



DFSORT Planning and Installation

**Program
Product**

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This is a major revision of, and makes obsolete, SC33-4034-10.

This edition applies to Release 8.0 of DFSORT, Program Product 5740-SM1, and to any subsequent releases until otherwise indicated in new editions or technical newsletters.

The changes for this edition are summarized under "Summary of Amendments" following the preface. Technical changes are indicated by a vertical bar to the left of the change. These bars will be deleted at any subsequent republication of the page affected. Editorial changes that have no technical significance are not noted.

Changes are made periodically to this publication; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370, 30xx, and 4300 Processors Bibliography*, GC20-0001, for the editions that are applicable and current.

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Preface

This book has planning information and general instructions for installing the DFSORT (Data Facility Sort) Program Product 5740-SM1. It is designed to be used with the **DFSORT program directory**, which has more-detailed installation instructions. It is important that you keep a copy of the program directory for your reference.

Both this book and the program directory are designed for system programmers familiar with job control language and the IBM System Modification Program (SMP) or IBM System Modification Program Extended (SMP/E).

How This Book Is Organized

This book is organized as follows:

- Chapter 1, “Introduction” on page 1, explains how DFSORT is distributed, discusses the hardware and software requirements, and gives an overview of the installation process.
- Chapter 2, “Planning for Installation” on page 5, discusses planning considerations, such as how much storage to reserve for DFSORT, whether to install DFSORT resident, and whether to change the defaults for DFSORT options.
- Chapter 3, “Installing DFSORT” on page 21, gives step-by-step instructions for installing DFSORT.
- Chapter 4, “ICEMAC Parameters” on page 39, describes the DFSORT installation options.
- Appendix A, “The ICEMSGS Macro” on page 57, shows a copy of the ICEMSGS macro, which contains the texts for DFSORT messages.
- Appendix B, “Messages” on page 63, lists messages issued during installation.

Related Publications

This book refers to some publications by generic names, such as “the COBOL programmer’s guide.” In such cases, the manual you require will depend on your installation.

Other references to publications are abbreviated by omitting the system name; for example, *MVS/Extended Architecture Data Administration: Utilities*, *OS/VS2 Utilities*, *MVS/370 Data Administration: Utilities*, and *OS/VS1 Utilities* are referred to simply as *Utilities*.

You may also need to refer to the publications listed below.

For MVS/Extended Architecture (MVS/XA)

- *Assembler H Version 2 Application Programming: Language Reference*, GC26-4037
- *DFSORT Application Programming: Guide*, SC33-4035
- *DFSORT Diagnosis Guide*, SY26-3971
- *DFSORT Reference Summary*, SX33-8001
- *MVS/Extended Architecture Data Administration: Utilities*, GC26-4018
- *MVS/Extended Architecture JCL*, GC28-1148
- *MVS/Extended Architecture System—Data Administration*, GC26-4010
- *MVS/Extended Architecture System Programming Library: Initialization and Tuning*, GC28-1149
- *MVS/Extended Architecture System Programming Library: Service Aids*, GC28-1159
- *MVS/Extended Architecture VSAM Administration Guide*, GC26-4015
- *MVS/Extended Architecture VSAM Administration: Macro Instruction Reference*, GC26-4016
- *System Modification Program Extended (SMP/E) Messages and Codes*, GC28-1108
- *System Modification Program Extended (SMP/E) Reference*, SC28-1107
- *System Modification Program Extended (SMP/E) Terminal User’s Guide*, SC28-1109
- *System Modification Program Extended (SMP/E) User’s Guide*, SC28-1302
- *System Modification Program (SMP) Messages and Codes*, GC38-1047
- *System Modification Program (SMP) System Programmer’s Guide*, GC28-0673

For MVS

- *DFSORT Application Programming: Guide*, SC33-4035
- *DFSORT Diagnosis Guide*, SY26-3971
- *DFSORT Reference Summary*, SX33-8001
- *OS/VS-DOS/VS-VM/370 Assembler Language*, GC33-4010
- *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3838; or, if MVS/370 Data Facility Product is installed, *MVS/370 VSAM Administration Guide*, GC26-4066
- *OS/VS2 MVS JCL*, GC28-0692
- *OS/VS2 MVS System Programming Library: Data Management*, GC26-3830; or, if MVS/370 Data Facility Product is installed, *MVS/370 System-Data Administration*, GC26-4056
- *OS/VS2 MVS System Programming Library: Initialization and Tuning*, GC28-1029
- *OS/VS2 MVS System Programming Library: Service Aids*, GC28-0674
- *OS/VS2 Utilities*, GC26-3902; or, if MVS/370 Data Facility Product is installed, *MVS/370 Data Administration: Utilities*, GC26-4065
- *System Modification Program Extended (SMP/E) Messages and Codes*, GC28-1108
- *System Modification Program Extended (SMP/E) Reference*, SC28-1107
- *System Modification Program Extended (SMP/E) Terminal User's Guide*, SC28-1109
- *System Modification Program Extended (SMP/E) User's Guide*, SC28-1302
- *System Modification Program (SMP) Messages and Codes*, GC38-1047
- *System Modification Program (SMP) System Programmer's Guide*, GC28-0673

For OS/VS1

- *DFSORT Application Programming: Guide*, SC33-4035
- *DFSORT Diagnosis Guide*, SY26-3971
- *DFSORT Reference Summary*, SX33-8001
- *OS/VS-DOS/VS-VM/370 Assembler Language*, GC33-4010
- *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3838

- *OS/VS1 Data Management for System Programmers*, GC26-3837
- *OS/VS1 JCL Reference*, GC24-5099
- *OS/VS1 Planning and Use Guide*, GC24-5090
- *OS/VS1 Service Aids*, GC28-0665
- *OS/VS1 Utilities*, GC26-3901
- *System Modification Program Extended (SMP/E) Messages and Codes*, GC28-1108
- *System Modification Program Extended (SMP/E) Reference*, SC28-1107
- *System Modification Program Extended (SMP/E) User's Guide*, SC28-1302
- *System Modification Program (SMP) Messages and Codes*, GC38-1047
- *System Modification Program (SMP) System Programmer's Guide*, GC28-0673

Summary of Amendments

March 1986

Release 8.0

The following new features affect DFSORT installation:

- The Peerage and Vale (Peer/Vale) modules are no longer installed resident as the default.
- Reduced storage requirements in the MVS link pack area (below 16-megabyte virtual) when installing DFSORT resident, due to removal of the Peer/Vale modules and Blockset filler modules from the link pack area.
- The RESDNT= installation option is no longer used. For MVS, DFSORT will automatically determine the resident/nonresident status of its modules at execution time. For OS/VS1, new installation options, RESDNTB= (Blockset) and RESDNTP= (Peer/Vale) replace RESDNT=.
- New installation option VLSHRT has been added.

June 1985

Release 7.1

New or reimplemented features added to DFSORT that affect installation are the ability to:

- Install DFSORT resident in LPA or ELPA without filler modules.
- Dynamic link-edit user exit routines. Note that the SORT Cataloged Procedure has been changed to include link-edit DD statements.
- Write program messages to the master console.

Note: The installation procedure has been changed significantly. The separate JCLIN processing has been replaced by a larger selection of DFSORT features.

January 1985

Release 7.0

New features added to DFSORT that affect installation are:

- For MVS/XA, the ability to reduce the processor time for sorting done in large storage by using IBM System/370 Extended Architecture Sorting Instructions.
- Virtual storage constraint relief for MVS/XA:
 - Improved performance because certain buffers, control blocks, and modules can now be placed above 16-megabyte virtual when sorting fixed-length records.
 - The ability to specify:
 - the upper limit of the amount of main storage above and below 16-megabyte virtual available to DFSORT (TMAXLIM).
 - the number of bytes reserved above 16-megabyte virtual for system use (ARESALL).
 - the number of bytes reserved above 16-megabyte virtual for a program that invokes DFSORT (ARESINV).
- COBOL-related enhancements:
 - the ability to invoke DFSORT from VS COBOL II programs.
 - the ability to use the VS COBOL II FASTSRT compile-time option, which enhances performance.
 - the ability to write E15 and E35 exit routines in COBOL.
 - the ability to specify an alternate message data set when invoking DFSORT with JCL. This is especially useful when exits are written in COBOL.
- Support of the IBM 3480 Magnetic Tape Subsystem for intermediate storage.
- Removal of the upper limit of 48K bytes for the RESALL option.
- The ability to specify the maximum number of records to be accepted for sorting.

The installation procedure has been changed significantly. An additional job is executed to perform JCLIN processing separately from the APPLY job. Separate JCLIN processing allows:

- Modules to be placed above 16-megabyte virtual for MVS/XA
- Support for exit routines written in VS COBOL II.

The new job also offers an improved procedure for renaming the SVC for DFSORT.

This manual has been reorganized significantly and a new chapter on planning for installation has been added. However, note that only new *technical* changes are marked with a vertical bar in the margin.

Service changes have been added.

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Chapter 1. Introduction

This chapter explains how DFSORT is distributed, discusses the hardware and software requirements, and gives an overview of the installation process.

How DFSORT Is Distributed

DFSORT is distributed on a tape that you can install using IBM System Modification Program, Release 4 (SMP) or System Modification Program Extended (SMP/E).

The tape contains:

- SMP and SMP/E control statements
- DFSORT modules
- DFSORT macros
- Source code for the modules containing installation defaults and message texts
- Sample jobs for installing DFSORT.

A more complete description of the tape format is in the DFSORT program directory.

Relationship to the Operating System

DFSORT can be installed under the following operating systems:

- MVS/Extended Architecture (MVS/XA)
- MVS Release 3.8 or higher
- MVS/370 (OS/VS2 MVS with MVS/370 Data Facility Product installed)
- OS/VS1 Release 7.0

Throughout this manual, the term MVS is used to refer to OS/VS2 MVS, MVS/370, and MVS/XA, unless otherwise indicated.

DFSORT is designed to execute under supported releases of the OS/VS1, MVS, and MVS/XA operating system environments unless otherwise announced. DFSORT also executes under OS/VS1 or MVS/370 when they are running as guests under VM/SP, VM/SP HPO (High Performance Option), VM/Extended Architecture (VM/XA) Migration Aid, VM/370, or VM/XA System Facility. DFSORT also executes under MVS/XA when it is running as a guest under VM/XA Migration Aid or VM/XA System Facility.

Because DFSORT uses the operating system's data management facilities,

- DFSORT must be invoked according to operating system conventions.
- Any data sets used by DFSORT must be defined according to operating system standards.

System Generation Considerations

DFSORT can be installed any time after your operating system has been generated.

If you do a complete system generation after installing DFSORT, you must restore the DFSORT modules residing in system target libraries because they will be deleted during the generation. Also be sure to RECEIVE, APPLY, and ACCEPT any PTFs and user modifications you may have had.

The DFSORT modules will remain in the distribution libraries, and you can restore the target libraries by relink-editing them; however, we recommend that you repeat the steps described in Chapter 3 for installing DFSORT in permanent libraries.

Using Extended Architecture Sorting Instructions

By using the IBM System/370 Extended Architecture Sorting Instructions, which are part of the extended architecture hardware, you can reduce the processor time for sorting done in large main storage.

Prerequisite Program Products

To install DFSORT, you need the following program products:

- System Modification Program (SMP) Release 4
- or
- System Modification Program Extended (SMP/E)
 - A linkage editor with the alias name IEWL.

If you modify the DFSORT messages or installation defaults, you need an XF-level, H-level, or compatible assembler with the alias name ASMBLR.

If you specify COBEXIT=COB2 on the installation macro, the VS COBOL II subroutine library must be accessible at installation and execution time.

Required Storage Devices

To *install* DFSORT, you need:

- Direct-access storage for the distribution and target libraries (storage estimates are given under “Allocating Storage” on page 11). You can choose any of the following IBM devices supported by your operating system:

- 2305 Fixed Head Storage
- 2314 Direct Access Storage Facility
- 2319 Disk Storage
- 3330 Disk Storage series
- 3333 Disk Storage and Control series
- 3340 Direct Access Storage Facility series
- 3344 Direct Access Storage
- 3350 Direct Access Storage
- 3375 Direct Access Storage
- 3380 Direct Access Storage

- At least one tape device for loading the DFSORT distribution tape.

To *use* DFSORT, you need:

- Direct-access or tape device(s) for work storage. You can choose any of the following IBM devices:

- 2314 Direct Access Storage Facility
- 2319 Disk Storage
- 3330 Disk Storage series
- 3333 Disk Storage and Control series
- 3340 Direct Access Storage Facility
- 3344 Direct Access Storage
- 3350 Direct Access Storage
- 3375 Direct Access Storage
- 3380 Direct Access Storage
- 3850 Mass Storage System
- 2400 Magnetic Tape Unit series
- 3400 Magnetic Tape Unit series

- Device(s) supported by QSAM or VSAM for input/output.

For work (intermediate) storage, high speed direct-access devices, such as the 3380, offer the best performance. For more information on how devices affect performance, see *DFSORT Application Programming: Guide*.

Overview of the Installation Process

The sample jobs provided with DFSORT are designed for you to first install DFSORT into temporary private libraries for testing and then reinstall it into permanent libraries. The installation steps described in Chapter 3, “Installing DFSORT” on page 21, reflect the sample jobs.

The steps are:

- Step 1—Copy the sample jobs.
- Step 2—Allocate space for the temporary private libraries.
- Step 3—Modify the SMPSORT procedure.
- Step 4—Install the distribution tape.
- Step 5—Modify the installation defaults (optional).
- Step 6—Modify the message texts (optional).
- Step 7—Make the target libraries accessible.
- Step 8—Re-IPL the system.
- Step 9—Verify DFSORT is installed correctly in the temporary libraries.
- Step 10—Delete the temporary libraries.
- Step 11—Install DFSORT in the permanent libraries.
- Step 12—Verify DFSORT is installed correctly in the permanent libraries.

Note:

A condensed installation procedure is described in the DFSORT Program Directory. It is designed for people who are experienced in installing DFSORT and prefer a “fast-path” for installing the current release.

The next chapter discusses planning for DFSORT installation.

Chapter 2. Planning for Installation

The main planning considerations for installing DFSORT are:

- Which distribution and target libraries to select
- How to modify the IBM-supplied cataloged procedures
- Which IBM-supplied defaults to modify, if any
- How much main and auxiliary storage to allocate
- Whether the DFSORT messages need to be modified

Selecting Distribution and Target Libraries

Before installing DFSORT, you must allocate space for the distribution and target libraries. After installation, the distribution libraries will contain a copy of DFSORT for maintenance purposes and the target libraries will contain a copy for production.

When selecting the target libraries, you will have to decide whether DFSORT is to be resident, whether certain libraries should be system or private, and whether DFSORT is to be tested before being put into production.

The required distribution and target libraries and the considerations for selecting the target libraries are discussed in the following sections.

Required Distribution Libraries

The required distribution libraries are:

- **ICELIB**, for all DFSORT routines
- **AICESRCE**, for the installation-default and message-text source statements
- **ASAMPLIB**, for the sample jobs
- **AICEMAC**, for the installation-default and message-text macros

The distribution libraries should all be private libraries.

Required Target Libraries

The required target libraries are:

- **LINKLIB, LPALIB**, for the *reentrant* routines of the Blockset technique
- **LINKLIB**, for the Peerage and Vale technique routines and the *nonreentrant* routines of the Blockset technique
- **SORTLIB**, for the Conventional technique routines
- **SAMPLIB**, for the sample jobs
- **ICEMAC**, for the installation-default and message-text macros
- **SVCLIB** (for OS/VS1 only), for the DFSORT SVC routine

Note: To install the DFSORT SVC routine, your OS/VS1 system must have the system utility program, IEHIOSUP. For additional information, see *System Modification Program (SMP) System Programmer's Guide*.

If DFSORT is to be nonresident, the first two libraries above should be contained in the same LINKLIB.

In addition, if you plan to use standard cataloged DFSORT procedures, you will need

- **PROCLIB**

For MVS, if you plan to record DFSORT SMF records (Type 16) or use IBM 3880 cache devices, you will need space for the DFSORT SVC routine in

- **LPALIB**

Selecting System or Private Target Libraries

In general, the following target library should be a *private* library:

- The library for the installation-default and message-text macros (**ICEMAC**)

The following must be a *system* library:

- The library for the DFSORT SVC routine (**SVCLIB** for OS/VS1 or **LPALIB** for MVS)

The remaining target libraries can be *either* private or system libraries:

- The link library for the reentrant routines of Blockset, (**LINKLIB**, or **LPALIB**)
- The link library for the Peerage and Vale routines and the nonreentrant routines of Blockset (**LINKLIB**)
- The link library for the Conventional technique routines (**SORTLIB**)

- The library for the sample jobs (SAMPLIB)
- The procedure library (PROCLIB)

Considerations for deciding whether to put the target link and procedure libraries in system or private libraries are:

- **Will DFSORT be resident or nonresident?**

If DFSORT is to be resident, you must place the link library for the reentrant Blockset routines in the system library. Installing DFSORT resident is discussed under "Deciding Whether to Install DFSORT Resident" on page 8.

- **Will DFSORT be tested before being installed permanently?**

If DFSORT is to be tested, you should initially place the remaining link libraries and the procedure library in private libraries. Then, after testing DFSORT, you can, optionally, place them in system libraries. Testing DFSORT is further discussed under "Testing DFSORT" on page 9.

- **If you plan to keep Sort/Merge program 360S-SM-023 or Program Product 5734-SM1, are the procedures for that program in PROCLIB?**

Before installing the DFSORT procedures in PROCLIB, you must delete any SORT or SORTD procedures from 360S-SM-023 or 5734-SM1. Therefore, if you want to keep the procedures for 360S-SM-023 or 5734-SM1, you must either move them to a private library or place the DFSORT procedures in a private library.

If creating a private procedure library, use the DCB attributes of PROCLIB on your DD statement.

- **Will DFSORT be used frequently?**

If DFSORT will be used frequently, you should place the routines and procedures in system libraries to make them more easily accessible. If the link libraries are private, you must either concatenate them to LINKLIB or specify them in the JOBLIB or STEPLIB DD statement at execution time. If the procedure library is private, you must either specify it in the JES2 or JES3 JOBPARM statement (for MVS) or concatenate it to PROCLIB (for OS/VS1) at execution time.

- **Will the operating system be regenerated often?**

If you regenerate your system often, you might consider putting the DFSORT routines and procedures in private libraries. If they are in system libraries, you must restore them after regenerating your system. For more information on installing DFSORT after system generation, see "System Generation Considerations" on page 2.

Deciding Whether to Install DFSORT Resident

Whether to install DFSORT resident (that is, to install the reentrant Blockset modules in the link pack area (MVS) or in the pageable supervisor area (OS/VS1) as opposed to in a private library) depends on your production requirements. Below are the advantages of installing DFSORT resident and installing DFSORT nonresident that you should consider.

Advantages of Installing DFSORT Resident

If you plan to use DFSORT frequently, you should consider installing it resident for the following reasons:

1. DFSORT will be more easily accessible. (If you install DFSORT nonresident, you must either concatenate your private link library to SYS1.LINKLIB or specify your library in a JOBLIB or STEPLIB DD statement at execution time.)
2. Two or more applications will be able to use the same copy of DFSORT in main storage at the same time. (If you install DFSORT nonresident, the applications must usually load separate copies of DFSORT into main storage.)
3. Performance may be improved because each separate load module need not be loaded each time DFSORT is executed.

Advantages of Installing DFSORT Nonresident

The advantages of installing DFSORT nonresident are:

1. If you have more than one operating system sharing direct-access devices, you need only one set of DFSORT modules (except for the SVC routine, which is dependent on the operating system).
2. If you regenerate your system after installing DFSORT, the modules in private libraries need not be restored. For more information on installing DFSORT after system generation, see "Step 11. Install DFSORT in the Permanent Libraries" on page 37.
3. You can save space in the link pack area for other programs. (However, on MVS/XA systems, DFSORT takes less space in the link pack area, because selected modules are placed in the extended link pack area.)

Figure 1 on page 9 shows which libraries to choose and the other actions you will need to take, depending on whether DFSORT is to be resident or nonresident.

MVS

OS/VS1

Is DFSORT to be Resident?	Yes	No	Yes	No
Installation option RESDNTB=	N/A	N/A	ALL	NONE
Installation option RESDNTP=	N/A	N/A	NONE unless Peer/Vale has been made resident	NONE
Reentrant modules ddname SORTLPA	SYS1.LPALIB	SYS1.LINKLIB or private	SYS1.LINKLIB	SYS1.LINKLIB or private
Nonreentrant modules ddname LINKLIB	SYS1.LINKLIB or private	SYS1.LINKLIB or private	SYS1.LINKLIB or private	SYS1.LINKLIB or private
Nonstandard DFSORT modules ddname SORTLIB	SYS1.SORTLIB or private	SYS1.SORTLIB or private	SYS1.SORTLIB or private	SYS1.SORTLIB or private
SVC routine DSNAME=	SYS1.LPALIB	SYS1.LPALIB	SYS1.SVCLIB	SYS1.SVCLIB
Update SYS1.PARMLIB?	No	No	Yes; add members IEAIGG02 and IEARSV01	Yes, add member IEARSV01
Re-IPL the system after installation?	Yes, to load resident modules and the SVC routine.*	Yes, to load the SVC routine.*	Yes, to load resident modules and the SVC routine.	Yes, to load the SVC routine.

Figure 1. Installing DFSORT Resident or Nonresident

Note to Figure 1:

- * For MVS, the SVC routine is not required unless you are planning to write DFSORT SMF records (Type 16) or are using 3880 cache devices.

Testing DFSORT

Even though you choose to install DFSORT into your system libraries, you should first install DFSORT into private libraries where you can test it and tune it to your system requirements.

You may even want to test DFSORT in two stages: You might do a preliminary test between the SMP APPLY and ACCEPT steps, and a more extensive test after the ACCEPT step.

The procedures for installing DFSORT into private libraries and then reinstalling it in system libraries are described in this manual and reflected in the sample jobs on the distribution tape.

Even if you are replacing a previous release of DFSORT, you should first test and tune the current release before deleting the old one.

Keeping the previous release during testing, and replacing the previous release after testing are further discussed below.

Keeping a Previous DFSORT Release (Temporarily or Permanently)

If you want to keep a previous DFSORT release (either temporarily, while you are testing the current release, or permanently):

- Ensure that the system catalog points to the current DFSORT release.
- Be aware that this release uses SVC 109.

For OS/VS1, the SVC routine is always required. For MVS, it is required only if you record DFSORT SMF records (Type 16) or use 3880 cache devices.

If your previous release uses SVC 109, you must assign a user SVC to this release during the period that both releases coexist in your system. For more information, see Step 4 on page 25 and SVC on page 52.

Replacing a Previous DFSORT Release

If you install the current release directly into the same distribution and target libraries used for the old release and use the same SMP control libraries used for installing the old release, the old release will automatically be deleted. *However, be sure that any modifications to the libraries in which the last release was installed were done by SMP operations.* If you do *not* use the same SMP control libraries, you must first delete the old release (all modules beginning with ICE) before installing the new one.

Keeping Another Sort/Merge Program (Temporarily or Permanently)

If you plan to keep Program Product 360S-SM-023 or 5734-SM1 (either temporarily, while testing DFSORT, or permanently), you can use the same link libraries for that program and for DFSORT.

However, if the program uses the alias name SORT (for module IERRCO00 or IGHRCO00), you must change it before installing DFSORT, because DFSORT has an entry point ICEMAN with the alias name SORT. The alias name can be changed using the utility program IEHPRGM; for more information, see *Utilities*.

Replacing Another Sort/Merge Program

If replacing Program Product 360S-SM-023 or 5734-SM1, you must first delete their SORT and SORTD procedures in PROCLIB before installing the DFSORT procedures.

Modifying the Standard DFSORT Procedures

The standard DFSORT procedures (SORT and SORTD) provided with DFSORT are for execution in as many environments as possible. Note that the SORT procedure contains DD statements for dynamic link-edit. You should review those that you plan to use and optimize them for your environment. For example, you may want to add or change parameters on the EXEC and DD statements and change the target libraries. To avoid allocating sort work data sets each time they are required, you might also want to dedicate one or more data sets that remain permanently allocated. See also WRKREL and WRKSEC in Chapter 4, "ICEMAC Parameters" on page 39, for additional information.

Modifying Installation Defaults

During installation, you can change the IBM-supplied defaults for DFSORT's options using the ICEMAC macro. Furthermore, you can establish separate defaults for JCL-invoked and dynamically-invoked DFSORT applications.

Most defaults may be overridden at execution time by means of control statements, the EXEC statement, or parameter list options. (For more information on overriding defaults, see Appendix D in *DFSORT Application Programming: Guide*.)

Before installing DFSORT, study the options described in Chapter 4, "ICEMAC Parameters" on page 39, to decide whether you should change any defaults.

Allocating Storage

The following sections give estimates of the amounts of auxiliary and main storage DFSORT requires and discuss how to set the storage-related installation defaults for optimum performance. For more information on main storage, see *DFSORT Application Programming: Guide*. For more detailed (and sometimes more current) information on auxiliary storage, see the DFSORT program directory.

Required Auxiliary Storage

For planning purposes, the *estimated* requirements for the distribution and target libraries are shown in Figure 2 on page 12 (for exact figures, see the sample jobs). The figures are given for the most widely used devices.

For storage requirements for the SMP libraries, see the DFSORT program directory and the sample jobs.

Library	Block Size	Blocks	Tracks				Directory Blocks
			3330	3350	3375	3380	
• AICEMAC	3120	52	13	11	6	4	2
• AICESRCE	3120	18	5	4	2	2	3
• ASAMPLIB	3120	95	24	19	10	8	6
• ICELIB	6144	405	206	138	83	59	62
• ICEMAC	3120	52	13	11	6	4	2
• LINKLIB*	6144	110	55	37	22	16	7
• LINKLIB**	6144	230	115	77	46	33	12
• LPALIB*	6144	60	30	20	12	9	6
• LPALIB**	***	1	1	1	1	1	1
• PROCLIB	***	2	1	1	1	1	1
• SAMPLIB	3120	95	24	19	10	8	6
• SORTLIB	6144	162	84	56	34	24	32
• SVCLIB	***	1	1	1	1	1	1
* Resident ** Nonresident *** Defined at system generation							

Figure 2. Estimated Auxiliary Storage Requirements

Required Main Storage

DFSORT requires a minimum of 88K bytes of (virtual) main storage (below 16-megabyte virtual for MVS/XA). However, depending on the application, DFSORT may require more storage. You may need more storage if you use:

- Spanned records
- COBOL user-exit routines
- ALTSEQ, CHALT, SMF, or STIMER options
- INCLUDE, OMIT, SUM, OUTREC, or INREC (Although INREC can also reduce storage requirements by shortening record sizes.)
- Very large blocks or logical records
- VSAM data sets

Note: In some cases, this release may use more storage than prior releases. This may affect the operation of some jobs. For example, there may be jobs that previously ran as in-storage sorts (with no SORTWKnn data sets) that will not run in-storage when using this release.

You can limit the amount of main storage DFSORT will allocate by using the **SIZE** option. For MVS/XA, this limit applies to the total storage allocated both above and below 16-megabyte virtual. Note that for MVS/XA, storage above 16-megabyte virtual is used *only for Blockset sorts*.

Effects of Varying Main Storage

In general, when you vary the amount of main storage available to DFSORT, several things occur:

1. If you increase the amount of storage,
 - EXCPs are reduced.
 - On a light to medium loaded system, elapsed time decreases.
 - On a heavily loaded system, elapsed time could increase because DFSORT could be swapped out more often.
 - Processor time may remain stable or increase because of the overhead in managing the extra storage. But, for large files (greater than 64 megabytes), processor time may decrease because the overhead in managing the extra storage would be less than the benefit gained by DFSORT making fewer passes over the data.
2. If you decrease the amount of storage,
 - EXCPs increase.
 - Elapsed time increases for most sorts.
 - Processor time decreases for small files, but increases for large files.

Storage-Related Options

You can tailor DFSORT's use of main storage to your installation's requirements. The following DFSORT installation options work together with the REGION size of your application and the system IEALIMIT values to control the total amount of main storage used by DFSORT:

SIZE
MAXLIM
TMAXLIM
MINLIM
RESALL
ARESALL
RESINV
ARESINV
OVERRGN

Note: SIZE, RESALL, ARESALL, RESINV, and ARESINV can be overridden at execution time. (See Appendix D of *DFSORT Application Programming: Guide*.)

SIZE

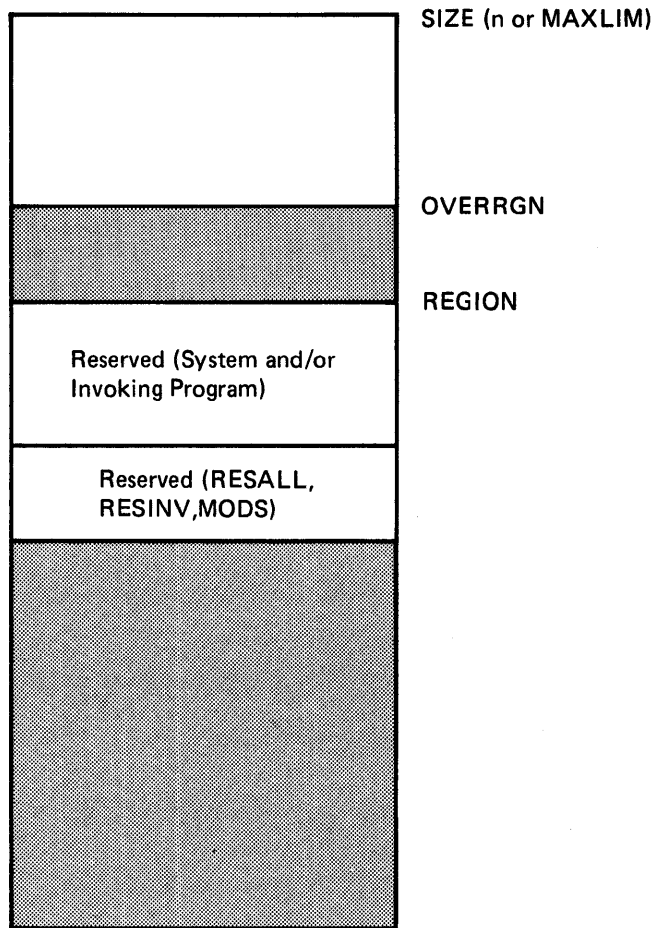
The SIZE option specifies the amount of main storage DFSORT will attempt to use. You can either specify the amount of storage yourself, by specifying SIZE=*n* (where *n* is the number of bytes), or allow DFSORT to determine the amount of storage, by specifying SIZE=MAX (the default and recommended setting for this option).

At execution time, SIZE can be specified on the EXEC statement; MAINSIZE, which is equivalent, can be specified on the OPTION statement, and an equivalent option can also be specified in a parameter list. For override details, see Appendix D of *DFSORT Application Programming: Guide*.

For non-MVS/XA systems, if you specify SIZE=*n*, DFSORT will use as much storage as it can obtain up to the value *n*. If you specify SIZE=MAX, DFSORT will use as much storage as it can obtain up to the MAXLIM value. If the REGION size is smaller than the value *n* or MAXLIM, DFSORT will use storage only up to the REGION size (plus OVERRGN). (See Figure 3 on page 15 and Figure 4 on page 16.)

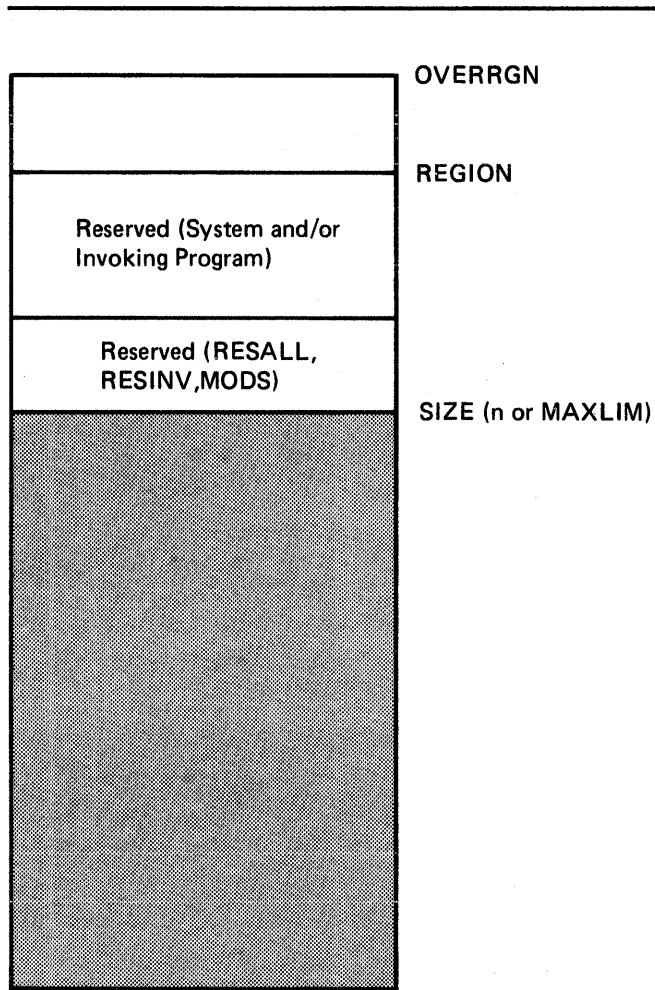
For MVS/XA, if you specify SIZE=*n*, DFSORT will use as much storage as it can obtain both above and below 16-megabyte virtual up to the value *n* (however, remember that storage above 16-megabyte virtual is used only for certain applications). If you specify SIZE=MAX, DFSORT will use as much storage as it can obtain both above and below 16-megabyte virtual up to the TMAXLIM value. (See Figure 5 on page 17.)

For MVS/XA, the MAXLIM and REGION (plus OVERRGN) values limit the amount of storage used below 16-megabyte virtual (as they do for non-MVS/XA systems).



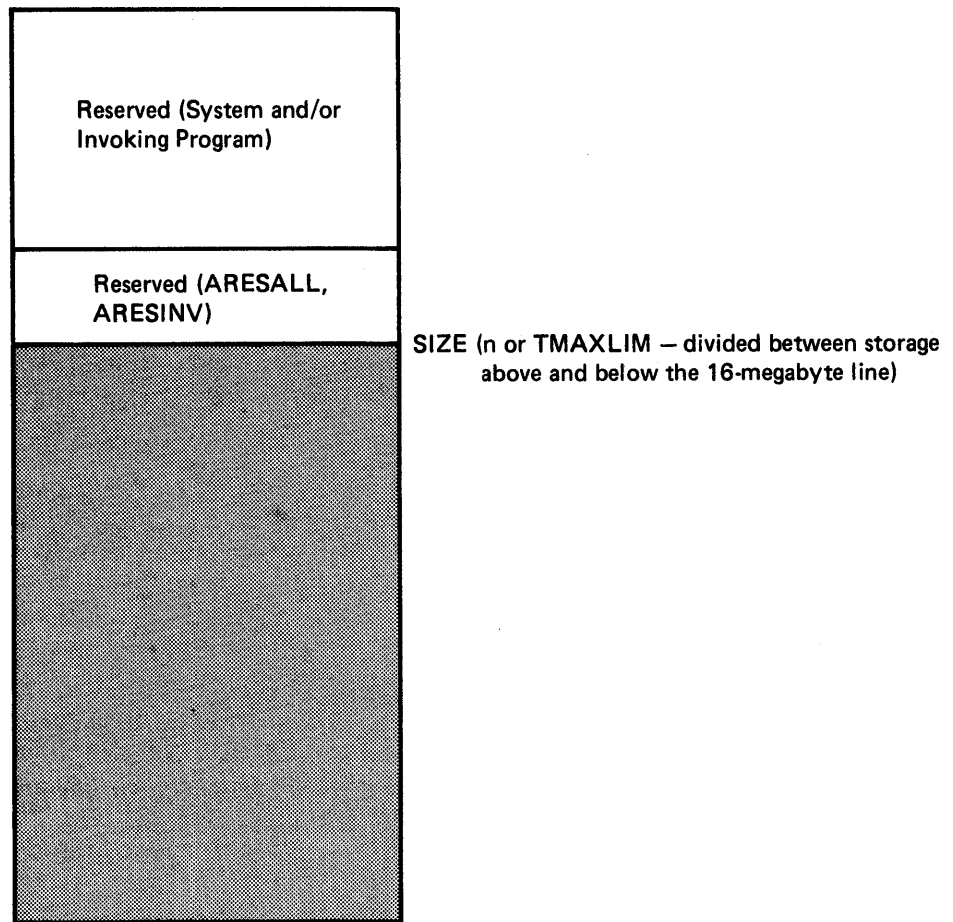
Legend
 Storage available for DFSORT processing

Figure 3. Storage Used Below 16-Megabyte Virtual When SIZE Is Greater Than REGION



Legend
 Storage available for DFSORT processing

Figure 4. Storage Used Below 16-Megabyte Virtual When REGION Is Greater Than SIZE




Legend
 Storage available for DFSORT processing

Figure 5. Storage Used Above 16-Megabyte Virtual

MAXLIM

The MAXLIM option is used only when SIZE/MAINSIZE=MAX is in effect. For non-MVS/XA systems, MAXLIM sets an upper limit to the total amount of storage available. For MVS/XA, it sets the upper limit only to the amount of storage below 16-megabyte virtual.

If MAXLIM is greater than the REGION size, DFSORT will use storage only up to the REGION size (plus OVERRGN).

You can increase or decrease the setting of this option from the default of 1048576 bytes, depending on your installation's requirements (see "Effects of Varying Main Storage" on page 13).

TMAXLIM

The TMAXLIM option is used only when SIZE/MAINSIZE=MAX is in effect. It sets the upper limit to the total amount of storage both above and below 16-megabyte virtual for MVS/XA.

You can increase or decrease the setting of this option from the default of 2097152 bytes, depending on your installation's requirements (see "Effects of Varying Main Storage" on page 13).

MINLIM

The MINLIM option is used only when SIZE/MAINSIZE=*n* is in effect. MINLIM specifies a lower limit to the SIZE/MAINSIZE value. If MINLIM is greater than the SIZE/MAINSIZE value, DFSORT will use storage up to the MINLIM value.

You can increase or decrease the setting of this option from the default of 204800 bytes, depending on your installation's requirements (see "Effects of Varying Main Storage" on page 13).

RESALL

The RESALL option is used only when SIZE/MAINSIZE=MAX is in effect. It tells DFSORT to reserve some of the storage it has allocated, for use by the system, while DFSORT is executing. The default of 4096 bytes is usually sufficient, but you can increase the setting of this option if necessary.

For non-MVS/XA systems, RESALL specifies the total amount of storage to be reserved for system use. For MVS/XA, it specifies only the amount of storage to be reserved for system use below 16-megabyte virtual.

RESALL can be used to reserve storage for user exit routines. However, because the storage reserved by RESALL is *always* reserved when SIZE/MAINSIZE=MAX is in effect, and is reserved for *all* DFSORT processing phases, you should not set the value higher than is required for your average application. The recommended way to reserve storage for user exit routines is to use the second parameter (*m*) on the MODS control statement at execution time. This way, the storage is reserved only during the phase containing the exit. The MODS statement, however, cannot be used for exit routines when the address is passed to DFSORT in the parameter list (that is, preloaded exit routines).

If SIZE/MAINSIZE=*n* is in effect and the REGION (plus OVERRGN) size is less than the value *n*, storage can be reserved only by using the MODS statement.

If SIZE/MAINSIZE=*n* is in effect and the REGION (plus OVERRGN) size is greater than the value *n*, either the MODS statement must be used or sufficient storage must be available between the SIZE/MAINSIZE value and the REGION (plus OVERRGN) size.

ARESALL

The ARESALL option specifies the amount of storage to be reserved for system use above 16-megabyte virtual for MVS/XA. This option is normally not needed because of the large amount of storage available above 16-megabyte virtual (the default for ARESALL is 0 bytes).

RESINV

The RESINV option is used only when DFSORT is dynamically invoked and SIZE/MAINSIZE=MAX is in effect. It tells DFSORT to reserve some of the storage it has allocated, for use by exits controlled by the invoking program (for example, a COBOL input procedure), while DFSORT is executing.

For non-MVS/XA systems, RESINV specifies the total amount of storage to be reserved for the invoking program. For MVS/XA, it specifies only the amount of storage to be reserved for the invoking program below 16-megabyte virtual.

Because the storage reserved by RESINV is *always* reserved for dynamically invoked applications when SIZE/MAINSIZE=MAX is in effect, and is reserved for *all* DFSORT processing phases, you should not set the value higher than is required for your average application. As mentioned under RESALL, the recommended way to reserve storage for user exit routines that are not preloaded is to use the MODS statement.

You can change the setting of this option from the default of 0 bytes if necessary.

ARESINV

The ARESINV option is used only when DFSORT is dynamically invoked. It specifies the amount of storage to be reserved for the invoking program above 16-megabyte virtual for MVS/XA. This option is normally not needed because of the large amount of storage available above 16-megabyte virtual (the default for ARESINV is 0 bytes).

OVERRGN

The OVERRGN option is used only when the Blockset technique is used. It specifies the amount of main storage above the REGION value that DFSORT should attempt to obtain from the area defined by the system's IEALIMIT value.

The default and recommended setting for this option for JCL invoked applications is 65536 bytes. The default setting for dynamically invoked applications is 16384 bytes to avoid problems due to incorrect use of the RESALL and RESINV options. If your installation uses RESALL and RESINV correctly or is installing DFSORT for the first time, it is recommended that you increase the OVERRGN value for dynamically invoked applications to 65536 bytes. This is *especially important* if you are doing benchmarks.

Required Storage for Installing DFSORT Resident

If DFSORT is installed resident, you need to ensure that enough storage is available in the link pack area (for MVS) or pageable supervisor area (for OS/VS1). For MVS/XA, storage is also required in the extended link pack area.

Peer/Vale modules are no longer automatically installed resident when Blockset is installed resident, thereby reducing storage requirements in the link pack area.

You can still install Peer/Vale modules resident if you have existing Peer/Vale sort applications that have critical storage requirements. These applications are not to be modified to allow Peer/Vale modules to be loaded into the private area of virtual storage during execution.

Modifying Message Texts

During the installation process, you can modify the wording of the DFSORT message texts or translate them into another language. However, you can modify the messages only for the Blockset, Peering, and Vale techniques.

Certain rules must be followed when modifying messages. Review the procedure for modifying messages described in “Step 6. Modify the Message Texts (Optional)” on page 30.

Chapter 3. Installing DFSORT

This chapter explains the steps for installing DFSORT in private libraries for testing, and then reinstalling it in permanent libraries. These steps are:

- Step 1—Copy the sample jobs.
- Step 2—Allocate space for the temporary private libraries.
- Step 3—Modify the SMPSORT procedure.
- Step 4—Install the distribution tape.
- Step 5—Modify the installation defaults (optional).
- Step 6—Modify the message texts (optional).
- Step 7—Make the target libraries accessible.
- Step 8—Re-IPL the system.
- Step 9—Verify DFSORT is installed correctly in the temporary libraries.
- Step 10—Delete the temporary libraries.
- Step 11—Install DFSORT in the permanent libraries.
- Step 12—Verify DFSORT is installed correctly in the permanent libraries.

General instructions for each of these steps are given in the following sections. More detailed instructions are given in the sample jobs and in the DFSORT program directory.

Step 1. Copy the Sample Jobs

The sample jobs for installing DFSORT are:

SMALLO
SMALSMPE
SMPROCE
SMRECE
SMAPPE
SMACCE
SMOPRECE

SMOPAPPE
SMOPACCE
SMMSGRECE
SMMSGAPPE
SMMSGACCE
SMDELE
SMALSMP4
SMPROC4
SMREC4
SMAPP4
SMACC4
SMOPREC4
SMOPAPP4
SMOPACC4
SMMSGREC4
SMMSGAPP4
SMMSGACC4
SMDEL4
SMPARM
SORTPROC
JCLSORT
INVSORT
COBSORT

In addition, if you install VS COBOL II *after* installing DFSORT, the following jobs are supplied to add support for exit routines compiled in VS COBOL II. (If you already have VS COBOL II when you install DFSORT, you do not need these jobs.)

SMC2RECE
SMC2APPE
SMC2ACCE
SMC2REC4
SMC2APP4
SMC2ACC4

The jobs contain comments with instructions on how to modify them for your particular installation.

Use the IEBCOPY utility program to copy these jobs to a new data set called SORT.SAMPJCL where they can be accessed (see Figure 6 on page 23).

Note: To meet the requirements of your installation, you will have to modify the JOB statement and the DD statements in Figure 6.

```

//SMJCL      JOB      MSGLEVEL=(1,1)
/*SETUP MOUNT TAPE SM1800 (This card required for JES2 only)
//COPY       EXEC     PGM=IEBCOPY
//SYSPRINT   DD       SYSOUT=A
//INPUT      DD       UNIT=TAPE,DISP=SHR,LABEL=(3,SL),
//           DSN=HSM1800.F2,VOL=SER=SM1800
//OUTPUT     DD       DSN=SORT.SAMPJCL,DISP=(NEW,CATLG),
//           UNIT=SYSDA,SPACE=(3120,(125,20,6))
//SYSUT3     DD       UNIT=SYSDA,SPACE=(TRK,(5,1))
//SYSUT4     DD       UNIT=SYSDA,SPACE=(TRK,(5,1))
//SYSIN      DD       *
              COPY INDD=INPUT,OUTDD=OUTPUT
/*

```

Figure 6. Copying the Sample JCL

If you haven't already added an index to the system catalog for SORT, do so before copying the sample jobs. See Figure 7 for the JCL to build an index in an OS CVOL catalog.

```

//CVOLJCL    JOB      MSGLEVEL=(1,1)
//STEPNAME   EXEC     PGM=IEHPROGM
//SYSPRINT   DD       SYSOUT=A
//DD1        DD       UNIT=3330,VOL=SER=SYSRES,DISP=OLD
//SYSIN      DD       *
              BLDX INDEX=SORT
/*

```

Figure 7. Building an Index for Sort

In Figure 8, the JCL is shown for building an index in an ICF catalog. An alias is defined in the master catalog for a user catalog. The parameters are: **NAME**, which specifies the alias, **SORT**; and **RELATE**, which specifies the name of the user catalog for which **SORT** is an alternate entry name (**ALIAS**).

```

//CATJCL     JOB      MSGLEVEL=(1,1)
//STEP1      EXEC     PGM=IDCAMS
//SYSPRINT   DD       SYSOUT=A
//SYSIN      DD       *
              DEFINE ALIAS -
                  (NAME(SORT) -
                   RELATE(user-catalog entryname))
/*

```

Figure 8. Building an Index for Sort in an ICF Catalog

The sample JCL in SORT.SAMPJCL can be listed, using the statements shown in Figure 9.

```
//LISTJCL      JOB      MSGLEVEL=(1,1)
//PTPCH        EXEC     PGM=IEBPTPCH
//SYSPRINT     DD       SYSOUT=A
//SYSUT1       DD       DSN=SORT.SAMPJCL,DISP=SHR
//SYSUT2       DD       SYSOUT=A
//SYSIN        DD       *
                PRINT  TYPORG=PO
/*
```

Figure 9. Listing the Sample JCL

Step 2. Allocate Space for the Temporary Private Libraries

The job SMALLOC allocates space for all the distribution libraries and the following *private* target libraries:

- LINKLIB
- ICEMAC
- SORTLIB
- SAMPLIB

If you want these libraries to be *system* libraries, you must modify the job.

The SVC library (LPALIB, or SVCLIB) is assumed to be a system library that is already allocated and cataloged.

It is also assumed that the SMPSORT procedure will be placed in PROCLIB. If you want to use a private procedure library, you can allocate space for it in this job.

How to Allocate SMP Libraries

If you are installing DFSORT using new private SMP/E libraries, run SMALSMPE for allocating the required data sets and initializing the SMP/E control library.

If you are installing DFSORT using new private SMP Release 4 libraries, run SMALSMP4.

The storage requirements for the SMP and SMP/E data sets are given in the DFSORT program directory.

Step 3. Modify the SMPSORT Procedure

If you are using SMP/E, SMPROCE places the procedure SMPSORT in PROCLIB.

If you are using SMP Release 4, SMPROC4 places the procedure SMPSORT in PROCLIB.

If you want to place SMPSORT in a private procedure library, you must modify the SYSUT2 DD statement in this job. If you have any earlier versions of SMPSORT in the procedure library, delete them before running this job.

The SMPSORT procedure invokes SMP and specifies the SMP data sets. The procedure must be modified to conform to the system or private libraries you are using for your SMP, target, and distribution libraries.

Step 4. Install the Distribution Tape

If you are installing DFSORT into the same library into which a prior release of DFSORT or OS/VS Sort/Merge was installed and if that prior release was *not* installed using the same SMP or SMP/E libraries that you are now using, you must delete all modules of the prior release before doing this step.

SMREC4, SMAPP4, and SMACC4 install the distribution tape using SMP Release 4. SMRECE, SMAPPE, and SMACCE install the distribution tape using the batch procedure of SMP/E. Modify (as instructed in the comments) and run the following jobs:

1. SMRECE or SMREC4, to RECEIVE products HSM1800 and selected features.
2. SMAPPE or SMAPP4, to APPLY products HSM1800, and selected features, and to rename the SVC for Release 8.0 (renaming the SVC is required only if you need the SVC routine *and* you have a previous release that uses SVC 109).

To install support for exit routines compiled by VS COBOL II, the VS COBOL II subroutine library must be accessible during the SMAPPLY job.

DFSORT is available for execution after running SMAPPLY. You may want to do some preliminary testing before running SMACCEPT.

3. SMACCE or SMACC4, to ACCEPT products HSM1800 and selected features.

The DFSORT features you can select from when installing the distribution tape modify the DFSORT load modules to allow loading above 16-megabyte virtual and to minimize the virtual storage required when DFSORT is installed resident.

The set of features includes:

- AN SVC routine:
 - JSM1810 for VS1
 - JSM1815 for MVS
- Selective link-editing according to the system and the residency:
 - JSM1811 for resident or nonresident on MVS/XA
 - JSM1812 for resident on MVS/370 or VS1
 - JSM1813 for nonresident on MVS/370 or VS1
- Support for exit routines compiled by VS COBOL II:
JSM1814

For information on installing the tape interactively using SMP/E, see *SMP/E Terminal Users Guide*.

Step 5. Modify the Installation Defaults (Optional)

The installation defaults provided on your installation tape are given in Chapter 4, “ICEMAC Parameters” on page 39. These defaults will be in effect if you install DFSORT without specifying your own defaults.

The defaults can also be changed at any time after installing DFSORT. You may want to first install the given defaults, then tailor them to your requirements after you have run DFSORT for a while.

Some of the defaults can be overridden by the application programmer at execution time by use of the JCL EXEC statement, a parameter list, or program control statements. (For full override details, see Appendix D of *DFSORT Application Programming: Guide*.)

To change the IBM-supplied defaults:

1. Create a USERMOD to modify the ICEMAC macro in modules ICEAM1 and ICEAM2 in your source distribution library (SYS1.AICESRCE or a private library). The USERMOD is an IEBUPDTE update.

Your update statements must conform to the syntax requirements of IEBUPDTE, assembler language, and the ICEMAC macro. Examples and rules for coding the ICEMAC macro are given below.

2. Modify (as instructed in the comments) and run the following sample jobs:
 - a. SMOPRECE or SMOPREC4, to RECEIVE the changes
 - b. SMOPAPPE or SMOPAPP4, to APPLY the changes
 - c. SMOPACCE or SMOPACC4, to ACCEPT the changes

If you violate any of the rules for coding ICEMAC, an appropriate MNOTE will be issued when ICEAM1 and ICEAM2 are reassembled during the APPLY step. Explanations of the MNOTE ICEMAC error messages are in Appendix B.

If you receive an error message:

1. Correct and recode the statement containing the error.
2. Run an SMP or SMP/E RESTORE to remove the USERMOD. (See the SMP or SMP/E reference manual for details.)
3. Rerun the RECEIVE and APPLY steps SMOPRECE and SMOPAPPE, or SMOPREC4 and SMOPAPP4.

How to Code the ICEMAC Macro

The rules for coding the ICEMAC macro are the same as those for coding IBM assembler language macro statements. "ICEMAC" must be preceded and followed by at least one blank space, and parameters must be separated by commas. For more complete rules, refer to your assembler language manual.

The format of the ICEMAC macro is shown in Figure 10.

Label	Operation	Parameters
label	ICEMAC END	JCL INV, <i>option</i> ..., <i>option</i>

Figure 10. Format of the ICEMAC Macro

The JCL and INV parameters allow you to specify two sets of defaults: one for when DFSORT is JCL-invoked at execution time, and the other when DFSORT is dynamically-invoked at execution time. Either JCL or INV must be specified.

Examples of the ICEMAC Macro

Figure 11 is a sample of the ICEMAC macro update statement for JCL-invoked DFSORT applications.

column				
1	16		72 73	80
	ICEMAC JCL,		* 00010000	01
	TMAXLIM=3145728,		* 00010100	02
	MAXLIM=2097152,		* 00010200	03
	MINLIM=524288,		* 00010300	04
	LIST=YES,		* 00010400	05
	EQUALS=YES,		* 00010500	06
	SMF=FULL,		* 00010600	07
	CHECK=NO		00010700	08

Figure 11. Coding the ICEMAC Macro for ICEAM1 (JCL-Invoked DFSORT)

Line Explanation

01 This ICEMAC call sets up your installation option defaults for JCL-invoked applications. The line number in columns 73 through 80 will cause the existing ICEMAC statement in ICEAM1 to be replaced.

02 DFSORT will make use of all available space (the default is SIZE=MAX) up to 3145728 bytes (3 megabytes) both above and below 16-megabyte virtual on MVS/XA for a Blockset sort application.

03 DFSORT will make use of all available space (the default is SIZE=MAX) up to a limit of 2097152 bytes (2 megabytes) below 16-megabyte virtual.

04 DFSORT will always try to use at least 524288 (512K) bytes.

05 Control statements will be printed.

Note: This is the standard default and need not be specified. It is shown for purposes of illustration only.

06 The order of equally collating records will be preserved from input to output.

07 At the end of each application for variable-length records, a full SMF record type 16 will be written to the SMF data set. At the end of each application for fixed-length records, a short SMF record type 16 will be written to the SMF data set.

08 Record count will not be checked for applications that use the E35 user exit routine.

No other standard defaults for JCL-invoked DFSORT applications will be overridden.

MNOTE messages are produced by the assembler program for the expansion of the ICEMAC statement during the apply step. These messages are printed in the assembler listing as part of the SYSPRINT data set (see Appendix B).

Figure 12 is a sample of the ICEMAC macro update statement for dynamically-invoked DFSORT applications.

column				
1	16		72 73	80
	ICEMAC INV,		* 00010000	01
	DYNALOC=3380,		* 00010100	02
	IGNCKPT=NO,		* 00010200	03
	MSGDDN=MSGOUT,		* 00010300	04
	MSGPRT=CRITICAL,		* 00010400	05
	OUTREL=NO,		* 00010500	06
	WRKREL=NO,		* 00010600	07
	LIST=NO		00010700	08

Figure 12. Coding the ICEMAC Macro for ICEAM2 (Dynamically-Invoked DFSORT)

Line Explanation

- 01** This ICEMAC call sets up your installation option defaults for dynamically-invoked DFSORT applications. The line number in columns 73 through 80 will cause the existing statement in ICEAM2 to be replaced.
- 02** 3380 is the default device for dynamically allocated work data sets on MVS systems if DYNALLOC is specified on the SORT or OPTION statement without a corresponding device name (for example, DYNALLOC or DYNALLOC=(,2)).

Because no value for the default number of work data sets on MVS systems is specified, the standard default of 1 for Blockset or 3 for Peer/Vale is to be used if DYNALLOC is specified on the SORT or OPTION statement without a corresponding number of work data sets (for example, DYNALLOC or DYNALLOC=3350).
- 03** The Blockset technique is not to be selected if CKPT or CHKPT is specified on the OPTION, SORT, or MERGE statement.
- 04** MSGOUT is to be used rather than SYSOUT as the ddname of the output data set for program messages. Note that, if a MSGOUT DD statement is not found at execution time, a SYSOUT DD statement will be used, if found.
- 05** Only error messages are to be printed.
- 06** Unused temporary SORTOUT space is not to be released.
- 07** Unused temporary SORTWKnn space is not to be released.
- 08** Control statements are not to be printed.

No other standard defaults for dynamically invoked applications will be overridden.

MNOTE messages are produced by the assembler program for the expansion of the ICEMAC statement during the apply step. These messages are printed in the assembler listing as part of the SYSPRINT data set (see Appendix B).

Step 6. Modify the Message Texts (Optional)

If you want DFSORT to issue messages in a language other than English or you want to change the wording of some messages, you can modify the message texts in the ICEMSGs macro. However, this option applies only to messages issued for Blockset, Peerage, and Vale. Note that, if you increase the length of a message past about 84 characters (subject to the restrictions of your system), it may be truncated if written to the master console. A copy of the ICEMSGs macro appears in Appendix A.

The format of the ICEMSGs macro is:

```
MACRO
ICEMSGs
ICEMSET 1,'text1...'
ICEMSET 2,'text2...'
.
.
.
MEND
```

Each message macro consists of a macro call name (ICEMSET), a message number, and a text string. The text string consists of fixed characters and insert fields. The insert fields supply variable information in three forms:

1. Character information represented by question mark characters (one question mark for each character of the maximum-length field).
2. Fixed-length numeric information represented by % characters (one % for each character of the maximum-length field). Leading zeros are printed.
3. Variable-length numeric information represented by exclamation point characters (one exclamation point for each character of the maximum-length field). Leading zeros are not printed.

You can change the text of a DFSORT message by executing a USERMOD system modification under SMP.

1. List or examine the source of ICEMSGs in your macro distribution library (SYS1.AICEMAC or your private macro distribution library). The USERMOD is an IEBUPDTE update to the source of this macro. The update statements you create must conform to the syntax requirements of both IEBUPDTE and assembler source code as well as the ICEMSGs rules for changing message texts listed below.

Modify the job SMSGRECE or SMSGREC4, adding your message update statements after the ++MACUPD SMP control statement and ./ CHANGE IEBUPDTE control statement.

2. Code your updates to ICEMSGs, keeping these rules in mind:

- If your message text contains an ampersand (&), it must be coded as two ampersands, following the assembler coding convention.
- If your message contains an apostrophe ('), it must be coded as two apostrophes, following the assembler coding convention.
- Message macros must not be added or deleted.
- Macro call names (ICEMSET) and message numbers must not be changed.
- Fixed characters may be changed, added, deleted, or relocated.
- Insert field characters (?, %, !) must not be changed, added, or deleted.
- Insert fields must not be made contiguous.
- Because the characters ?, %, and ! have special meanings in this context, they must not be used in new message texts.
- Insert fields may be relocated. **However, the position of insert fields relative to each other must not be changed.**
- The total length of each text string must not exceed 110 bytes.
- If you increase the length of a text string past about 84 characters (subject to the restrictions of your system), a message written to the master console may be truncated.
- If continuation is necessary, use normal macro statement continuation rules.

Note: If your translation causes the message texts to expand by more than about 25%, you may cause the reassembly of one or more message CSECTs to fail.

As examples, the text of messages ICE134I and ICE142I could be translated into French as follows:

ICE134I:

NUMBER OF BYTES SORTED: n

NOMBRE D'OCTETS TRIES: n

ICE142I:

ddname NOT FOUND - SYSOUT USED

ddname NON TROUVE - SYSOUT UTILISE

To accomplish this, the ICEMSGSG macro could be changed as follows (see Appendix A for the original text of these messages):

```

.
.
.
ICEMSET 134,'NOMBRE D'OCTETS TRIES: !!!!!!!!!!!'
.
.
.
ICEMSET 142,'????????? NON TROUVE - SYSOUT UTILISE'
.
.
.

```

Receive, Apply, and Accept Jobs

Three jobs are used to modify your message texts. These jobs should be modified to conform to your system requirements.

Run:

1. SMSGRECE or SMSGREC4, to RECEIVE your modifications to ICEMSGSG.
2. SMSGAPPE or SMSGAPP4, to APPLY your modifications to ICEMSGSG.

If you violate any of the rules for modifying messages, an appropriate MNOTE message will be issued when the message CSECTs are reassembled during the apply step. (Explanations of the MNOTE module errors are in Appendix B.) You can *recover* any message that you render invalid by using:

- The ICEMSGSG macro in Appendix A, or
- The copy of ICEMSGSG in the DFSORT distribution library.

Correct and recode the statement containing the error. Run an SMP or SMP/E RESTORE to remove the USERMOD. (For details, see the SMP or SMP/E reference manual.) Then rerun the RECEIVE and APPLY steps SMSGRECE and SMSGAPPE, or SMSREC4 and SMSGAPP4.

3. SMSGACCE or SMSGACC4, to ACCEPT your modifications to ICEMSGSG.

Step 7. Make the Target Libraries Accessible

If DFSORT is not resident or installed in SYS1.LINKLIB, you must make the libraries accessible. When using a private link library, you must either concatenate it to SYS1.LINKLIB at IPL time, or specify it in JOBLIB or STEPLIB DD statements at execution time.

Modify the Standard Cataloged Procedures

SORT and SORTD are standard cataloged procedures supplied with DFSORT. These procedures can simplify the use of DFSORT by making the libraries accessible and by reducing the number of DD statements and parameters that must be specified in each application. Figure 13 and Figure 14 show the JCL for the SORTD and SORT procedures respectively.

Modify these procedures to meet your system requirements. Planning for modifying these procedures is discussed under “Modifying the Standard DFSORT Procedures” on page 11. Also see WRKREL and WRKSEC in Chapter 4, “ICEMAC Parameters” on page 39.

```
//SORT      EXEC   PGM=ICEMAN
//STEPLIB   DD     DSN=sort.LINKLIB,DISP=SHR
//SORTLIB   DD     DSN=sort.SORTLIB,DISP=SHR
//SYSOUT    DD     SYSOUT=A
```

Figure 13. JCL for SORTD Procedure

```
//SORT      EXEC   PGM=ICEMAN
//STEPLIB   DD     DSN=sort.LINKLIB,DISP=SHR
//SORTLIB   DD     DSN=sort.SORTLIB,DISP=SHR
//SYSOUT    DD     SYSOUT=A
//SYSPRINT  DD     DUMMY
//SYSLMOD   DD     DSN=&GOSET,UNIT=SYSDA,SPACE=(3600,(20,20,1))
//SYSLIN    DD     DSN=&LOADSET,UNIT=SYSDA,SPACE=(80,(10,10))
//SYSUT1    DD     DSN=&SYSUT1,SPACE=(1024,(60,20)),
//          UNIT=(SYSDA,SEP=(SORTLIB,SYSLMOD,SYSLIN))
```

Figure 14. JCL for SORT Procedure

Update SYS1.PARMLIB (OS/VS1 Only)

For OS/VS1, if the reenterable DFSORT program is to be resident in the pageable supervisor area, you must add a member called IEAIGG02 to SYS1.PARMLIB that contains the DFSORT program modules. If this member already exists in SYS1.PARMLIB, modify it to include the modules listed below. Job SMPARM is the JCL to create this member. Modify the JCL to fit your installation, then execute SMPARM. All the following load modules will be used:

ICEMAN (with alias SORT)
ICEAM1
ICEAM2
ICEBBUG
ICECBIF
ICECOB2
ICEEXIT (with alias ICEMESO)
ICEINIC
ICEINIE
ICEINIF
ICEINIV
ICEIPUT (with alias ICEIPVT)
ICEMAN (with alias SORT)
ICEMPUT (with alias ICECPUT)
ICESUMG
ICEXPUB

Note: These modules must reside in LINKLIB. For further information, see *OS/VS1 Planning and Use Guide*.

If you make Peerage and Vale reentrant modules resident, in addition to the Blockset modules normally resident when you choose resident installation, you will need to include the following modules in your IEAIGG02 list:

```
ICEBUG
ICECKP
ICECRE
ICECRO
ICEDEC
ICEDED
ICEDEF
ICEDEG
ICEDEV
ICEDYN
ICEERR
ICELIM
ICELIV
ICEMON
ICEMOS
ICEOBS
ICEPAR
ICERED
ICEVED
ICEVIM
ICEVIP
ICEVRE
ICEVRN
ICEVRO
ICEXCP
```

The SVC routine must also be made resident in the pageable supervisor area. Add it to the IEARSV01 list in SYS1.PARMLIB.

Step 8. Re-IPL the System

You will need to re-IPL the system if you are installing DFSORT resident or if you need the SVC routine. (The SVC routine is always required for OS/VS1; it is required for MVS only if you record DFSORT SMF records (Type 16) or use 3880 cache devices.) The re-IPL will load the resident programs and make them accessible.

For MVS, you must specify option 'CLPA' when you re-IPL.

Step 9. Verify DFSORT Is Installed Correctly in the Temporary Libraries

To verify that DFSORT is installed correctly in the temporary libraries, modify and run the following jobs:

- JCLSORT, to create data and invoke DFSORT from JCL
- INVSORT, to create data and dynamically invoke DFSORT from an assembler routine (IEV90)

- COBSORT, if you have VS COBOL II, to verify that the interface is installed correctly.

Note: For OS/VS1, if you have specified RESDNTB=ALL (or accepted it as the default), on the ICEMAC macro, DFSORT will not be able to correctly calculate the amount of available main storage. Therefore, to avoid running out of main storage, specify a minimum of 512K bytes of storage on the REGION parameter for the test period.

The data to be sorted is created by the IEBDG utility program, and consists of 360 eighty-character records, each containing a 6-digit sequence number and a 36-character control field. The SORT control statement specifies that the data is to be sorted on the 36-character control field.

An IEBGENER step is included to print the contents of SORTOUT.

The sorted output should be 36 groups of records, each group containing 10 records with equal control fields. Figure 15 shows the first two groups and the last group.

```

*****000001*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000037*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000073*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000109*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000145*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000181*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000217*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000253*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000289*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000325*****ABCDEFGHIJKLMNQPQRSTUVWXYZ0123456789*****
*****000326*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000290*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000254*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000218*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000182*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000146*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000110*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000074*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000038*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
*****000002*****BCDEFGHIJKLMNQPQRSTUVWXYZ0123456789A*****
.
.
.
*****000360*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000324*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000288*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000252*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000216*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000180*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000144*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000108*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000072*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****
*****000036*****9ABCDEFGHIJKLMNQPQRSTUVWXYZ012345678*****

```

Figure 15. Output from JCLSORT and INVSORT

Step 10. Delete the Temporary Libraries

Run SMDELE or SMDEL4 to delete the temporary distribution, target, and SMP libraries allocated by SMALLOC and either SMALSMPE or SMALSMP4.

Step 11. Install DFSORT in the Permanent Libraries

If you have installed DFSORT in temporary libraries to test it and are now ready to install it in permanent libraries, repeat Steps 1 through 8, this time modifying the sample jobs to specify your permanent libraries. After completing Steps 1 through 8, go to Step 12.

Step 12. Verify DFSORT Is Installed Correctly in the Permanent Libraries

To verify that DFSORT is installed in the permanent libraries correctly, run the JCLSORT and INVSORT jobs. Run the COBSORT job if you have VS COBOL II.

Chapter 4. ICEMAC Parameters

The ICEMAC parameters and the defaults are shown in Figure 16 on page 40. Specify a parameter only if the IBM-supplied default is not acceptable. Detailed descriptions of each parameter follow Figure 16.

The following conventions are used to illustrate the format of the parameters:

- **Boldface** letters, numbers, and punctuation marks must be coded exactly as shown. Exceptions to this convention are braces {}, brackets [], and the OR symbol |. These must never be coded.
- Lowercase *italic* letters and words represent variables for which you must substitute specific information or specific values.
- Braces {} group related items, one of which must be coded.
- Brackets [] indicate optional items.
- Parentheses () must enclose subparameters if more than one is specified. If only one subparameter is specified, the parentheses may be omitted.

Macro	Parameters	IBM-Supplied Defaults
ICEMAC	{JCL INV}	See note below.
	[,ALTSEQ={fft...,fft}]	Normal EBCDIC
	[,ARESALL={n}]	0
	[,ARESINV={n}]	0
	[,CHALT={YES NO}]	NO
	[,CHECK={YES NO}]	YES
	[,COBEXIT={COB1 COB2}]	COB1
	[,DYNALOC={d (d) (,n) (d,n)}]	SYSDA,1
	[,EQUALS={YES NO}]	NO
	[,ERET={ABEND RC16}]	RC16
	[,EXCPVR={YES NO}]	YES
	[,IGNCKPT={YES NO}]	YES
	[,LIST={YES NO}]	YES
	[,MAXLIM=n]	1048576
	[,MINLIM=n]	204800
	[,MSGCON={ALL CRITICAL NONE}]	NONE
	[,MSGDDN=ddname]	SYSOUT
	[,MSGPRT={ALL CRITICAL NONE}]	ALL
	[,OUTREL={YES NO}]	YES
	[,OUTSEC={YES NO n}]	YES
	[,OVERRGN=n]	65536 (JCL invoked) 16384 (dynamically invoked)
	[,RESALL=n]	4096
	[,RESDNTB={ALL NONE}]	ALL
[,RESDNTP={ALL NONE}]	NONE	
[,RESINV=n]	0	

Figure 16 (Part 1 of 2). ICEMAC Installation Macro—Parameters and Defaults

Macro	Parameters	IBM-Supplied Defaults
ICEMAC	[,SIZE={MAX n}]	MAX
	[,SMF={SHORT FULL NO}]	NO
	[,STIMER={YES NO}]	YES
	[,SVC=n]	109
	[,TMAXLIM=n]	2097152
	[,VERIFY={YES NO}]	NO
	[,VIO={YES NO}]	NO
	[,VLSHRT={YES NO}]	NO
	[,WRKREL={YES NO}]	YES
	[,WRKSEC={YES NO n}]	YES

Figure 16 (Part 2 of 2). ICEMAC Installation Macro—Parameters and Defaults

Note to Figure 16:

When ICEMAC is coded, either JCL (to generate module ICEAM1) or INV (to generate module ICEAM2) must be specified. ICEAM1 is used for JCL invoked DFSORT applications; ICEAM2 is used for dynamically invoked DFSORT applications.

If you do not change an option, the IBM-supplied default value shown in Figure 16 for that option will be used. Note that RESINV and ARESINV apply to dynamically invoked DFSORT applications only (ICEMAC INV) and will be ignored if specified for JCL invoked DFSORT applications (ICEMAC JCL).

JCL | INV

indicates whether the defaults specified are to be used when DFSORT is JCL invoked or dynamically invoked at execution time. JCL | INV is required and must be the first parameter specified.

JCL

specifies that the defaults are for JCL invocation. It produces module ICEAM1, the JCL defaults module, which is used at execution time. All ICEMAC options may be specified with ICEMAC JCL. However, options RESINV and ARESINV are not meaningful for JCL invocation and thus will not be used.

INV

specifies that the defaults are for dynamic invocation. It produces module ICEAM2, the dynamic defaults module, which is used at execution time. All ICEMAC options may be specified with ICEMAC INV.

ALTSEQ=(fft....fft)

specifies a modification to the standard EBCDIC collating sequence, to apply when the user defines a control field with the alternate sequence format (AQ). Note that the data itself does not change, but only the order in which it is collated.

ff

specifies, in hexadecimal, the character whose position is to be changed.

tt

specifies, in hexadecimal, the new position in the collating sequence the character is to occupy.

For example, if you want to specify that “\$” (X'5B') should collate after “Z” (X'E9'), you should specify ALTSEQ=(5BEA).

Applicable systems: OS/VS1, MVS

Default: The normal EBCDIC collating sequence

Note: Use of ALTSEQ can degrade performance.

ARESALL=*n*

specifies the amount of main storage reserved *above 16-megabyte virtual*, while DFSORT is executing, for system use. Normally, this parameter is not needed.

Note: RESALL specifies the amount of storage reserved *below 16-megabyte virtual*. For more information, see “Allocating Storage” on page 11.

n

specifies the number of bytes as a decimal value within the range of 0 to 16515072 (16128K). If the value specified is not a multiple of 8, it will be rounded up to the next multiple of 8.

Applicable systems: MVS/XA

Default: 0 bytes

ARESINV=*n*

specifies the amount of main storage reserved *above 16-megabyte virtual*, while DFSORT is executing, for an invoking program and/or exit routines that reside above 16-megabyte virtual or use space above 16-megabyte virtual. For more information, see “Allocating Storage” on page 11. Normally, this parameter is not needed.

Note: RESINV specifies the amount of storage reserved *below 16-megabyte virtual*. For more information, see “Allocating Storage” on page 11.

n

specifies the number of bytes as a decimal value within the range of 0 to 16515072 (16128K). If the value specified is not a multiple of 8, it will be rounded up to the next multiple of 8.

Applicable systems: MVS/XA

Default: 0 bytes

Note: For JCL-invoked applications, ARESINV will not be used.

CHALT={YES | NO}

specifies whether ALTSEQ is to apply to character format fields (CH).

YES

specifies that ALTSEQ is to apply to character format fields.

NO

specifies that ALTSEQ is not to apply to character format fields.

Applicable systems: OS/VS1, MVS

Default: NO

CHECK={YES | NO}

specifies whether record count should be checked for applications that use the E35 user exit routine without a SORTOUT data set.

YES

specifies that record count should be checked.

NO

specifies that record count should not be checked.

Applicable systems: OS/VS1, MVS

Default: YES

COBEXIT={COB1 | COB2}

indicates whether the E15 and E35 exit routines written in COBOL will be executed with the OS/VS COBOL or VS COBOL II library, or in some cases with no COBOL library.

COB1

specifies that the COBOL E15 and E35 exit routines will be executed with the OS/VS COBOL library or in some cases with no COBOL library.

COB2

specifies that the COBOL E15 and E35 exit routines will be executed with the VS COBOL II library.

Applicable systems: OS/VS1, MVS

Default: COB1

DYNALOC={d | (d) | (,n) | (d,n)}

specifies the default values to be used when the DYNALOC option is specified at execution time in the SORT or OPTION statement without a corresponding device name and/or number of work data sets. This option does *not* request dynamic allocation of needed work space; *it merely supplies default values for d and n.*

d

specifies the default device name for work data sets to be dynamically allocated. You can specify any of the following IBM devices, provided the device is supported by your system:

2314 series	3340 series	3380 series
2400 series	3350 series	3400 series
3330 series	3375 series	

You may also specify a group name, such as DISK or SYSDA.

n

specifies the default number of work data sets to be dynamically allocated. You may specify 1 through 16 data sets (if you specify more than 16, 16 will be allocated).

Applicable systems: MVS

Default: The default for *d* is SYSDA. For performance reasons, every effort should be made to avoid using tape as the default. If at execution time one of the Blockset techniques is chosen, the default for *n* will be set to 1. If any other technique is chosen, the default for *n* will be set to 3.

EQUALS={YES | NO}

specifies whether the order of equally collating records for a sort or merge should be preserved from input to output. For full details, see the OPTION statement in *DFSORT Application Programming: Guide*.

YES

means the order should be preserved.

NO

means the order need not be preserved.

Applicable systems: OS/VS1, MVS

Default: NO (except for VLR Blockset: default=YES)

Note: EQUALS=YES can degrade performance (except for VLR Blockset).

ERET={ABEND | RC16}

specifies the action to be taken if DFSORT encounters a critical error.

ABEND

specifies that DFSORT will terminate, using the message number as the user ABEND code.

RC16

specifies that DFSORT will terminate with a return code of 16.

Applicable systems: OS/VS1, MVS

Default: RC16

EXCPVR={YES | NO}

specifies whether the EXCPVR SVC can be used for SORTWKnn I/O (Peerage and Vale techniques only). By default, the SORTWKnn buffers will be fixed and EXCPVR will be used instead of EXCP. However, if the page fixing is not successful, that is, when the system is heavily loaded, EXCP will be chosen dynamically and no page fixing will take place.

YES

specifies that the EXCPVR SVC can be used.

NO

specifies that the EXCPVR SVC cannot be used.

Applicable systems: OS/VS1

Default: YES

IGNCKPT={YES | NO}

specifies the action to be taken if checkpoint/restart is requested at execution time and one of the Blockset techniques (which do not support checkpoint/restart) can be used.

YES

means select the Blockset technique and ignore the checkpoint/restart request.

NO

means do not select the Blockset technique, and honor the checkpoint/restart request.

Applicable systems: OS/VS1, MVS

Default: YES

LIST={YES | NO}

specifies whether program control statements should be printed. For full details on use of the message data set, see Appendix H of *DFSORT Application Programming: Guide*.

YES

specifies that the program control statements should be printed (on the message data set).

NO

specifies that the program control statements should not be printed.

Applicable systems: OS/VS1, MVS

Default: YES

MAXLIM=*n*

specifies an upper limit to the amount of main storage available to DFSORT when SIZE/MAINSIZE=MAX is in effect. For MVS/XA, MAXLIM applies only to the storage *below 16-megabyte virtual* (TMAXLIM limits the total storage both above and below 16-megabyte virtual). For more information, see "Allocating Storage" on page 11.

n

specifies the number of bytes as a decimal value within the range of 90112 (88K) to 16777208 (16 megabytes minus 8), but must not be greater than the TMAXLIM value. If the value specified is not a multiple of 8, it will be rounded down to the next multiple of 8.

Applicable systems: OS/VS1, MVS

Default: 1048576 (1024K) bytes

MINLIM=*n*

specifies a lower limit to the amount of main storage available to DFSORT when SIZE/MAINSIZE=*n* is in effect. If the requested minimum amount of main storage is not available, DFSORT will still execute, provided that at least 88K bytes of storage (below 16-megabyte virtual for MVS/XA) is available. For more information, see "Allocating Storage" on page 11.

n

specifies the number of bytes as a decimal value. The minimum value is 90112 (88K) bytes; in addition, the value must be less than or equal to both the SIZE and MAXLIM values specified for the ICEMAC macro. If the value specified is not a multiple of 8, it will be rounded down to the next multiple of 8.

Applicable systems: OS/VS1, MVS

Default: 204800 (200K) bytes

MSGCON={ALL | CRITICAL | NONE}

specifies the class of messages to be written to the master console. For full details, see Appendix H of *DFSORT Application Programming: Guide*.

ALL

specifies that all messages, except option-in-effect messages (ICE128I to ICE133I) and diagnostic messages (ICE800I to ICE999I) will be written to the master console.

CRITICAL

specifies that only critical messages will be written to the master console.

NONE

specifies that messages will not be written to the master console.

Applicable systems: OS/VS1, MVS

Default: NONE

Note: The value specified for MSGCON will have no effect on messages ICE097I or ICE158A, when issued; these will always be written to the master console.

MSGDDN=ddname

specifies an alternate ddname for the message data set. MSGDDN must be in effect if:

- A program that invokes DFSORT uses SYSOUT and you do not want DFSORT messages intermixed with the program messages.
- The invoking program is written in COBOL and you do not want DFSORT messages intermixed with COBOL messages.
- A program invokes DFSORT more than once and you want separate messages for each invocation of DFSORT.
- You have E15 or E35 user exit routines written in COBOL and you do not want DFSORT messages intermixed with COBOL messages.

ddname

specifies a name of 1 to 8 characters. The name must be unique within the job step; do not use a name that is used by DFSORT (for example, SORTIN).

If the ddname specified is not available at execution time, SYSOUT will be used instead. For full details on use of the message data set, see Appendix H of *DFSORT Application Programming: Guide*.

Applicable systems: OS/VS1, MVS

Default: SYSOUT

MSGPRT={ALL | CRITICAL | NONE}

specifies the class of messages to be printed. Messages will be written to the message data set. For full details on use of the message data set, see Appendix H of *DFSORT Application Programming: Guide*.

ALL

specifies that all messages except diagnostic messages (ICE800I to ICE999I) will be printed. Control statements will be printed only if LIST is in effect (that is, if LIST is the option actually chosen at execution time by DFSORT; for override details, see Appendix D of *DFSORT Application Programming: Guide*).

CRITICAL

specifies that only critical messages will be printed. Control statements will be printed only if LIST is in effect.

NONE

specifies that messages and control statements will not be printed.

Applicable systems: OS/VS1, MVS

Default: ALL

OUTREL={YES | NO}

specifies whether unused temporary SORTOUT data set space is to be released.

YES

specifies that unused space is to be released. This option will not be used for a tape work data set sort.

NO

specifies that unused space is not to be released.

Applicable systems: OS/VS1, MVS

Default: YES

OUTSEC={YES | NO | n}

specifies whether DFSORT should use automatic secondary allocation for SORTOUT data sets that are temporary or new. This option will not be used for a tape work data set sort.

YES

specifies that automatic secondary allocation will be used for temporary or new SORTOUT data sets, and that 25% of the primary allocation will be used as the secondary allocation.

NO

specifies that automatic secondary allocation will not be used for temporary or new SORTOUT data sets.

n

specifies that automatic secondary allocation will be used for temporary or new SORTOUT data sets, and that n% of the primary allocation will be used as secondary allocation. The value n must be between 1 and 1000.

Applicable systems: OS/VS1, MVS

Default: YES

OVERRGN=n

specifies the amount of main storage above the REGION value that Blockset should attempt to obtain from the area defined by the system's IEALIMIT value. For more information, see "Allocating Storage" on page 11.

n

specifies the number of bytes as a decimal value within the range 0 to 65536 (64K). If the value specified is not a multiple of 4096 (4K), it will be rounded up to the next multiple of 4K.

Applicable systems: MVS

Default: 65536 (64K) bytes for JCL invoked applications; 16384 (16K) bytes for dynamically invoked applications

RESALL=*n*

indicates the number of bytes to be reserved in a partition or region, while DFSORT is executing, *when SIZE/MAINSIZE=MAX is in effect.*

Normally, only 4K bytes (the default) of main storage has to be available in a region or partition for system use. However, in a few cases this may not be enough; for example, if your installation does not have the BSAM/QSAM data management modules resident or if you have exits that open data set(s).

For MVS/XA systems, RESALL applies only to the amount of main storage below 16-megabyte virtual. ARESALL applies to the amount of main storage above 16-megabyte virtual.

For more information, see "Allocating Storage" on page 11.

n

specifies the number of bytes as a decimal value within the range of 4096 (4K) to 16515072 (16128K). If the value specified is not a multiple of 8, it will be rounded up to the next multiple of 8.

Applicable systems: OS/VS1, MVS

Default: 4096 (4K) bytes

Notes:

1. *The OS/VS1 system may require a value of 6144 (6K bytes) or more.*
2. *This specified amount of main storage is not used by DFSORT but may be logged as used by the system.*

RESDNTB={ALL | NONE}

specifies, for OS/VS1, whether DFSORT reenterable Blockset modules reside in the pageable supervisor area.

ALL

specifies that all the reenterable Blockset modules reside in the pageable supervisor area.

NONE

specifies that none of the reenterable Blockset modules reside in the pageable supervisor area.

This parameter must be coded the same for ICEAM1 and ICEAM2, and the reenterable Blockset modules must be made resident if ALL is selected. For further information, see Figure 1 on page 9.

Applicable systems: OS/VS1

Default: ALL

RESDNTP={ALL | NONE}

specifies, for OS/VS1, whether DFSORT reenterable Peerage and Vale modules reside in the pageable supervisor area.

ALL

specifies that all the reenterable Peerage and Vale modules reside in the pageable supervisor area.

NONE

specifies that none of the reenterable Peerage and Vale modules reside in the pageable supervisor area.

This parameter must be coded the same for ICEAM1 and ICEAM2, and the reenterable Peerage and Vale modules must be made resident if ALL is selected. For further information, see Figure 1 on page 9.

Applicable systems: OS/VS1

Default: NONE

RESINV=*n*

indicates the number of bytes to be reserved for the invoking program, while DFSORT is executing, *when DFSORT is dynamically invoked and SIZE/MAINSIZE=MAX is in effect.*

This extra space is usually required for data handling by the invoking program while DFSORT is executing (as is the case with some PL/I and all COBOL invoked sorts). For example, when invoking DFSORT from COBOL and using the RESINV option, *n* should specify the number of bytes to be reserved for COBOL's use in its default or user-written input or output procedure. This space is normally needed at execution time for OPEN/CLOSE modules and for buffers.

The number and size of buffers you need depend upon the routines you have, how the data is stored, and which access methods you use. Normally, RESINV=16384 (16K bytes) is sufficient. The reserved space is not meant for the executable code itself.

If your invoking program and its associated exits do not do data set handling, you do not need to specify this parameter. For MVS/XA systems, RESINV applies only to the amount of main storage below 16-megabyte virtual. ARESINV applies to the amount of main storage above 16-megabyte virtual.

For more information, see "Allocating Storage" on page 11.

n

specifies the number of bytes as a decimal value within the range of 0 to 16515072 (16128K). If the value specified is not a multiple of 8, it will be rounded up to the next multiple of 8.

Applicable systems: OS/VS1, MVS

Default: 0 bytes

Notes:

1. *This parameter should always be used if the program is to be called by a COBOL or PL/I program. It may also be needed if the program is to be called by programs written in other languages (refer to your specific language manual).*
2. *For JCL invoked applications, RESINV will not be used.*

SIZE={MAX | *n*}

specifies the amount of main storage DFSORT will attempt to use.

If the amount you specify for SIZE exceeds the amount of real storage generally available for one initiator, excessive paging may occur.

For more information, see "Allocating Storage" on page 11.

MAX

specifies that DFSORT will calculate the maximum amount of available storage as limited by the MAXLIM or TMAXLIM value.

n

specifies the number of bytes as a decimal value within the range of 90112 (88K) to 33554416 (32 megabytes minus 16). If the value specified is not a multiple of 8, it will be rounded down to the next multiple of 8.

Applicable systems: OS/VS1, MVS

Default: MAX

Note: RESALL and RESINV will be ignored unless SIZE/MAINSIZE=MAX is in effect.

SMF={NO | SHORT | FULL}

specifies whether DFSORT SMF records are to be produced.

NO

means that DFSORT will not produce any SMF type 16 records.

SHORT

means that DFSORT will produce a short SMF record type 16 for each application executed, and cause it to be written to the installation's SMF data set. The short SMF record does not contain the record length statistics.

FULL

means that DFSORT will produce a full SMF record type 16 for each application executed, containing the same information as the short form plus record length statistics, and cause it to be written to the installation's SMF data set.

Applicable systems: OS/VS1, MVS

Default: NO

Notes:

1. *SMF=FULL will result in a full SMF record type 16 only for variable-length record applications. For fixed-length record applications, DFSORT will produce the short SMF record type 16.*
2. *SMF=FULL can degrade performance for variable-length record applications.*
3. *Sort SMF record type 16 is written only if DFSORT completes successfully (return code 0).*

STIMER={YES | NO}

specifies whether DFSORT will issue an STIMER to monitor the processor time.

YES

an STIMER will be issued and processor time data will appear in SMF records.

NO

no STIMER will be issued and processor time data will not appear in SMF records.

Applicable systems: OS/VS1, MVS

Default: YES

SVC=*n*

specifies a user SVC number for the DFSORT SVC routine.

n

must be the decimal number 109 or a decimal number between 200 and 255. It must be an SVC number that is valid at your installation.

The DFSORT SVC routine (IGX00017) is normally SVC 109. If you have a previous release of DFSORT that uses SVC 109, you will need to:

- Specify an alternate number with this parameter.
- Specify the correct name for the SVC module in sample job SMAPPE or SMAPP4.

For more information, see "Keeping a Previous DFSORT Release (Temporarily or Permanently)" on page 10 and Step 4 on page 25.

You can also find more information on installing SVCs in *OS/VS1 Planning and Use Guide*, *OS/VS2 MVS System Programming Library: Initialization and Tuning Guide*, and *MVS/Extended Architecture System Programming Library: Initialization and Tuning*.

Applicable systems: OS/VS1, MVS

Default: 109

TMAXLIM=*n*

specifies an upper limit to the total amount of main storage, *both above and below 16-megabyte virtual* available to DFSORT when SIZE/MAINSIZE=MAX is in effect. For more information, see "Allocating Storage" on page 11.

n

specifies the number of bytes as a decimal value within the range of 0 to 33554424 (32 megabytes minus 8), but must not be less than the MAXLIM value. If the value specified is not a multiple of 8, it will be rounded down to the next multiple of 8.

Applicable systems: MVS/XA

Default: 2097152 (2048K) bytes

VERIFY={YES | NO}

specifies whether the sequence of output records is to be verified.

YES

specifies that the sequence is to be verified.

NO

specifies that the sequence is not to be verified.

Applicable systems: OS/VS1, MVS

Default: NO

Note: VERIFY=YES can degrade performance, especially when sorting short records.

VIO={YES | NO}

specifies whether virtual allocations for sort work data sets will be dynamically reallocated to real disk locations.

YES

If virtual allocation of sort work data sets takes place, DFSORT will use them without reallocating them to real disk locations.

NO

DFSORT will dynamically reallocate any virtual allocation of sort work data sets to get real disk locations.

Note: The device type used for the real allocation will be the same as that used for the virtual allocation.

Applicable systems: MVS

Default: NO

Note: If VIO sort work data sets are used, performance can be degraded.

VLSHRT={YES | NO}

specifies whether to continue sorting or merging if a variable-length input record is found that is too short to contain all specified control fields. VLSHRT is not meaningful for fixed-length record processing. For full details of VLSHRT, see the OPTION statement in *DFSORT Application Programming: Guide*.

YES

continue processing if a "short" record is found.

NO

terminate if a "short" record is found.

Applicable systems: OS/VS1, MVS

Default: NO

WRKREL={YES | NO}

specifies whether unused temporary SORTWKnn data set space will be released.

YES

specifies that unused space will be released.

NO

specifies that unused space will not be released.

Applicable systems: OS/VS1, MVS

Default: YES

Note: If you have dedicated certain volumes for SORTWKnn data sets, and you do not want unused temporary space to be released, you should specify WRKREL=NO.

WRKSEC={YES | NO | n}

specifies whether DFSORT should use automatic secondary allocation for temporary SORTWKnn data sets.

YES

specifies that automatic secondary allocation for temporary SORTWRKnn data sets will be used, and that 25% of the primary allocation will be used as the secondary allocation.

NO

specifies that automatic secondary allocation for temporary SORTWRKnn data sets will not be used.

n

specifies that automatic secondary allocation for temporary SORTWKnn data sets will be used, and that n% of the primary allocation will be used as the secondary allocation. The value n must be between 1 and 1000.

Applicable systems: OS/VS1, MVS

Default: YES

Appendix A. The ICEMSGS Macro

Figure 17 on page 58 is a copy of the ICEMSGS macro.


```

MACRO                                00010490
ICEMSGS                              00011000
**/ 5740-SM1                          00011570
**/ (C) COPYRIGHT IBM CORP. 1973, 1986 00011640
**/ (C) COPYRIGHT WATSON M CONNER INC. 1983 00011710
**/ LICENSED MATERIALS - PROPERTY OF IBM 00011780
**/**/**/**/**                        00011850
.*                                     * 00012000
.* $MAC(ICEMSGS) PROD(57406-SM1)      * 00013000
.*                                     * 00014000
.* FUNCTION: CONTAINS ALL THE MESSAGE TEXT FOR MESSAGES ISSUED * 00015000
.* BY THE STANDARD TECHNIQUES. EACH MESSAGE TEXT                * 00016000
.* CONSISTS OF FIXED CHARACTERS AND INSERT FIELDS. THE         * 00017000
.* INSERT FIELDS SUPPLY VARIABLE INFORMATION IN THE            * 00018000
.* FOLLOWING FORMS:                                           * 00019000
.*     1. ? - REPRESENTS CHARACTER DATA                       * 00020000
.*     2. % - REPRESENTS FIXED LENGTH NUMERIC DATA           * 00021000
.*     3. ! - REPRESENTS VARIABLE LENGTH NUMERIC DATA        * 00022000
.*                                                             * 00023000
.* NOTES:                                                       * 00024000
.*                                                             * 00025000
.* DEPENDENCIES: THE FOLLOWING MODULES MUST BE RE-ASSEMBLED AND * 00026000
.* RE-LINKEDITED TO APPLY CHANGES MADE TO THIS              * 00027000
.* MACRO:                                                       * 00028000
.*     ICEMCRE,ICEMDEC,ICEMDEF,ICEMDEV,ICEMERR,              * 00029000
.*     ICEMLIM,ICEMMON,ICEMMOS,ICEMPAR,                      * 00030000
.*     ICEMSGN,ICEMSGO                                       * 00031000
.*                                                             * 00032000
.* RESTRICTIONS: THE FOLLOWING RULES APPLY WHEN MODIFYING MESSAGES: * 00033000
.*     1. THE AND SIGN MUST NOT BE USED.                      * 00034000
.*     2. MESSAGE MACROS MUST NOT BE ADDED OR DELETED.       * 00035000
.*     3. THE MACRO CALL NAME 'ICEMSET' AND THE              * 00036000
.*     MESSAGE NUMBER MUST NOT BE CHANGED.                   * 00037000
.*     4. FIXED CHARACTERS MAY BE CHANGED, ADDED,           * 00038000
.*     DELETED, OR RELOCATED.                                 * 00039000
.*     5. INSERT FIELD CHARACTERS ?, %, AND ! MUST          * 00040000
.*     NOT BE CHANGED, ADDED, OR DELETED, OR USED          * 00041000
.*     AS NON-SPECIAL CHARACTERS.                            * 00042000
.*     6. INSERT FIELDS MUST NOT BE MADE CONTIGUOUS.        * 00043000
.*     7. INSERT FIELDS MAY BE RELOCATED. HOWEVER,          * 00044000
.*     THE POSITION OF INSERT FIELDS RELATIVE TO              * 00045000
.*     EACH OTHER MUST NOT BE CHANGED.                       * 00046000
.*     8. THE TOTAL LENGTH OF EACH TEXT STRING MUST NOT* 00047000
.*     EXCEED 110 BYTES.                                     * 00048000
.*     9. ASSEMBLER MACRO CONTINUATION RULES APPLY IF      * 00049000
.*     CONTINUATION IS NECESSARY.                            * 00050000
.*     10. EXPANSION OF MESSAGE TEXTS BY MORE THAN 25%     * 00051000
.*     MAY CAUSE THE RE-ASSEMBLY OF ONE OR MORE            * 00052000
.*     MESSAGE CSECTS TO FAIL.                               * 00053000
.*                                                         * 00054000
.*                                                         * 00055000

```

Figure 17 (Part 1 of 5). The ICEMSGS Macro

```

ICEMSET 0, '--- CONTROL STATEMENTS/MESSAGES ---- 5740-SM1 REL 8*00056000
      .0 ----- ???.???.?? ??? %%, 19?? --'          00057000
ICEMSET 1, 'TEXT BEGINS IN WRONG COLUMN'              00058000
ICEMSET 2, 'DUPLICATE OR CONFLICTING ???????? STATEMENT' 00059000
ICEMSET 3, 'CONTINUATION LINE MISSING'                00060000
ICEMSET 5, 'STATEMENT DEFINER ERROR'                 00062000
ICEMSET 6, 'OPERAND DEFINER ERROR'                   00063000
ICEMSET 7, 'SYNTAX ERROR'                            00064000
ICEMSET 8, 'FIELD OR VALUE GT 8 CHARACTERS'          00065000
ICEMSET 10, 'NO SORT OR MERGE CONTROL STATEMENT'     00066000
ICEMSET 11, 'DUPLICATE OR CONFLICTING OPERANDS ON THE OPTION ST*00067000
      ATEMENT'                                         00068000
ICEMSET 12, 'MISSING FIELDS OPERAND DEFINER'         00069000
ICEMSET 13, 'INVALID SORT OR MERGE STATEMENT OPERAND' 00070000
ICEMSET 14, 'DUPLICATE SORT OR MERGE STATEMENT OPERAND' 00071000
ICEMSET 15, 'VARIABLE RECORD TOO SHORT'              00072000
ICEMSET 16, 'INVALID FIELDS OPERAND VALUE'           00073000
ICEMSET 17, 'CONTROL FIELD DISPLACEMENT OR LENGTH VALUE ERROR' 00074000
ICEMSET 18, 'INVALID FORMAT'                         00075000
ICEMSET 20, 'INVALID RECORD STATEMENT OPERAND'       00076000
ICEMSET 21, 'NO TYPE OPERAND'                       00077000
ICEMSET 22, 'RECORD FORMAT NOT F, V OR D'           00078000
ICEMSET 23, 'NO LENGTH OPERAND'                     00079000
ICEMSET 24, 'RECORD LENGTH VALUE ERROR'              00080000
ICEMSET 25, 'RECORD COUNT OFF'                      00081000
ICEMSET 26, 'SMF RECORD NOT WRITTEN TO THE SMF DATA SET(RC=!!)' 00082000
ICEMSET 27, 'FIELD BEYOND MAXIMUM RECORD LENGTH'     00083000
ICEMSET 29, 'IMPROPER EXIT'                          00084000
ICEMSET 30, 'MULTIPLY DEFINED EXITS'                 00085000
ICEMSET 32, 'EXIT E61 REQUIRED'                       00086000
ICEMSET 33, 'CONTROL FIELD SEQUENCE INDICATOR E REQUIRED' 00087000
ICEMSET 34, 'MODS STATEMENT OPERAND ERROR'           00088000
ICEMSET 39, 'INSUFFICIENT MAIN STORAGE - ADD !!!!!K BYTES' 00089000
ICEMSET 40, 'INSUFFICIENT WORK UNITS'                00090000
ICEMSET 42, 'UNIT ASSIGNMENT ERROR ??????????'      00091000
ICEMSET 43, 'INVALID DATA SET ATTRIBUTES SPECIFIED ?????????? ???*00092000
      ??????'                                         00093000
ICEMSET 44, 'EXIT E%% INVALID OPTION'                00094000
ICEMSET 46, 'SORT CAPACITY EXCEEDED - RECORD COUNT !!!!!!!!!!!!!' 00095000
ICEMSET 47, 'RECORD COUNT OFF, SPECIFIED !!!!!!!!!!!!!, RECEIVED *00096000
      !!!!!!!!!!!!!!'                                00097000
ICEMSET 51, 'UNENDING MERGE'                         00098000
ICEMSET 52, 'END OF DFSORT'                          00099000
ICEMSET 53, 'OUT OF SEQUENCE'                        00100000
ICEMSET 54, 'RECORDS - IN: !!!!!!!!!!!!!, OUT: !!!!!!!!!!!!!' 00101000
ICEMSET 55, 'INSERT !!!!!!!!!!!!!, DELETE !!!!!!!!!!!!!' 00102000
ICEMSET 56, '????????? NOT DEFINED'                  00103000
ICEMSET 59, 'RECORD LENGTH INVALID FOR ??????????'  00104000
ICEMSET 61, 'I/O ERROR, DD ??????????, DEV ???, ECB ??, CSW ?????, *00105000
      SENSE ??????'                                  00106000
ICEMSET 62, 'LINK-EDIT ERROR'                        00106500
ICEMSET 63, 'OPEN ERROR ??????????'                 00107000

```

Figure 17 (Part 2 of 5). The ICEMSGS Macro

```

ICEMSET 65,'PROBABLE DECK STRUCTURE ERROR' 00108000
ICEMSET 67,'INVALID PARAMETER IN JCL EXEC PARM OR INVOKED PARM*00109000
LIST' 00109500
ICEMSET 68,'OUT OF SEQUENCE SORTIN??' 00110000
ICEMSET 69,'INVALID SIGN' 00111000
ICEMSET 71,'INVALID RETURN CODE FROM EXIT E%' 00112000
ICEMSET 72,'FIELD NOT WITHIN MINIMUM RECORD LENGTH' 00113000
ICEMSET 73,'VARIABLE RECORD TOO LONG' 00114000
ICEMSET 74,'RECORD LENGTH L1 OR L3 OVERRIDDEN' 00115000
ICEMSET 75,'VSAM CB ERROR (!!) AT ??????' 00116000
ICEMSET 76,'VSAM INPUT ERROR ?(!!!) ????????' 00117000
ICEMSET 77,'VSAM OUTPUT ERROR ?(!!!) ????????' 00118000
ICEMSET 78,'VSAM OPEN ERROR (!!!) ????????' 00119000
ICEMSET 79,'VSAM CLOSE ERROR (!!!) ????????' 00120000
ICEMSET 80,'IN MAIN STORAGE SORT' 00121000
ICEMSET 81,'COMMUNICATION AREA NOT FULLY ADDRESSABLE' 00122000
ICEMSET 82,'CHECKPOINT CANCELLED' 00123000
ICEMSET 83,'UNAVAILABLE RESOURCES DYNALLOC (????)' 00124000
ICEMSET 84,'???? ACCESS METHOD USED FOR ????????' 00125000
ICEMSET 88,'?????????.????????, INPUT LRECL = !!!!!, BLKSIZE = *00126000
!!!!, TYPE = ??' 00127000
ICEMSET 89,'?????????.????????, INPUT LRECL = !!!!!, TYPE = ??' 00128000
ICEMSET 92,'MAIN STORAGE = (!!!!!!!!!!!!,!!!!!!!!!!!!,!!!!!!!!!!!!), *00130000
NMAX = !!!!!!!!!!!!!' 00131000
ICEMSET 93,'MAIN STORAGE = (MAX,!!!!!!!!!!!!,!!!!!!!!!!!!), NMAX = *00132000
!!!!!!!!!!!!' 00133000
ICEMSET 94,'SMF RECORDS NOT WRITTEN' 00134000
ICEMSET 95,'INVALID OPTION STATEMENT OPERAND' 00135000
ICEMSET 96,'SUCCESSFUL RECOVERY FROM B37 ABEND(S) FOR WORK DAT*00136000
A SET(S)' 00137000
ICEMSET 98,'AVERAGE RECORD LENGTH = !!!!!!!!!!!!! BYTES' 00138000
ICEMSET 99,'BLDL FAILED FOR ????????? DATA SET' 00139000
ICEMSET 100,'OPERATING SYSTEM NOT SUPPORTED' 00140000
ICEMSET 101,'?????????????? STATEMENT NOT SUPPORTED FOR TECHNIQU*00141000
E USED' 00142000
ICEMSET 102,'MISSING COND OPERAND DEFINER' 00143000
ICEMSET 103,'INVALID INCLUDE OR OMIT STATEMENT OPERAND' 00144000
ICEMSET 104,'INVALID INREC OR OUTREC STATEMENT OPERAND' 00145000
ICEMSET 105,'INVALID SORT, MERGE, OR SUM STATEMENT OPERAND' 00146000
ICEMSET 106,'DUPLICATE INCLUDE OR OMIT STATEMENT OPERAND' 00147000
ICEMSET 107,'DUPLICATE INREC OR OUTREC STATEMENT OPERAND' 00148000
ICEMSET 108,'DUPLICATE SUM STATEMENT OPERAND' 00149000
ICEMSET 109,'SUM FIELD DISPLACEMENT OR LENGTH VALUE ERROR' 00150000
ICEMSET 110,'VERIFY NOT USED WITH SUM' 00150500
ICEMSET 111,'INREC OR OUTREC FIELD DISPLACEMENT OR LENGTH VALU*00151000
E ERROR' 00152000
ICEMSET 112,'EQUALS NOT USED WITH SUM' 00153000
ICEMSET 113,'CONDITION VALUE INVALID' 00154000
ICEMSET 114,'CONDITION FIELDS COMPARISON INVALID' 00155000
ICEMSET 115,'INSUFFICIENT MAIN STORAGE' 00156000
ICEMSET 116,'SORT CAPACITY EXCEEDED' 00157000
ICEMSET 117,'I/O ERROR ?????????????????????????????????????????*00158000
????????????????????????????????????????????????????????????' 00159000

```

Figure 17 (Part 3 of 5). The ICEMSGs Macro

```

ICEMSET 119, 'SUM FIELD OVERLAPS CONTROL FIELD' 00160000
ICEMSET 120, 'EXIT E?? IGNORED' 00161000
ICEMSET 123, 'CKPT OR CHKPT OPTION IGNORED' 00162000
ICEMSET 124, 'SUM FIELD OVERLAPS RECORD DESCRIPTOR WORD' 00163000
ICEMSET 125, 'SUM FIELD OVERLAPS SUM FIELD' 00164000
ICEMSET 126, 'REFORMATTING FIELDS ARE INCONSISTENT' 00165000
ICEMSET 128, 'OPTIONS: SIZE=!!!!!!!!!!!!,MAXLIM=!!!!!!!!!!!!,MINLIM*00166000
=!!!!!!!!!!!!,EQUALS=?,LIST=?,ERET=?????,MSGDDN=?????????' 00167000
ICEMSET 129, 'OPTIONS: VIO=?,EXCPVR=?,RESDNT=????,SMF=?????,WRK*00168000
SEC=?,OUTSEC=?,VERIFY=?,CHALT=?,DYNALOC=?????????????????' 00169000
ICEMSET 130, 'OPTIONS: RESALL=!!!!!!!!!!!!,RESINV=!!!!!!!!!!!!,SVC=*00170000
%%,CHECK=?,WRKREL=?,OUTREL=?,CKPT=?,STIMER=?,COBEXIT=CO*00170300
B?' 00170600
ICEMSET 131, 'OPTIONS: TMAXLIM=!!!!!!!!!!!!,ARESALL=!!!!!!!!!!!!,AR*00171000
ESINV=!!!!!!!!!!!!,OVERRGN=!!!!!!!!!!!!' 00171500
ICEMSET 132, 'OPTIONS: VLSHRT=?' 00171700
ICEMSET 134, 'NUMBER OF BYTES SORTED: !!!!!!!!!!!' 00172000
ICEMSET 136, '????????? REALLOCATED IN CYLINDERS' 00173000
ICEMSET 137, 'VSAM INPUT ERROR ?(!!!) ?????????????????????????????????*00174000
?????????????????????????????????????????' 00175000
ICEMSET 138, 'VSAM OUTPUT ERROR ?(!!!) ?????????????????????????????????*00176000
?????????????????????????????????????????' 00177000
ICEMSET 141, 'SPANNED RECORD ON ?????????? COULD NOT BE ASSEMBLED' 00178000
ICEMSET 142, '????????? NOT FOUND - SYSOUT USED' 00179000
ICEMSET 143, '????????????????? ?????? TECHNIQUE SELECTED' 00180000
ICEMSET 144, 'GENERATED SUM ROUTINE GREATER THAN 4K BYTES' 00181000
ICEMSET 146, 'END OF STATEMENTS FROM ???CNTL - PARAMETER LIST *00182000
STATEMENTS FOLLOW' 00183000
ICEMSET 147, 'OPTION STATEMENT OPERAND SORTIN OR SORTOUT NOT AL*00184000
LOWED' 00185000
ICEMSET 148, '????????? CONCATENATION NOT ALLOWED' 00186000
ICEMSET 150, 'VLSHRT NOT USED' 00187000
ICEMSET 151, 'GENERATED INCLUDE/OMIT ROUTINE GREATER THAN 4K BY*00188000
TES' 00189000
ICEMSET 152, 'OVERFLOW DURING SUMMATION' 00190000
ICEMSET 153, 'COBOL EXIT NOT SUPPORTED FOR TECHNIQUE USED' 00190200
ICEMSET 154, 'STOPAFT NOT SUPPORTED FOR TECHNIQUE USED' 00190300
ICEMSET 155, 'STOPAFT OR SKIPREC NOT APPLICABLE TO MERGE' 00190350
ICEMSET 156, 'MAIN STORAGE ABOVE 16MB = (!!!!!!!!!!!!,!!!!!!!!!!!!)*00190360
00190370
ICEMSET 157, 'EXEC PARM E15=COB OR E35=COB AND NO MODS EXIT' 00190400
ICEMSET 159, 'MODULE ICECOB2 NOT FOUND' 00190700
ICEMSET 160, 'COPY FUNCTION COULD NOT BE USED - REASON CODE IS *00190800
%%' 00190900
ICEMSET 161 'COBEXIT=COB2 AND COBOL E15 and E35 EXITS WERE FOU*00190930
ND'
ICEMSET 800, 'BLOCKSET TECHNIQUE COULD NOT BE USED - REASON COD*00191000
E IS %%' 00192000
ICEMSET 802, '????????????????? TECHNIQUE IN CONTROL' 00193000
ICEMSET 803, 'TOTAL WORK DATA SET TRACKS ALLOCATED: !!!!!!!!!! , *00194000
TRACKS USED: !!!!!!!!!!' 00195000
ICEMSET 804, '?????????? EXCP COUNT: !!!!!!!!!!' 00196000
ICEMSET 805, 'JOBNAME: ?????????? , STEPNAME: ??????????' 00197000
ICEMSET 806, 'DYNAMIC ALLOCATION REQUIRED !! DATASET(S), EACH W*00198000
ITH !!!!!!!!!!!!! BLOCKS OF !!!!!!!!!!!!! BYTES' 00199000
ICEMSET 807, '370/XA SORTING INSTRUCTIONS ARE ??? BEING USED' 00199500
D' 00199700

```

Figure 17 (Part 4 of 5). The ICEMSGSGS Macro

```

ICEMSET 820,'RL=!!!!!! B=!!!!!! IL=!!!!!! IS=!!!!!! IB=!!!!!! *00200000
      RM=!!!!!! EM=!!!!!! BA=!!!!!! IX=!!!!!! OX=!!!!!!'      00201000
ICEMSET 808,'PHASE ?: RSA ALLOCATED ?????????????????????????????*00201200
      ??'      00201300
ICEMSET 809,'PHASE ?: ??????? BUFFERS ALLOCATED ?????????????????*00201400
      ??????????????????'      00201600
ICEMSET 821,'BN=!!!!!! X=!!!!!! TO=!!!!!! SN=!!!!!! G=!!!!!!' 00202000
ICEMSET 822,'BN=!!!!!! X=!!!!!! G=!!!!!! PN=!!!!!! BT=!!!!!! TO*00203000
      =!!!!!!'      00204000
ICEMSET 823,'BN=!!!!!! X=!!!!!! G=!!!!!! TO=!!!!!! BT=!!!!!!' 00205000
ICEMSET 824,'PE=!!!!!! RP=!!!!!! CX=!!!!!! CO=!!!!!! CO=!!!!!!*00206000
      CR=!!!!!! G=!!!!!! WB=!!!!!!'      00207000
ICEMSET 825,'GP=!!!!!! SA=!!!!!! X=!!!!!!'      00208000
ICEMSET 826,'BN=!!!!!! X=!!!!!! RM=!!!!!!'      00209000
ICEMSET 891,'!!!!!!!! WMAIN, !!!!! CMAIN'      00210000
ICEMSET 892,'!!!! RIN !!!!! BLI !!!!! BLO !!!!! RUN !!!!!*00211000
      BUN !!!!! CPU'      00212000
ICEMSET 893,'!!!! XIN !!!!! WIN !!!!!!! GIN'      00213000
ICEMSET 894,'!!!! STR !!! MOR !!! IPB !!! OPB !!!!! CYL' 00214000

      ICEMSET 895,'!!!!!! MUNIT !!!!!!! SUNIT !!!!!!! OUNIT'      00215000
      ICEMSET 896,'!!!!!!!!!! SET !!!!!!!!!!! DEXTOT !!!!!!!!!!! BLK* 00216000
      !!!!!!!!!!! CSZ'
MEND      00217000

```

Figure 17 (Part 5 of 5). The ICEMSGs Macro

Appendix B. Messages

Messages are produced by the assembler program during the expansion of your ICEMAC macro instruction and during the expansion of your message modules. These messages are printed as part of the assembler listing in the SYS PRINT data set. Two types of messages are produced: error messages and informative messages.

Messages produced by the program during execution are listed and explained in *DFSORT Application Programming: Guide*.

ICEMAC Error Messages

The general format of DFSORT installation error messages is the following:

s,***ICESM1nnn text

where *s* is the severity code; ICESM1 is the prefix; *nnn* is the message serial number; and *text* is the message.

A complete list of these messages is given in Figure 18 on page 64, with their explanations. In each case (except when JCL or INV is not specified), the entire ICEMAC macro is analyzed before generation is terminated. After you have corrected the error, you can restart generation. For more information, see the note under the APPLY step in “Step 5. Modify the Installation Defaults (Optional)” on page 26.

Message Number	Explanation
8,***ICESM1000	JCL OR INV NOT SPECIFIED - GENERATION TERMINATED Either JCL or INV must be specified as the first ICEMAC parameter. The generation procedure was unsuccessful. Specify JCL or INV and restart generation.
8,***ICESM1001	SIZE VALUE x INVALID The value x specified for SIZE is not a valid decimal number or MAX, or is not in the valid range for SIZE.
8,***ICESM1002	MAXLIM VALUE x INVALID The value x specified for MAXLIM is not a valid decimal number, or is not in the valid range for MAXLIM.
8,***ICESM1003	MINLIM VALUE x INVALID The value x specified for MINLIM is not a valid decimal number, or is not in the range for MINLIM.
8,***ICESM1004	MSGPRT VALUE x INVALID The value x specified for MSGPRT is not a valid keyword.
8,***ICESM1005	EQUALS VALUE x INVALID The value x specified for EQUALS is not a valid keyword.
8,***ICESM1006	LIST VALUE x INVALID The value x specified for LIST is not a valid keyword.
8,***ICESM1007	ERET VALUE x INVALID The value x specified for ERET is not a valid keyword.
8,***ICESM1009	MSGDDN VALUE x GREATER THAN 8 CHAR The value x specified for MSGDDN is too long.
8,***ICESM1011	VIO VALUE x INVALID The value x specified for VIO is not a valid keyword.

Figure 18 (Part 1 of 4). ICEMAC Error Messages

Message Number	Explanation
8,***ICESM1012	EXCPVR VALUE x INVALID The value x specified for EXCPVR is not a valid keyword.
8,***ICESM1013	RESDNTB VALUE x INVALID The value x specified for RESDNTB is not a valid keyword.
8,***ICESM1014	IGNCKPT VALUE x INVALID The value x specified for IGNCKPT is not a valid keyword.
8,***ICESM1015	WRKSEC VALUE x INVALID The value x specified for WRKSEC is not a valid decimal number or keyword, or is not in the valid range for WRKSEC.
8,***ICESM1016	VERIFY VALUE x INVALID The value x specified for VERIFY is not a valid keyword.
8,***ICESM1017	SVC VALUE x INVALID The value x specified for SVC is not an allowed SVC number.
8,***ICESM1018	DYNALOC VALUE x GREATER THAN 8 CHAR The value x specified for DYNALOC device type is too long.
8,***ICESM1019	DYNALOC VALUE x IS INVALID The value x specified for DYNALOC number of devices is not a valid decimal number.
8,***ICESM1020	ALTSEQ VALUE x INVALID The value x specified for ALTSEQ is not four digits or is not a valid pair of hexadecimal digits (xxxx). The message appears once for each invalid value.
8,***ICESM1021	RESALL VALUE x INVALID The value x specified for RESALL is not a valid decimal number, or is not in the valid range for RESALL.
8,***ICESM1022	RESINV VALUE x INVALID The value x specified for RESINV is not a valid decimal number.

Figure 18 (Part 2 of 4). ICEMAC Error Messages

Message Number	Explanation
8,***ICESM1023	SMF VALUE x INVALID The value x specified for SMF is not a valid keyword.
8,***ICESM1024	CHALT VALUE x INVALID The value x specified for CHALT is not a valid keyword.
8,***ICESM1025	CHECK VALUE x INVALID The value x specified for CHECK is not a valid keyword.
8,***ICESM1026	WRKREL VALUE x INVALID The value x specified for WRKREL is not a valid keyword.
8,***ICESM1027	OUTREL VALUE x INVALID The value x specified for OUTREL is not a valid keyword.
8,***ICESM1028	MINLIM VALUE x IS GREATER THAN SIZE VALUE The value x specified for MINLIM is larger than the value specified for SIZE.
8,***ICESM1029	MINLIM VALUE x IS GREATER THAN MAXLIM VALUE The value x specified for MINLIM is larger than the value specified for MAXLIM.
8,***ICESM1030	OUTSEC VALUE x INVALID The value x specified for OUTSEC is not a valid decimal number or keyword, or is not in the valid range for OUTSEC.
8,***ICESM1031	STIMER VALUE x INVALID The value x specified for STIMER is not a valid keyword.
8,***ICESM1032	OVERRGN VALUE x INVALID The value x specified for OVERRGN is not a valid decimal number, or is not in the valid range for OVERRGN.
8,***ICESM1033	TMAXLIM VALUE x INVALID The value x specified for TMAXLIM is not a valid decimal number, or is not in the valid range for TMAXLIM.
8,***ICESM1034	ARESALL VALUE x INVALID The value x specified for ARESALL is not a valid decimal number, or is not in the valid range for ARESALL.

Figure 18 (Part 3 of 4). ICEMAC Error Messages

Message Number	Explanation
8,***ICESM1035	ARESINV VALUE x INVALID The value x specified for ARESINV is not a valid decimal number, or is not in the valid range for ARESINV.
8,***ICESM1036	COBEXIT VALUE x INVALID The value x specified for COBEXIT is not valid.
8,***ICESM1037	TMAXLIM VALUE IS LESS THAN MAXLIM VALUE The value specified for TMAXLIM is less than the MAXLIM value.
8,***ICESM1038	MSGCON VALUE x INVALID The value x specified for MSGCON is not a valid keyword.
8,***ICESM1039	VLSHRT VALUE x INVALID The value x specified for VLSHRT is not a valid keyword.
8,***ICESM1040	RESDNTP VALUE x INVALID The value x specified for RESDNTP is not a valid keyword.
8,*****	GENERATION TERMINATED ***** The generation procedure was unsuccessful. Correct errors and restart generation.

Figure 18 (Part 4 of 4). ICEMAC Error Messages

Message Module Error Messages

The messages in Figure 19 are produced during expansion of the message text modules after you have changed the ICEMSG macro. After you have corrected the error, you can restart generation.

Message Number	Explanation
12,***ICESM1050	<p>TEXT FOR MESSAGE n IS NOT PRESENT IN ICEMSG</p> <p>The message text requested does not appear in the ICEMSG macro in SYS1.PPOPTION, that is, a statement of the form:</p> <pre>ICEMSET n, 'textn...'</pre> <p>was not found in ICEMSG.</p> <p>Locate the original version of this statement in Appendix A or in the distribution library copy of ICEMSG, add it to ICEMSG in SYS1.PPOPTION, and modify it if necessary.</p>
12,***ICESM1051	<p>MESSAGE n TEXT LENGTH IS m BYTES TOO LONG</p> <p>The message text requested is m bytes too long as it appears in the ICEMSG macro.</p> <p>Locate the statement:</p> <pre>ICEMSET n, 'textn...'</pre> <p>in ICEMSG and shorten textn to 110 characters or fewer.</p>

Figure 19 (Part 1 of 2). Message Module Error Messages

12,***ICESM1052 MESSAGE TEXTS LENGTH IS n BYTES TOO LONG

The total length of the message texts requested is too long as they appear in the ICEMSGS macro. The message texts requested are indicated by the statements:

```
ICEDMSG a,...  
ICEDMSG b,...  
.  
.  
.
```

in this CSECT.
Locate the corresponding statements:

```
ICEMSET a,'texta...'  
ICEMSET b,'textb...'  
.  
.  
.
```

in ICEMSGS in SYS1.PPOPTION and shorten the total text length of these statements by n bytes.

12,***ICESM1053 TEXT FOR MESSAGE n HAS INCORRECT INSERT FIELD(S)

The message text requested has incorrect insert field(s) as it appears in the ICEMSGS macro in SYS1.PPOPTION; that is, an insert field character (?, %, or !) has been deleted, added, or changed, or the relative position of the insert fields has been changed. Locate the statement:

```
ICEMSETn, 'textn...'
```

in ICEMSGS in SYS1.PPOPTION, and change its insert field(s) to match those in the original version of this statement in Appendix A or in the distribution library copy of ICEMSGS.

Figure 19 (Part 2 of 2). Message Module Error Messages

ICEMAC Informative Messages

The following messages document the defaults generated for your DFSORT program, as specified in the ICEMAC statement. All options included in your generated program are described, whether the specification was explicit or implicit. One message will be printed from each group of messages listed in Figure 20 on page 71 to describe the default you have selected (or the IBM-supplied default).

-
- *, GENERATED JCL INVOKED DEFAULTS FOR 5740-SM1 RELEASE 8.0
 - *, GENERATED DYNAMICALLY INVOKED DEFAULTS FOR 5740-SM1 RELEASE 8.0

 - *, x BYTES IS LIMIT FOR MAXLIM
 - *, 1024K BYTES IS LIMIT FOR MAXLIM

 - *, x BYTES IS LIMIT FOR TMAXLIM
 - *, 2048K BYTES IS LIMIT FOR TMAXLIM

 - *, SIZE IS x BYTES
 - *, SIZE IS LIMITED BY TMAXLIM/MAXLIM

 - *, MIN MAIN STORAGE DFSORT
 - *, WILL TRY TO USE: x BYTES
 - *, MIN MAIN STORAGE DFSORT
 - *, WILL TRY TO USE: 200K BYTES

 - *, x BYTES RESERVED FOR DYNAMICALLY INVOKED DFSORT
 - *, NO BYTES RESERVED FOR DYNAMICALLY INVOKED DFSORT
 - *, RESINV IGNORED FOR JCL INVOKED DFSORT

 - *, x BYTES RESERVED ABOVE 16 MB VIRTUAL
 - *, FOR DYNAMICALLY INVOKED DFSORT
 - *, NO BYTES RESERVED ABOVE 16 MB VIRTUAL
 - *, FOR DYNAMICALLY INVOKED DFSORT
 - *, ARESINV IGNORED FOR JCL INVOKED DFSORT

 - *, x BYTES RESERVED FOR SYSTEM USE
 - *, 4096 BYTES RESERVED FOR SYSTEM USE

 - *, x BYTES RESERVED ABOVE 16 MB VIRTUAL FOR SYSTEM USE
 - *, NO BYTES RESERVED ABOVE 16 MB VIRTUAL FOR SYSTEM USE

 - *, DYNAMIC ALLOCATION NAME IS x
 - *, DYNAMIC ALLOCATION NAME IS SYSDA

 - *, DYNAMIC ALLOCATION NUMBER IS x
 - *, DYNAMIC ALLOCATION DEFAULT NUMBER IS 1
 - *, DYNAMIC ALLOCATION NUMBER IS x, DEFAULTED TO 16 (MAXIMUM)

 - *, SVC NUMBER IS x

 - *, ALL REENTERABLE BLOCKSET MODULES RESIDENT
 - *, REENTERABLE BLOCKSET MODULES NON-RESIDENT

 - *, ALL REENTERABLE PEERVALE MODULES RESIDENT
 - *, REENTERABLE PEERVALE MODULES NON-RESIDENT

Figure 20 (Part 1 of 3). Informative Messages

-
- | *, VIRTUAL I/O UNDER MVS
 - *, NO VIRTUAL I/O UNDER MVS

 - *, NO AUTOMATIC SECONDARY ALLOCATION FOR WORK DATA SETS
 - *, AUTOMATIC SECONDARY ALLOCATION FOR WORK DATA SETS

 - *, NO AUTOMATIC SECONDARY ALLOCATION FOR OUTPUT DATA SETS
 - *, AUTOMATIC SECONDARY ALLOCATION FOR OUTPUT DATA SETS

 - *, STIMER WILL BE USED
 - *, STIMER WILL NOT BE USED

 - *, ORDER OF EQUALS WILL BE PRESERVED
 - *, ORDER OF EQUALS WILL NOT BE PRESERVED

 - *, ALTSEQ TABLE USED ON FORMAT AQ CONTROL FIELDS
 - | *, ALTSEQ TABLE USED ON FORMAT AQ AND CH CONTROL FIELDS

 - *, RECORD COUNTERS NOT CHECKED WHEN E35 IS PRESENT
 - *, RECORD COUNTERS CHECKED WHEN E35 IS PRESENT

 - *, NO SMF RECORDS WILL BE WRITTEN TO SMF DATA SET
 - *, FULL SMF RECORDS WILL BE WRITTEN TO SMF DATA SET
 - *, SHORT SMF RECORDS WILL BE WRITTEN TO SMF DATA SET

 - *, EXCPVR SVC WILL BE USED FOR SORTWK BUFFERS
 - *, EXCPVR SVC WILL NOT BE USED FOR SORTWK BUFFERS

 - *, OUTPUT RECORDS WILL BE VERIFIED
 - *, OUTPUT RECORDS WILL NOT BE VERIFIED

 - *, BLOCKSET TECHNIQUE MAY BE USED IF CKPT IS SPECIFIED
 - *, BLOCKSET TECHNIQUE MAY NOT BE USED IF CKPT IS SPECIFIED

 - *, UNUSED SORTWORK SPACE WILL BE RELEASED
 - *, UNUSED SORTWORK SPACE WILL NOT BE RELEASED

 - *, UNUSED SORTOUT SPACE WILL BE RELEASED
 - *, UNUSED SORTOUT SPACE WILL NOT BE RELEASED

 - *, x IS ALTERNATE MESSAGE DDNAME
 - *, SYSOUT IS ALTERNATE MESSAGE DDNAME

 - *, COBOL EXITS USE OS/VIS COBOL
 - *, COBOL EXITS USE VS COBOL II

 - | *, ABEND IF DFSORT UNSUCCESSFUL
 - *, RC=16 IF DFSORT UNSUCCESSFUL

Figure 20 (Part 2 of 3). Informative Messages

*, CONTROL STATEMENTS WILL NOT BE LISTED
*, CONTROL STATEMENTS WILL BE LISTED

*, DO NOT WRITE MESSAGES TO MASTER CONSOLE
*, WRITE ALL MESSAGES TO MASTER CONSOLE
*, WRITE CRITICAL MESSAGES TO MASTER CONSOLE

*, DO NOT PRINT MESSAGES
*, PRINT ALL MESSAGES
*, PRINT CRITICAL MESSAGES

*, x BYTES OVER REGION FOR BLOCKSET UNDER MVS
*, 64K BYTES OVER REGION FOR BLOCKSET UNDER MVS
*, 16K BYTES OVER REGION FOR BLOCKSET UNDER MVS

*, CHANGED ALTSEQ CODE GENERATED:
*, ALTSEQ CODE GENERATED:

| *, SHORT VARIABLE RECORDS WILL BE ACCEPTED
| *, SHORT VARIABLE RECORDS WILL NOT BE ACCEPTED

0, ***** GENERATION SUCCESSFUL *****

Figure 20 (Part 3 of 3). Informative Messages

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