSE.QM1) ACC(ALL)

TSS PER(JOHNS)   MQQUEUE(VSE.QM1.TEST.Q1) ACC(READ,UPDATE)
TSS PER(JOHNS)   MQQUEUE(VSE.QM1.TEST.Q2) ACC(READ,UPDATE)
TSS PER(JOHNS)   MQQUEUE(VSE.QM1.TEST.Q3) ACC(READ,UPDATE)

TSS PER(JANED)   MQQUEUE(VSE.QM1.TEST.Q1) ACC(READ,UPDATE)
TSS PER(JANED)   MQQUEUE(VSE.QM1.TEST.Q2) ACC(READ,UPDATE)

TSS PER(SHELLYS) MQQUEUE(VSE.QM1.TEST.Q3) ACC(READ,UPDATE)

TSS PER(STEVEJ)  MQQUEUE(VSE.QM1.TEST.Q3) ACC(READ)
```

Access to underlying MQSeries datasets must also be granted. Following the listed assumptions, you need to issue the following commands:

```
TSS PER(JOHNS)   FCT(MQFI001) ACC(INQUIRE,READ,WRITE)
TSS PER(JOHNS)   FCT(MQFI002) ACC(INQUIRE,READ,WRITE)
TSS PER(JOHNS)   FCT(MQFI003) ACC(INQUIRE,READ,WRITE)

TSS PER(JANED)   FCT(MQFI001) ACC(INQUIRE,READ,WRITE)
TSS PER(JANED)   FCT(MQFI002) ACC(INQUIRE,READ,WRITE)

TSS PER(SHELLYS) FCT(MQFI003) ACC(INQUIRE,READ,WRITE)

TSS PER(STEVEJ)  FCT(MQFI003) ACC(INQUIRE,READ)
```

For testing purposes, you can use the TST2 transaction, which allows users to read and write messages to queues. To allow users to use this transaction, issue the following commands:

```
TSS ADD(JOHNS)   TRANS(CICSPROD,TST2)
TSS ADD(JANED)   TRANS(CICSPROD,TST2)
```

Note that SHELLYS and STEVEJ do not need the TST2 transaction. SHELLYS is a client user and can issue MQI calls directly from a remote MQI client program. STEVEJ is a batch user and similarly can issue MQI calls from a batch partition.

Batch user permissions

Batch users identify themselves to the External Security Manager via the // ID card. For example:

```
// ID USER=STEVEJ,PWD=J0NES
```

MQSeries security uses the user name from the ID card and passes it to the MQSeries Batch Interface transaction running under CICS. The user that starts the batch interface must be a surrogate for batch users who want to use the batch interface.

In this example, you use the MQADMIN user to start the batch interface and act as surrogate to any batch users (that is, STEVEJ). To register MQADMIN as a surrogate, you can issue the following command:

```
TSS ADD(MQADMIN) SURROGAT(STEVEJ)
```

Note: For the surrogate feature to be active, the facility matrix option `XUSER=YES` must be set.

When the batch user attempts to establish a connection to the queue manager, the batch interface user (MQADMIN) starts the partner transaction (MQBX) as the batch user. This is why the batch interface user must be a surrogate for the batch user.

From this point on, all MQSeries API calls issued by the batch user will be treated as if they were issued by the batch user under CICS. Therefore, the batch user should be granted the appropriate MQCONN and MQQUEUE privileges.

The batch user also needs authority to execute the MQBX transaction, for example:

```
TSS ADD(STEVEJ) TRANS(CICSPROD,MQBX)
```

Client user permissions

Client users should be treated the same as CICS application users. For security purposes, they are the same. MQSeries API calls issued by client programs are treated as if they were issued by the client user under CICS.

In this example, the client user SHELLYS has already been granted the necessary authority to get and put messages to the TEST.Q3 queue.

Java program clients are a special case for client user permissions. Existing MQSeries Java classes may attempt to open the queue manager as an object during an MQCONN request. This means, for such clients, the client user must have READ access to the queue manager object. For example:

```
TSS PER(SHELLYS) MQQUEUE(VSE.QM1.VSE.QM1) ACC(READ)
```

Trigger permissions

Trigger programs and transactions are started automatically when an application program puts a message to a queue that is defined to start a trigger. The invocation and control of trigger instances is handled by MQSeries transaction MQ02.

Therefore, if an application user puts messages to a queue that may start a trigger instance, that user must have authority to run the MQ02 transaction.

In this example, you could define TEST.Q1 to start a trigger program every time a message is put to the queue. For example, the trigger program may get a message from TEST.Q1 and put a message on TEST.Q2. To enable application user JANED to put messages to TEST.Q1 and successfully start the trigger instance, you need to grant authority to the MQ02 transaction. For example:

```
TSS ADD(JANED) TRANS(CICSPROD,MQ02)
```

If you do not grant this authority, JANED can successfully put messages to the target queue, but the trigger instance will ABEND.

If you trigger a transaction, the application user must also have authority to run the trigger transaction. If you use program security, the application user needs authority to run the trigger program and a range of MQSeries programs (the exact programs are beyond the scope of this Appendix).

If you use the trigger option Allow Restart of Trigger in a queue definition, transaction MQSM will, when appropriate, attempt to run the MQ02 transaction. MQSM runs as the MQSeries startup user. Therefore, for security purposes, you should be careful when using the Allow Restart of Trigger feature. For details about this option, see “Trigger Information” on page 56.

CICS startup

Your CICS startup deck should include a // ID card. For the example user CICSP1, the // ID card would appear as follows:

```
// JOB jobname
// ID USER=CICSP1,PWD=P1CICS
```

You also need to identify the CICS default user as a SIT parameter. For the example user CICSP1DF, the SIT parameter would appear as follows:

```
DFLTUSER=CICSP1DF
```

Starting MQSeries

It is important that MQSeries is started by a user with sufficient authority. In this example, the user MQADMIN has full access to the MQSeries datasets, transactions, and MQSeries resources, including connection authority.

To start MQSeries, log on to CICS as MQADMIN and run the following transactions:

- MQSE
- MQIT

Another way to start MQSeries is to run 'MQSE I', or use the MQMT transaction, option 2.4.

A further option is to use the PLTPI program. The DFHPLT macro does not allow you to specify a userid with a PLTPI program. However, you can specify a SIT parameter for PLTPIUSR. For example:

```
PLTPIUSR=PLTUSER
```

In such a case, the PLTPIUSR must be authorized to the approriate resources defined by PLTPISEC.

Remember that your PLTPIUSR may run programs that are not relevant to MQSeries for VSE/ESA, so, in this example implementation, it may not be appropriate to use user MQADMIN. Therefore, you can define a special PLTPIUSR as follows:

```
--  Create the PLTPIUSR
TSS CREATE(PLTUSER)  NAME('CICS PLTPI USER')  TYPE(USER)      +
                     DEPT(CICSP1G) PAS(PLTP1,0) FAC(CICSPROD)

--  Grant surrogate authority to CICS region user
TSS ADD(CICSP1) SURROGAT(PLTUSER)

--  Grant access to MQ File Control entries
TSS PER(PLTUSER) FCT(MQFCNFG) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFLOG)  ACC(ALL)
TSS PER(PLTUSER) FCT(MQFMON)  ACC(ALL)
TSS PER(PLTUSER) FCT(MQFERR)  ACC(ALL)
TSS PER(PLTUSER) FCT(MQFREOR) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFSSET) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFI001) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFI002) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFI003) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFO001) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFO002) ACC(ALL)
TSS PER(PLTUSER) FCT(MQFO003) ACC(ALL)

--  Grant authority to necessary transactions
TSS ADD(PLTUSER) TRANS(CICSPROD,INWL,IESO,IESN,MQIT,MQSM,MQTL)
```

Note that the CICS region user must be a surrogate for the PLTPIUSR. Once again, to activate the surrogate user feature, you should include the following facilities matrix option:

```
FACILITY(CICSPROD=XUSER=YES)
```

Also, take care that you do not grant NORESCHK to the PLTPIUSR. This is because resource checking for security switches will always result in success. Success indicates that the switch is present, and security features are deactivated. In other words, if the MQSeries startup user, PLTPI or otherwise, has NORESCHK authority, MQSeries resource security will be deactivated.

If you do not identify a SIT parameter for a PLTPIUSR, CICS TS uses the CICS default user. Although it may not be appropriate to authorize the CICS default user to MQSeries resources, it is possible to use the default user for MQSeries activation during CICS initialization.

Stopping MQSeries

The MQADMIN user has the authority to stop MQSeries by running the MQST transaction (because it has authority to all MQSeries transactions).

If you want to shut down MQSeries via the PLTSD, you must ensure that the shutdown user is authorized to the appropriate resources relevant to the PLTSD phase (these may be other than MQSeries resources).

The shutdown user is the user who issues the shutdown command, for example:

```
CEMT P SHUT
```

If this command is issued from the console, the console user must have authority similar to the PLTPIUSR user described earlier. Also, the shutdown user should have authority to execute the CEMT transaction.

Appendix J. Notices

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Glossary of terms and abbreviations

This glossary defines MQSeries terms and abbreviations used in this book. If you do not find the term you are looking for, see the Index or the *IBM Dictionary of Computing*, New York: McGraw-Hill, 1994.

This glossary includes terms and definitions from the *American National Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42 Street, New York, New York 10036. Definitions are identified by the symbol (A) after the definition.

A

abend reason code. A 4-byte hexadecimal code that uniquely identifies a problem with MQSeries for MVS/ESA. A complete list of MQSeries for MVS/ESA abend reason codes and their explanations is contained in the *MQSeries for MVS/ESA Messages and Codes* manual.

active log. See *recovery log*.

adapter. An interface between MQSeries for MVS/ESA and TSO, IMS, CICS, or batch address spaces. An adapter is an attachment facility that enables applications to access MQSeries services.

address space. The area of virtual storage available for a particular job.

address space identifier (ASID). A unique, system-assigned identifier for an address space.

alert. A message sent to a management services focal point in a network to identify a problem or an impending problem.

alert monitor. In MQSeries for MVS/ESA, a component of the CICS adapter that handles unscheduled events occurring as a result of connection requests to MQSeries for MVS/ESA.

alias queue object. An MQSeries object, the name of which is an alias for a base queue defined to the local queue manager. When an application or a queue manager uses an alias queue, the alias name is resolved and the requested operation is performed on the associated base queue.

allied address space. See *ally*.

ally. An MVS address space that is connected to MQSeries for MVS/ESA.

APAR. Authorized program analysis report.

application environment. The software facilities that are accessible by an application program. On the MVS platform, CICS and IMS are examples of application environments.

application queue. A queue used by an application.

ASID. Address space identifier.

asynchronous messaging. A method of communication between programs in which programs place messages on message queues. With asynchronous messaging, the sending program proceeds with its own processing without waiting for a reply to its message. Contrast with *synchronous messaging*.

attribute. One of a set of properties that defines the characteristics of an MQSeries object.

authorization checks. Security checks that are performed when a user tries to open an MQSeries object.

authorized program analysis report (APAR). A report of a problem caused by a suspected defect in a current, unaltered release of a program.

B

backout. An operation that reverses all the changes made during the current unit of recovery or unit of work. After the operation is complete, a new unit of recovery or unit of work begins. Contrast with *commit*.

basic mapping support (BMS). An interface between CICS and application programs that formats input and output display data and routes multiple-page output messages without regard for control characters used by various terminals.

BMS. Basic mapping support.

browse. In message queuing, to use the MQGET call to copy a message without removing it from the queue. See also *get*.

browse cursor. In message queuing, an indicator used when browsing a queue to identify the message that is next in sequence.

buffer pool. An area of main storage used for MQSeries for MVS/ESA queues, messages, and object definitions. See also *page set*.

C

call back. In MQSeries, a requester message channel initiates a transfer from a sender channel by first calling the sender, then closing down and awaiting a call back.

CCSID. Coded character set identifier.

CDF. Channel definition file.

channel. See *message channel*.

channel control function (CCF). In MQSeries, a program to move messages from a transmission queue to a communication link, and from a communication link to a local queue, together with an operator panel interface to allow the setup and control of channels.

channel definition file (CDF). In MQSeries, a file containing communication channel definitions that associate transmission queues with communication links.

channel event. An event indicating that a channel instance has become available or unavailable. Channel events are generated on the queue managers at both ends of the channel.

checkpoint. A time when significant information is written on the log. Contrast with *syncpoint*.

CI. Control interval.

class. For security, a class associates a group of resources. MQSeries uses the security classes MQADMIN, MQCONN and MQQUEUE.

client. A run-time component that provides access to queuing services on a server for local user applications. The queues used by the applications reside on the server. See also *MQSeries client*.

client application. An application, running on a workstation and linked to a client, that gives the application access to queuing services on a server.

client connection channel type. The type of MQI channel definition associated with an MQSeries client. See also *server connection channel type*.

COA. Confirm-on-arrival. In reply queue processing, a reply message can be generated when a message is initially put to a queue by using the COA report option in the message descriptor of an object message.

COD. Confirm-on-delivery. In reply queue processing, a reply message can be generated when a message is initially read from a queue by using the COD report option in the message descriptor of an object message.

coded character set identifier (CCSID). The name of a coded set of characters and their code point assignments.

command. In MQSeries, an instruction that can be carried out by the queue manager.

command processor. The MQSeries component that processes commands.

command server. The MQSeries component that reads commands from the system-command input queue, verifies them, and passes valid commands to the command processor.

commit. An operation that applies all the changes made during the current unit of recovery or unit of work. After the operation is complete, a new unit of recovery or unit of work begins. Contrast with *backout*.

completion code. A return code indicating how an MQI call has ended.

connect. To provide a queue manager connection handle, which an application uses on subsequent MQI calls. The connection is made either by the MQCONN call, or automatically by the MQOPEN call.

connection handle. The identifier or token by which a program accesses the queue manager to which it is connected.

context. Information about the origin of a message.

control interval (CI). A fixed-length area of direct access storage in which VSAM stores records and creates distributed free spaces. The control interval is the unit of information that VSAM transmits to or from direct access storage.

controlled shutdown. See *quiesced shutdown*.

CPF. Command prefix.

D

DAE. Dump analysis and elimination.

datagram. The simplest message that MQSeries supports. This type of message does not require a reply.

DBCS. In data conversion, a Double Byte Character Set.

DCI. Data conversion interface.

DCT. In CICS, the Destination Control Table.

dead-letter queue (DLQ). A queue to which a queue manager or application sends messages that it cannot deliver to their correct destination.

default object. A definition of an object (for example, a queue) with all attributes defined.

deferred connection. A pending event that is activated when a CICS subsystem tries to connect to MQSeries for MVS/ESA before MQSeries for MVS/ESA has been started.

distributed application. In message queuing, a set of application programs that can each be connected to a different queue manager, but that collectively constitute a single application.

distributed queue management (DQM). In message queuing, the setup and control of message channels to queue managers on other systems.

DLQ. Dead-letter queue.

DQM. Distributed queue management.

dump analysis and elimination (DAE). An MVS service that enables an installation to suppress SVC dumps and ABEND SYSUDUMP dumps that are not needed because they duplicate previously written dumps.

E

environment. See *application environment*.

ESM. External security manager.

event. See *channel event*.

event log. See *application log*.

external security manager (ESM). A security product that is invoked by the MVS System Authorization Facility. RACF® is an example of an ESM.

F

FCT. In CICS, the File Control Table.

FIFO. First-in-first-out.

first-in-first-out (FIFO). A queuing technique in which the next item to be retrieved is the item that has been in the queue for the longest time. (A)

forced shutdown. A type of shutdown of the CICS adapter where the adapter immediately disconnects from MQSeries for MVS/ESA, regardless of the state of any currently active tasks. Contrast with *quiesced shutdown*.

FRR. Functional recovery routine.

functional recovery routine (FRR). An MVS recovery/termination manager facility that enables a recovery routine to gain control in the event of a program interrupt.

G

get. In message queuing, to use the MQGET call to remove a message from a queue. See also *browse*.

H

handle. See *connection handle* and *object handle*.

I

immediate shutdown. In MQSeries, a shutdown of a queue manager that does not wait for applications to disconnect. Current MQI calls are allowed to complete, but new MQI calls fail after an immediate shutdown has been requested. Contrast with *quiesced shutdown* and *preemptive shutdown*.

initiation queue. A local queue on which the queue manager puts trigger messages.

input/output parameter. A parameter of an MQI call in which you supply information when you make the call, and in which the queue manager changes the information when the call completes or fails.

input parameter. A parameter of an MQI call in which you supply information when you make the call.

Interactive System Productivity Facility (ISPF). An IBM licensed program that serves as a full-screen editor and dialog manager. It is used for writing application programs, and provides a means of generating standard screen panels and interactive dialogues between the application programmer and terminal user.

IP Address. Internet Protocol address. Usually a four-part dotted decimal value that uniquely identifies a remote host, for example, 1.20.33.444.

ISO. International Standards Organization. In data conversion, ISO code pages are those that conform to ISO definitions.

L

listener. A communications program that runs while MQSeries is active. The Listener program waits for connection requests from Sender MCAs or from client programs. For MQSeries for VSE/ESA V2.1, the Listener exclusively waits for TCP/IP connection requests and starts the Receiver MCA.

local definition. An MQSeries object belonging to a local queue manager.

local definition of a remote queue. An MQSeries object belonging to a local queue manager. This object defines the attributes of a queue that is owned by another queue manager. In addition, it is used for queue-manager aliasing and reply-to-queue aliasing.

local queue. A queue that belongs to the local queue manager. A local queue can contain a list of messages waiting to be processed. Contrast with *remote queue*.

local queue manager. The queue manager to which a program is connected and that provides message queuing services to the program. Queue managers to which a program is not connected are called *remote queue managers*, even if they are running on the same system as the program.

log. In MQSeries, a file recording the work done by queue managers while they receive, transmit, and deliver messages.

logical unit of work (LUW). See *unit of work*.

M

machine check interrupt. An interruption that occurs as a result of an equipment malfunction or error. A machine check interrupt can be either hardware recoverable, software recoverable, or non-recoverable.

MCA. Message channel agent.

MCI. Message channel interface.

message. (1) In message queuing applications, a communication sent between programs. See also *persistent message* and *nonpersistent message*. (2) In system programming, information intended for the terminal operator or system administrator.

message channel. In distributed message queuing, a mechanism for moving messages from one queue manager to another. A message channel comprises two message channel agents (a sender and a receiver) and a communication link. Contrast with *MQI channel*.

message channel agent (MCA). A program that transmits prepared messages from a transmission queue to a communication link, or from a communication link to a destination queue.

message descriptor. Control information describing the message format and presentation that is carried as part of an MQSeries message. The format of the message descriptor is defined by the MQMD structure.

message priority. In MQSeries, an attribute of a message that can affect the order in which messages on a queue are retrieved, and whether a trigger event is generated.

message queue. Synonym for *queue*.

message queue interface (MQI). The programming interface provided by the MQSeries queue managers. This programming interface allows application programs to access message queuing services.

message queuing. A programming technique in which each program within an application communicates with the other programs by putting messages on queues.

message sequence numbering. A programming technique in which messages are given unique numbers during transmission over a communication link. This enables the receiving process to check whether all messages are received, to place them in a queue in the original order, and to discard duplicate messages.

messaging. See *synchronous messaging* and *asynchronous messaging*.

MQI. Message queue interface.

MQI channel. Connects an MQSeries client to a queue manager on a server system, and transfers only MQI calls and responses in a bidirectional manner. Contrast with *message channel*.

MQMD. MQSeries Message Descriptor. The MQMD is a data structure that is prefixed to all MQSeries messages.

MQSeries. A family of IBM licensed programs that provides message queuing services.

MQSeries client. Part of an MQSeries product that can be installed on a system without installing the full queue manager. The MQSeries client accepts MQI calls from applications and communicates with a queue manager on a server system.

N

null character. The character that is represented by X'00'.

O

object. In MQSeries, an object is a queue manager, a queue, a process definition, a channel, a namelist (MVS/ESA only), or a storage class (MVS/ESA only).

object descriptor. A data structure that identifies a particular MQSeries object. Included in the descriptor are the name of the object and the object type.

object handle. The identifier or token by which a program accesses the MQSeries object with which it is working.

output parameter. A parameter of an MQI call in which the queue manager returns information when the call completes or fails.

P

page set. A VSAM data set used when MQSeries for MVS/ESA moves data (for example, queues and messages) from buffers in main storage to permanent backing storage (DASD).

| **PCT**. In CICS, the Program Control Table.

pending event. An unscheduled event that occurs as a result of a connect request from a CICS adapter.

persistent message. A message that survives a restart of the queue manager.

ping. In distributed queuing, a diagnostic aid that uses the exchange of a test message to confirm that a message channel or a TCP/IP connection is functioning.

platform. In MQSeries, the operating system under which a queue manager is running.

point of recovery. In MQSeries for MVS/ESA, the term used to describe a set of backup copies of MQSeries for MVS/ESA page sets and the corresponding log data sets required to recover these page sets. These backup copies provide a potential restart point in the event of page set loss (for example, page set I/O error).

preemptive shutdown. In MQSeries, a shutdown of a queue manager that does not wait for connected applications to disconnect, nor for current MQI calls to complete. Contrast with *immediate shutdown* and *quiesced shutdown*.

port. A unique communications identifier used by TCP/IP programs to establish a conversation with a specific application. The target application binds a TCP/IP socket to the unique port number and then waits for connection requests for the port from remote hosts.

| **PPT**. In CICS, the Processing Program Table.

program temporary fix (PTF). A solution or by-pass of a problem diagnosed by IBM field engineering as the result of a defect in a current, unaltered release of a program.

PTF. Program temporary fix.

Q

queue. An MQSeries object. Message queuing applications can put messages on, and get messages from, a queue. A queue is owned and maintained by a queue manager. Local queues can contain a list of messages waiting to be processed. Queues of other types cannot contain messages—they point to other queues, or can be used as models for dynamic queues.

queue manager. (1) A system program that provides queuing services to applications. It provides an application programming interface so that programs can access messages on the queues that the queue manager owns. See also *local queue manager* and *remote queue manager*. (2) An MQSeries object that defines the attributes of a particular queue manager.

queue manager event. An event that indicates:

- An error condition has occurred in relation to the resources used by a queue manager. For example, a queue is unavailable.
- A significant change has occurred in the queue manager. For example, a queue manager has stopped or started.

queuing. See *message queuing*.

quiesced shutdown. (1) In MQSeries, a shutdown of a queue manager that allows all connected applications to disconnect. Contrast with *immediate shutdown* and *preemptive shutdown*. (2) A type of shutdown of the CICS adapter where the adapter disconnects from MQSeries, but only after all the currently active tasks have been completed. Contrast with *forced shutdown*.

quiescing. In MQSeries, the state of a queue manager prior to it being stopped. In this state, programs are allowed to finish processing, but no new programs are allowed to start.

R

reason code. A return code that describes the reason for the failure or partial success of an MQI call.

receiver channel. In message queuing, a channel that responds to a sender channel, takes messages from a communication link, and puts them on a local queue.

relative byte address (RBA). The displacement in bytes of a stored record or control interval from the beginning of the storage space allocated to the data set to which it belongs.

remote queue. A queue belonging to a remote queue manager. Programs can put messages on remote queues, but they cannot get messages from remote queues. Contrast with *local queue*.

remote queue manager. To a program, a queue manager that is not the one to which the program is connected.

remote queue object. See *local definition of a remote queue*.

remote queuing. In message queuing, the provision of services to enable applications to put messages on queues belonging to other queue managers.

reply message. A type of message used for replies to request messages.

reply-to queue. The name of a queue to which the program that issued an MQPUT call wants a reply message or report message sent.

report message. A type of message that gives information about another message. A report message can indicate that a message has been delivered, has arrived at its destination, has expired, or could not be processed for some reason.

requester channel. In message queuing, a channel that may be started remotely by a sender channel. The requester channel accepts messages from the sender channel over a communication link and puts the messages on the local queue designated in the message. See also *server channel*.

request message. A type of message used to request a reply from another program.

resolution path. The set of queues that are opened when an application specifies an alias or a remote queue on input to an MQOPEN call.

resource. Any facility of the computing system or operating system required by a job or task.

resource manager. An application, program, or transaction that manages and controls access to shared resources such as memory buffers and data sets. MQSeries, CICS, and IMS are resource managers.

responder. In distributed queuing, a program that replies to network connection requests from another system.

resynch. In MQSeries, an option to direct a channel to start up and resolve any in-doubt status messages, but without restarting message transfer.

return codes. The collective name for completion codes and reason codes.

rollback. Synonym for *back out*.

RTM. Recovery termination manager.

S

SAF. System Authorization Facility. SAF is an interface between the VSE/ESA operating system and external security managers. The SAF interface is used for security purposes.

SBCS. In data conversion, a Single Byte Character Set.

sender channel. In message queuing, a channel that initiates transfers, removes messages from a transmission queue, and moves them over a communication link to a receiver or requester channel.

sequential delivery. In MQSeries, a method of transmitting messages with a sequence number so that the receiving channel can reestablish the message sequence when storing the messages. This is required where messages must be delivered only once, and in the correct order.

sequential number wrap value. In MQSeries, a method of ensuring that both ends of a communication link reset their current message sequence numbers at the same time. Transmitting messages with a sequence number ensures that the receiving channel can reestablish the message sequence when storing the messages.

server. (1) In MQSeries, a queue manager that provides queue services to client applications running on a remote workstation. (2) The program that responds to requests for information in the particular two-program, information-flow model of client/server. See also *client*.

server channel. In message queuing, a channel that responds to a requester channel, removes messages

from a transmission queue, and moves them over a communication link to the requester channel.

server connection channel type. The type of MQI channel definition associated with the server that runs a queue manager. See also *client connection channel type*.

session ID. In MQSeries for MVS/ESA, the CICS-unique identifier that defines the communication link to be used by a message channel agent when moving messages from a transmission queue to a link.

shutdown. See *immediate shutdown*, *preemptive shutdown*, and *quiesced shutdown*.

single-phase backout. A method in which an action in progress must not be allowed to finish, and all changes that are part of that action must be undone.

single-phase commit. A method in which a program can commit updates to a queue without coordinating those updates with updates the program has made to resources controlled by another resource manager. Contrast with *two-phase commit*.

SSID. Subsystem Identifier. An SSID is usually synonymous with an MQSeries queue manager name.

socket. A communications handle used by TCP/IP programs to send data to, and receive data from, a remote host.

subsystem. In MVS, a group of modules that provides function that is dependent on MVS. For example, MQSeries for MVS/ESA is an MVS subsystem.

symptom string. Diagnostic information displayed in a structured format designed for searching the IBM software support database.

synchronous messaging. A method of communication between programs in which programs place messages on message queues. With synchronous messaging, the sending program waits for a reply to its message before resuming its own processing. Contrast with *asynchronous messaging*.

syncpoint. An intermediate or end point during processing of a transaction at which the transaction's protected resources are consistent. At a syncpoint, changes to the resources can safely be committed, or they can be backed out to the previous syncpoint.

system initialization table (SIT). A table containing parameters used by CICS on start up.

T

target library high-level qualifier (thlqual). High-level qualifier for MVS/ESA target data set names.

task switching. The overlapping of I/O operations and processing between several tasks.

TCP/IP. Transmission Control Protocol, Internet Protocol. TCP/IP is a family of communications protocols.

termination notification. A pending event that is activated when a CICS subsystem successfully connects to MQSeries for MVS/ESA.

thlqual. Target library high-level qualifier.

thread. In MQSeries, the lowest level of parallel execution available on an operating system platform.

time-independent messaging. See *asynchronous messaging*.

trace. In MQSeries, a facility for recording MQSeries activity. The destinations for trace entries can include GTF and the system management facility (SMF).

tranid. See *transaction identifier*.

transaction identifier. In CICS, a name that is specified when the transaction is defined, and that is used to invoke the transaction.

transmission program. See *message channel agent*.

transmission queue. A local queue on which prepared messages destined for a remote queue manager are temporarily stored.

triggering. In MQSeries, a facility allowing a queue manager to start an application automatically when predetermined conditions on a queue are satisfied.

trigger message. A message containing information about the program that a trigger monitor is to start.

trigger monitor. A continuously-running application serving one or more initiation queues. When a trigger message arrives on an initiation queue, the trigger monitor retrieves the message. It uses the information in the trigger message to start a process that serves the queue on which a trigger event occurred.

two-phase commit. A protocol for the coordination of changes to recoverable resources when more than one resource manager is used by a single transaction. Contrast with *single-phase commit*.

U

undelivered-message queue. See *dead-letter queue*.

Unicode. Codepage UCS-2 is the Universal Multiple-Octet Coded Character Set defined by ISO/IEC 10646-1:1993(EE).

unit of recovery. A recoverable sequence of operations within a single resource manager. Contrast with *unit of work*.

unit of work. A recoverable sequence of operations performed by an application between two points of consistency. A unit of work begins when a transaction starts or after a user-requested syncpoint. It ends either at a user-requested syncpoint or at the end of a transaction. Contrast with *unit of recovery*.

utility. In MQSeries, a supplied set of programs that provide the system operator or system administrator with facilities in addition to those provided by the MQSeries commands. Some utilities invoke more than one function.

Bibliography

This section describes the documentation available for all current MQSeries products.

MQSeries cross-platform publications

Most of these publications, which are sometimes referred to as the MQSeries "family" books, apply to all MQSeries Level 2 products. The latest MQSeries Level 2 products are:

- MQSeries for AIX, V5.1
- MQSeries for AS/400, V5.1
- MQSeries for AT&T GIS UNIX V2.2
- MQSeries for Compaq Tru64 UNIX, V5.1
- MQSeries for Compaq (DIGITAL) OpenVMS, V2.2.1.1
- MQSeries for Compaq Tru64 UNIX, V5.1
- MQSeries for HP-UX, V5.1
- MQSeries for OS/2 Warp, V5.1
- MQSeries for OS/390, V2.2
- MQSeries for SINIX and DC/OSx, V2.2
- MQSeries for Sun Solaris, V5.1
- MQSeries for Tandem NonStop Kernel, V2.2.0.1
- MQSeries for VSE/ESA V2.1
- MQSeries for Windows V2.0
- MQSeries for Windows V2.1
- MQSeries for Windows NT, V5.1

Any exceptions to this general rule are indicated.

MQSeries Brochure
The *MQSeries Brochure*, G511-1908, gives a brief introduction to the benefits of MQSeries. It is intended to support the purchasing decision, and describes some authentic customer use of MQSeries.

MQSeries: An Introduction to Messaging and Queuing
MQSeries: An Introduction to Messaging and Queuing, GC33-0805, describes briefly what MQSeries is, how it works, and how it can solve some classic interoperability problems. This book is intended for a more technical audience than the *MQSeries Brochure*.

MQSeries Intercommunication
The *MQSeries Intercommunication* book, SC33-1872, defines the concepts of distributed queuing and explains how to set up a distributed queuing network in a variety of MQSeries environments. In particular, it demonstrates how to (1) configure communications to and from a representative sample of MQSeries products, (2) create required MQSeries objects, and (3) create and configure MQSeries channels. The use of channel exits is also described.

MQSeries Queue Manager Clusters
MQSeries Queue Manager Clusters, SC34-5349, describes MQSeries clustering. It explains the concepts and terminology and shows how you can benefit by taking advantage of clustering. It details changes to the MQI, and summarizes the syntax of new and changed MQSeries commands. It shows a number of examples of tasks you can perform to set up and maintain clusters of queue managers.

This book applies to the following MQSeries products only:

- MQSeries for AIX V5.1
- MQSeries for AS/400 V5.1
- MQSeries for HP-UX V5.1
- MQSeries for OS/2 Warp V5.1
- MQSeries for OS/390 V2.2
- MQSeries for Sun Solaris V5.1
- MQSeries for Windows NT V5.1

MQSeries Clients
The *MQSeries Clients* book, GC33-1632, describes how to install, configure, use, and manage MQSeries client systems.

MQSeries System Administration
The *MQSeries System Administration* book, SC33-1873, supports day-to-day management of local and remote MQSeries objects. It includes topics such as security, recovery and restart, transactional support, problem determination, and the dead-letter queue handler. It also includes the syntax of the MQSeries control commands.

This book applies to the following MQSeries products only:

- MQSeries for AIX, V5.1
- MQSeries for HP-UX, V5.1
- MQSeries for OS/2 Warp, V5.1
- MQSeries for Sun Solaris, V5.1
- MQSeries for Windows NT, V5.1

MQSeries MQSC Command Reference
The *MQSeries MQSC Command Reference*, SC33-1369, contains the syntax of the MQSC commands, which are used by MQSeries system operators and administrators to manage MQSeries objects.

MQSeries Event Monitoring
MQSeries Event Monitoring, SC34-5760, describes how to use MQSeries instrumentation events.

MQSeries Programmable System Management
The *MQSeries Programmable System Management* book, SC33-1482, provides both reference and guidance information for users of MQSeries

Programmable Command Format (PCF) messages and installable services.

MQSeries Administration Interface Programming Guide and Reference
The *MQSeries Administration Interface Programming Guide and Reference*, SC34-5390, provides information for users of the MQAI. The MQAI is a programming interface that simplifies the way in which applications manipulate Programmable Command Format (PCF) messages and their associated data structures.

This book applies to the following MQSeries products only:

- MQSeries for AIX V5.1
- MQSeries for AS/400 V5.1
- MQSeries for HP-UX V5.1
- MQSeries for OS/2 Warp V5.1
- MQSeries for Sun Solaris V5.1
- MQSeries for Windows NT V5.1

MQSeries Messages
The *MQSeries Messages* book, GC33-1876, which describes "AMQ" messages issued by MQSeries, applies to these MQSeries products only:

- MQSeries for AIX, V5.1
- MQSeries for HP-UX, V5.1
- MQSeries for OS/2 Warp, V5.1
- MQSeries for Sun Solaris, V5.1
- MQSeries for Windows NT, V5.1
- MQSeries for Windows V2.0
- MQSeries for Windows V2.1

This book is available in softcopy only.

For other MQSeries platforms, the messages are supplied with the system. They do not appear in softcopy manual form.

MQSeries Application Programming Guide
The *MQSeries Application Programming Guide*, SC33-0807, provides guidance information for users of the message queue interface (MQI). It describes how to design, write, and build an MQSeries application. It also includes full descriptions of the sample programs supplied with MQSeries.

MQSeries Application Programming Reference
The *MQSeries Application Programming Reference*, SC33-1673, provides comprehensive reference information for users of the MQI. It includes: data-type descriptions; MQI call syntax; attributes of MQSeries objects; return codes; constants; and code-page conversion tables.

MQSeries Programming Interfaces Reference Summary
The *MQSeries Programming Interfaces Reference Summary*, SX33-6095, summarizes programming interfaces information including the application programming interface, the application messaging interface, event messages, PCF messages, and installable services.

MQSeries Using C++
MQSeries Using C++, SC33-1877, provides both guidance and reference information for users of the MQSeries C++ programming-language binding to the MQI. MQSeries C++ is supported by these MQSeries products:

- MQSeries for AIX, V5.1
- MQSeries for HP-UX, V5.1
- MQSeries for OS/2 Warp, V5.1
- MQSeries for AS/400, V5.1
- MQSeries for OS/390, V2.1
- MQSeries for Sun Solaris, V5.1
- MQSeries for Windows NT, V5.1

MQSeries C++ is also supported by MQSeries clients supplied with these products and installed in the following environments:

- AIX
- HP-UX
- OS/2
- Sun Solaris
- Windows NT
- Windows 3.1
- Windows 95 and Windows 98

MQSeries Using Java
MQSeries Using Java, SC34-5456, provides both guidance and reference information for users of the MQSeries Bindings for Java and the MQSeries Client for Java. MQSeries classes for Java are supported by these MQSeries products:

- MQSeries for AIX, V5.1
- MQSeries for AS/400, V5.1
- MQSeries for HP-UX, V5.1
- MQSeries for MVS/ESA V1.2
- MQSeries for OS/2 Warp, V5.1
- MQSeries for Sun Solaris, V5.1
- MQSeries for Windows NT, V5.1

This book is available in softcopy only.

MQSeries Application Messaging Interface
MQSeries Application Messaging Interface, SC34-5604, describes how to use the application messaging interface, which is an easy-to-use interface to the MQI.

MQSeries platform-specific publications

Each MQSeries product is documented in at least one platform-specific publication, in addition to the MQSeries family books.

MQSeries for AIX

MQSeries for AIX Version 5 Release 1 Quick Beginnings, GC33-1867

MQSeries for AS/400

MQSeries for AS/400 Version 5 Release 1 Quick Beginnings, GC34-5557

MQSeries for AS/400 Version 5 Release 1 System Administration, SC34-5558

MQSeries for AS/400 Version 5 Release 1 Application Programming Reference (ILE RPG), SC34-5559

MQSeries for AT&T GIS UNIX

MQSeries for AT&T GIS UNIX Version 2 Release 2 System Management Guide, SC33-1642

MQSeries for Compaq (DIGITAL) OpenVMS

MQSeries for Compaq (DIGITAL) OpenVMS Version 2 Release 2.1.1 System Management Guide, GC33-1791

MQSeries for Compaq Tru64 UNIX

MQSeries for Compaq Tru64 UNIX, Version 5.1 Quick Beginnings, GC34-5684

MQSeries for HP-UX

MQSeries for HP-UX Version 5 Release 1 Quick Beginnings, GC33-1869

MQSeries for OS/2 Warp

MQSeries for OS/2 Warp Version 5 Release 1 Quick Beginnings, GC33-1868

MQSeries for OS/390

MQSeries for OS/390 Version 2 Release 2 Licensed Program Specifications, GC34-5377

MQSeries for OS/390 Version 2 Release 2 Program Directory

MQSeries for OS/390 Version 2 Release 2 Messages and Codes, GC34-5375

MQSeries for OS/390 Version 2 Release 2 Problem Determination Guide, GC34-5376

MQSeries for OS/390 Version 2 Release 2 Concepts and Planning Guide, SC34-5650

MQSeries for OS/390 Version 2 Release 2 System Setup Guide, SC34-5651

MQSeries for OS/390 Version 2 Release 2 System Administration Guide, SC34-5652

MQSeries Publish/Subscribe

MQSeries Publish Subscribe User's Guide, GC34-5269

MQSeries link for R/3

MQSeries link for R/3 Version 1 Release 2 User's Guide, GC33-1934

MQSeries for SINIX and DC/OSx

MQSeries for SINIX and DC/OSx Version 2 Release 2 System Management Guide, GC33-1768

MQSeries for Sun Solaris

MQSeries for Sun Solaris Version 5 Release 1 Quick Beginnings, GC33-1870

MQSeries for Tandem NonStop Kernel

MQSeries for Tandem NonStop Kernel Version 2 Release 2.0.1 System Management Guide, GC33-1893

MQSeries for VSE/ESA

MQSeries for VSE/ESA Version 2 Release 1 Licensed Program Specifications, GC34-5365

MQSeries for VSE/ESA Version 2 Release 1 System Management Guide, GC34-5364

MQSeries for Windows

MQSeries for Windows Version 2 Release 0 User's Guide, GC33-1822

MQSeries for Windows Version 2 Release 1 User's Guide, GC33-1965

MQSeries for Windows NT

MQSeries for Windows NT Version 5 Release 1 Quick Beginnings, GC34-5389

MQSeries for Windows NT Using the Component Object Model Interface, SC34-5387

MQSeries LotusScript Extension, SC34-5404

Softcopy books

Most of the MQSeries books are supplied in both hardcopy and softcopy formats.

BookManager format

The MQSeries library is supplied in IBM BookManager® format on a variety of online library collection kits, including the *Transaction Processing and Data* collection kit, SK2T-0730. You can view the softcopy books in IBM BookManager format using the following IBM licensed programs:

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BookManager READ/DOS
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BookManager READ for Windows

HTML format

Relevant MQSeries documentation is provided in HTML format with these MQSeries products:

- MQSeries for AIX, V5.1
- MQSeries for AS/400, V5.1
- MQSeries for Compaq Tru64 UNIX, V5.1
- MQSeries for HP-UX, V5.1
- MQSeries for OS/2 Warp, V5.1
- MQSeries for OS/390, V2.2
- MQSeries for Sun Solaris, V5.1
- MQSeries for Windows NT, V5.1 (compiled HTML)
- MQSeries link for R/3 V1.2

The MQSeries books are also available in HTML format from the MQSeries product family Web site at:

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```

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PDF files can be viewed and printed using the Adobe Acrobat Reader.

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- MQSeries for AS/400, V5.1
- MQSeries for Compaq Tru64 UNIX, V5.1
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- MQSeries for OS/390, V2.2
- MQSeries for Sun Solaris, V5.1
- MQSeries for Windows NT, V5.1
- MQSeries link for R/3 V1.2

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PostScript format

The MQSeries library is provided in PostScript (.PS) format with many MQSeries Version 2 products. Books in PostScript format can be printed on a PostScript printer or viewed with a suitable viewer.

Windows Help format

The *MQSeries for Windows User's Guide* is provided in Windows Help format with MQSeries for Windows Version 2.0 and MQSeries for Windows Version 2.1.

MQSeries information available on the Internet

The MQSeries product family Web site is at:

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http://www.ibm.com/software/mqseries/
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By following links from this Web site you can:

- Obtain latest information about the MQSeries product family.
- Access the MQSeries books in HTML and PDF formats.
- Download MQSeries SupportPacs.

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