

RSX-11M/RSX-11S

Release Notes

Order No. AA-2573I-TC

RSX-11M/RSX-11S

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RSX-11M Version 4.2
RSX-11S Version 4.2

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PREFACE

MANUAL OBJECTIVES

The RSX-11M/RSX-11S Release Notes includes information on RSX-11M Version 4.2, RSX-11S Version 4.2, and RMS-11 Version 2.0. This manual is designed to provide you with information necessary to generate and use an RSX-11M or RSX-11S Version 4.2 system. The following information is discussed in this manual:

- Descriptions of new features and changes to existing features
- Descriptions of software restrictions and corrections to problems in previous versions
- Supplementary information that has not been incorporated into the manuals
- Corrections to documentation errors

INTENDED AUDIENCE

The RSX-11M/RSX-11S Release Notes are intended for all users of the RSX-11M or RSX-11S operating systems.

STRUCTURE OF THE MANUAL

RSX-11M VERSION 4.2 RELEASE NOTES

CHAPTER 1 RSX-11M New Features and Restrictions

This chapter describes the new features and restrictions for the RSX-11M Version 4.2 operating system. The first section lists the major new features. Subsequent sections are organized by operating system components and give more information about the new features and restrictions for Version 4.2.

CHAPTER 2 RSX-11M Documentation Corrections

This chapter describes errors and omissions in the RSX-11M manuals and refers you to the specific sections in the documentation to make corrections. The chapter is organized according to the titles of manuals in the RSX-11M documentation set.

PREFACE

CHAPTER 3 RMS-11 Version 2.0 Release Notes

This chapter describes the new features and restrictions for RMS-11 Version 2.0. The RMS-11 version number has not changed for this release of RSX-11M; however, new RMS-11 features are documented in this manual.

RSX-11S VERSION 4.2 RELEASE NOTES

CHAPTER 4 RSX-11S New Features

This chapter describes the new features and restrictions for the RSX-11S Version 4.2 operating system. Information specific to the performance of the RSX-11S operating system is included in this chapter.

APPENDIX A Reporting Problems

Appendix A describes the procedure for filling out Software Performance Reports (SPRs) for reporting problems you may encounter with RSX-11M, RSX-11S, and RMS-11 software.

APPENDIX B DIGITAL Equipment Computer Users Society (DECUS)

Appendix B is an introduction to the DIGITAL Equipment Computer Users Society (DECUS). The goals and activities of DECUS and information about becoming a DECUS member are described in Appendix B.

PREFACE

CONVENTIONS USED IN THIS MANUAL

The following conventions are observed in this manual:

Convention	Meaning
<CTRL/a>	A symbol that indicates the CTRL key; it must be held down while another key is pressed. For example, <CTRL/Z> means hold down CTRL while pressing Z. In examples, this control key sequence is shown as ^a; for example, ^Z indicates the result of <CTRL/Z>, because that is how the system echoes most control key combinations.
<XXX>	A 1- to 3-character key symbol. For example, <RET> indicates the RETURN key, <LF> indicates the LINE FEED key, and <ESC> indicates the ESC key.
^	The circumflex character, when appearing with another character, represents the system response to receiving a control character. For example, when you type <CTRL/Z> while running some system tasks, the system echoes ^Z. (On some terminals, the up-arrow (^) character is used in place of the circumflex.)
>	The MCR prompting character that appears whenever control is returned to the user task terminal and the system is ready to accept input.
"print" and "type"	As these words are used in the text, the system prints and the user types.

RSX-11M Release Notes
Version 4.2

CHAPTER 1

RSX-11M NEW FEATURES AND RESTRICTIONS

This chapter describes the new features, restrictions, and other supplementary information pertaining to the RSX-11M Version 4.2 operating system. The first section presents a brief summary of new features for Version 4.2. Subsequent sections are organized by operating system components. Information under each system component is divided into three categories:

- NEW FEATURES - Describes new features and enhancements to existing features for Version 4.2
- RESTRICTIONS - Describes restrictions to software performance and corrections to problems in previous versions
- SUPPLEMENTARY INFORMATION - Describes software changes that were documented in the previous release notes, and other information that has not been incorporated into the RSX-11M manuals

If you do not find one or more of these headings under a system component, you may assume that there is no information on that topic for Version 4.2.

1.1 SUMMARY OF NEW FEATURES

The following list summarizes the new features and changes to RSX-11M for Version 4.2.

- New device support:
 - J11-series processors
 - TK50 cartridge tape drive (MU:)
 - DEUNA driver
 - KDA50-Q controller
 - RQDX2 controller
 - RQDX3 controller
 - LA100 letterprinter

RSX-11M NEW FEATURES AND RESTRICTIONS

- LA210 letterprinter
- PC380 (as a VT102/VT125 in emulation mode)
- LN03 laser printer
- LQP02 letter quality printer
- LQP03 letter quality printer
- DTC01 DECTalk
- VT200-series terminals
- RUX50 UNIBUS interface for the 5-1/4 inch RX50 diskette drive
- RD53 71Mb disk drive
- DHU11 UNIBUS multiplexer
- DHV11 Q-BUS multiplexer
- DZQ11 Q-BUS multiplexer

(See sections 1.15 and 1.16 for more information about new device support.)

- New Network Command Terminal (NCT) support
- New DIGITAL Storage Architecture (DSA) support
- Stall I/O for the RC25 disk subsystem
- SYSGEN enhancements
- New and modified MCR commands and keywords
- New and modified DCL commands and qualifiers
- The User Environment Test Package (UETP) -- no longer distributed with RSX-11M
- IP11 and IPV11 Process Control subsystems support -- no longer in the RSX-11M distribution kit (now available as a separate layered product)

1.2 SYSTEM GENERATION

This section describes new features and restrictions that apply to performing an RSX-11M Version 4.2 system generation.

1.2.1 New System Generation Features

The following new system generation features have been added to RSX-11M Version 4.2:

- Saved answer files
- New device support

RSX-11M NEW FEATURES AND RESTRICTIONS

- Changes to SYSGEN questions
- GBLDEF enhancement
- System generation on a VAX/VMS host system
- Changes to the distribution kit
- Products no longer supported by SYSGEN

1.2.1.1 Saved Answer Files

A Version 4.1 saved answer file (SYSSAVED.COM) can be used when generating a Version 4.2 system. These files are still upward compatible.

NOTE

If you are using the Version 4.1 Saved answer files and you want to use the IP11 layered product, you will need to modify the previous IP11 symbols to conform with the new symbols.

1.2.1.2 New Device Support

You can select the following new devices during system generation:

Processors: RSX-11M supports the J11-series processors, which consist of the LSI-11/73, MicroPDP-11/73, MicroPDP-11/83, and PDP-11/84. (Note that, due to hardware restrictions, RSX-11M may not work properly with most configurations built around the LSI-11/73 processor module.)

The MicroPDP-11/23 processor is also supported on RSX-11M Version 4.2.

Printers: RSX-11M supports the LN03, LQP02, LQP03, LA210 and LA100 printers.

Terminals: RSX-11M supports the VT200-series terminals.

Terminal Driver: RSX-11M supports additional terminal characteristics if you select support for the full-duplex terminal driver in the Terminal Driver Options section of Phase I of SYSGEN. The additional terminal characteristics include parity generation and checking, advanced video and editing options, ANSI-standard and DIGITAL-specific escape sequences, ReGIS graphics, and block-mode transmission.

Asynchronous Terminal Interfaces: RSX-11M supports the YV device for the DHV11 and DHU11 multiplexers. The DHV11 is a Q-BUS multiplexer that handles eight lines at speeds up to 19.2K baud with full modem control. The DHU11 is the UNIBUS equivalent of the DHV11. It handles up to 16 lines with full modem control. You must select the full-duplex terminal driver during system generation, if you want support for the DHV11 or DHU11. Also, RSX-11M supports the YZ device for the DZQ11 Q-BUS multiplexer.

Network Communications Driver: RSX-11M supports the DEUNA driver for the XE UNIBUS Ethernet communications device.

RSX-11M NEW FEATURES AND RESTRICTIONS

DU: Devices: RSX-11M supports the RD53 fixed disk.

MU: Devices: RSX-11M supports the TK50 magnetic tape cartridge. The MU: devices are also supported as memory crash dump devices.

Controllers: RSX-11M supports the RUX50 UNIBUS controller for the RX50 diskette drive, the KDA50-Q controller for RA60 and RA80/RA81 disks, and the TQK50 Q-BUS controllers for the TK50 cartridge tape.

1.2.1.3 Changes to SYSGEN Questions

Several questions have been modified or added to the SYSGEN dialogue. The changes are described as follows:

In the Setup sections of Phases I and II, if you are using an RL01 or RL02 distribution kit and doing a PREPGEN, SYSGEN asks where you want the assembly and task-build files to be located. You can select the default user device or the null device; this saves space on the distribution disks.

If you have an RL01 or RL02 distribution kit and you are chaining from Phase I to Phase II, in the SETUP section of Phase I SYSGEN asks you to specify the device on which the PRVBLD disk will be mounted. If you are not chaining from Phase I to Phase II, SYSGEN asks you to specify the device in the Setup section of Phase II.

In the Executive Options section of Phase I, if you select support for DECnet-11M, SYSGEN asks if you want to include Network Command Terminal (NCT) support. NCT support enhances the full-duplex terminal driver by adding support for modem hangup and for out-of-band character ASTs, switch characters, and extended I/O.

In the Executive Options section, SYSGEN question #3 no longer mentions RMS-11. This is because the feature applies to both RMS and FCS.

In the System Options section of Phase I, SYSGEN asks if you want to include support for the IP11 Industrial Control Subsystem. The IP11 is a combined software and hardware subsystem that controls and monitors industrial processes. If you do select support for the IP11, SYSGEN then asks if you also want IP11 power-fail support.

In the Peripheral Options section of Phase I, the prompt for DU: devices has been changed. Instead of specifying a drive, you specify the interrupt vector address, the CSR address, and the number of disk drives for each DU controller.

1.2.1.4 GBLDEF Enhancement

When you choose user-written driver support, SYSGEN includes, by default, the statement GBLDEF=\$USRTB:0 in the task-build command file for the Executive.

1.2.1.5 System Generation on a VAX/VMS Host System

You can perform an RSX-11M system generation on a VAX/VMS host system running VAX-11 RSX software.

RSX-11M NEW FEATURES AND RESTRICTIONS

1.2.1.6 Changes to the Distribution Kit

The distribution kits that contain the files for generating the new system image have undergone several changes.

For stand-alone system generations, the default CSR address that the Stand-Alone Configuration and Disk Sizing Program (CNF) expects for MT:-type devices has been changed. Also, default values have been added for MU: devices.

The RL01 and RL02 distribution kits have been changed. The RL01 kit consists of seven disks rather than six. A new backup set, called PRVBLD, is stored on the additional disk. The EXCPRV backup set has been divided into two sets, EXCPRV and PRVBLD. EXCPRV contains the files for assembling the Executive, device drivers, and some MCR modules during Phase I of SYSGEN. PRVBLD contains the files for building the Executive, device drivers, libraries, and privileged tasks during Phase II of SYSGEN.

The RL02 distribution kit contains five disks because the PRVBLD and RLUTIL backup sets are on the disk labeled PRVBLD, and the MCRSRC and HLPDCL backup sets are on the disk labeled MCRSRC.

A new distribution kit is available with this version of the operating system. The new kit consists of two TK50 magnetic tape cartridges that are driven by a TK50 streaming tape drive. The first tape contains the new system files; the second tape contains BRUSYS, which is an RSX-11S system dedicated to stand-alone copying of the distribution kit.

References in the previous release to an RC25 Disk Kit and an RC25-specific Big Disk Magnetic Tape Kit were errors. Support for system generations targeted to RC25 system disks is provided in the magnetic tape distribution kit.

References in the previous release to an RP07 Big Disk Magnetic Tape Kit were errors. There is no support for system generation targeted to the RP07.

The procedure for copying the baseline system from the distribution kits to a disk has been simplified. The baseline system includes an Indirect command procedure called TAPEKIT.COMD, which guides you through the copying process.

RSX-11M Version 4.2 is distributed on the following media:

- Seven RL01 cartridge disks
- Five RL02 cartridge disks
- Two RK06 cartridge disks
- One RK07 cartridge disk
- Two TK50 magnetic tape cartridges
- Two magnetic tapes, 9-track, 800 bpi, 2400-foot
- One magnetic tape, 9-track, 1600 bpi, 2400-foot

RSX-11M NEW FEATURES AND RESTRICTIONS

NOTE

RSX-11M Version 4.2 is the last release that will include an RK06 disk distribution or allow you to generate an RK06-based system from the tape distribution. However, until the next release, updates will continue to be distributed on RK06 disks.

1.2.1.7 Products No Longer Supported by SYSGEN

SYSGEN no longer supports the following hardware and software products:

- The User Environment Test Package (UETP)
- The IP11 Industrial Control Subsystem software is no longer automatically supported. It is now a layered product with its own installation process. You can select support for it in the System Options section of Phase I of SYSGEN.

1.2.2 System Generation Restrictions

The following restrictions apply to performing an RSX-11M Version 4.2 system generation:

1.2.2.1 Minimum Requirements for System Generation and Installation

The host machine for a system generation must meet the following minimum requirements:

- Have at least 128Kb of memory for distributions other than the TK50
- Have at least 248Kb of memory for using the BRUSYS system
- Be mapped and have a null device (NL:)

1.2.2.2 On-Line System Generation Restriction

When performing a Version 4.2 on-line system generation, SYSGEN will always install the Task Builder supplied on the distribution kit. The Task Builder is installed under the task name (...TKL).

NOTE

You must be a privileged user to perform an on-line system generation.

1.3 MCR

This section describes new Monitor Console Routine (MCR) features and restrictions for RSX-11M Version 4.2. See the RSX-11M/M-PLUS MCR Operations Manual for more information.

RSX-11M NEW FEATURES AND RESTRICTIONS

1.3.1 New MCR Features

New MCR device support, as well as new and modified keywords have been added for RSX-11M Version 4.2. The new MCR features for Version 4.2 are listed as follows:

- New device support
- New SET keywords
- Modified SET keyword
- Modified MOUNT (MOU) keywords

1.3.1.1 New Device Support

The MCR command ALLOCATE /TYPE supports the following additional devices:

- RA60
- RA80
- RA81
- RC25
- RX50
- RD51
- RD52
- RD53
- TK50

The MCR command SET /TERM supports the following additional devices:

- DTC01
- LA50
- LA210
- LN03
- LQP02, LQP03
- PC3xx (Professional-series)
- VT2xx (VT200-series)

RSX-11M NEW FEATURES AND RESTRICTIONS

1.3.1.2 New SET Keywords

The SET command has the following new keywords:

```
SET
/[NO]ANSI
/[NO]AVO
/[NO]BLKMOD
/[NO]DEC
/[NO]EDIT
/HOST
/[NO]HSYNC
/INQUIRE
/[NO]PARITY
/[NO]PASTHRU
/[NO]PRINTER_PORT
/[NO]REGIS
/[NO]SOFT
/[NO]TTSYNC
```

NOTE

The SET /HOST command executes only on systems that have selected Network Command Terminal (NCT) support during system generation, and have installed DECnet software (a separate layered product).

1.3.1.3 Modified SET Keyword

The SET command also has the following modified keyword:

```
SET/BUF      Sets the default buffer size of a specified
              device. The minimum default buffer size for
              devices other than terminals is 14(decimal)
              characters. Formerly, the minimum size was one
              character. The minimum buffer size for terminals
              is 16(decimal) characters.
```

1.3.1.4 Modified MOUNT (MOU) Keyword

The MOUNT (MOU) command has the following modified keywords:

```
MOU
/FPRO       Specifies default file protection codes for files
              created on Files-11 magnetic tapes or disks.
              Formerly, this keyword applied only to disks.
/PRO        Specifies the default volume protection for
              Files-11 magnetic tape or disk volumes.
              Formerly, this keyword applied only to Files-11
              disk volumes.
```

RSX-11M NEW FEATURES AND RESTRICTIONS

1.4 DCL

This section describes new DIGITAL Command Language (DCL) features and restrictions for RSX-11M Version 4.2. See the RSX-11M Command Language Manual for detailed descriptions of new features.

1.4.1 New DCL Features

New DCL device support, new and modified commands, and new command qualifiers have been added to RSX-11M Version 4.2. The new DCL features for Version 4.2 are listed as follows:

- New device support
- New ANALYZE commands
- New SET and SHOW HOST commands
- New SET FILE command
- Modified INITIALIZE/BADBLOCKS command
- New command qualifiers

1.4.1.1 New Device Support

The DCL commands SET and SHOW TERMINAL support the following additional devices:

- DTC01
- LA50
- LA210
- LN03
- LQP02
- LQP03
- PRO_series (Professional-series)
- VT200_series (VT200-series)

Additional devices supported by DCL include:

- The RD52 and RD53 disk devices
- The TK25 and TK50 magnetic tape devices

RSX-11M NEW FEATURES AND RESTRICTIONS

1.4.1.2 New ANALYZE Commands

You use the DCL command ANALYZE to collect information about hardware on your system. The ANALYZE/MEDIA command determines whether bad blocks exist on a disk volume, and records their location. Bad block information recorded by the ANALYZE/MEDIA command can then be used by the BACKUP and INITIALIZE commands. The format and valid qualifiers are as follows:

```
ANALYZE/MEDIA [/qualifier[s]] ddn:  
  /ALLOCATE=label  
  /BADBLOCKS  
  /BADBLOCKS/NOEXERCISE  
  /EXERCISE[=(n,m)]  
  /OVERRIDE  
  /RETRY  
  /SHOW
```

Other ANALYZE DCL commands include the ANALYZE/CRASH_DUMP command and the ANALYZE/ERROR_LOG command.

The ANALYZE/CRASH_DUMP command helps determine the cause of system crashes by formatting and listing a memory dump created by the Executive Crash Dump module. The format and valid qualifiers are as follows:

```
ANALYZE/CRASH_DUMP/outputqualifier[s] infile[/qualifier[s]]
```

Outputqualifiers:

```
  /LIST=lfil[/listqualifier[s]]  
  /ERRORLIMITS=n  
  /PAGECOUNT=n  
  /PAGELENGTH=n  
  /[NO]PRINTER  
  /BINARY=bfil[/MEMORYSIZE=n]  
  /SYMBOLS=sfil
```

Infile[/qualifier[s]]:

```
  /ACTIVE=(actlist)  
  /ALL  
  /BLOCK=n  
  /DATASTRUCTURES=(datalist)  
  /CLOCKQUEUE  
  /DENSITY=n  
  /DEVICES  
  /DUMP  
  /HEADERS  
  /KERNEL  
  /PARTITION  
  /POOL  
  /[NO]SYSTEM  
  /TASKS=(taslist)
```

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The ANALYZE/ERROR_LOG command analyzes and formats information about errors and events, which occur on system hardware. It also generates reports that Field Service can use to repair your hardware. The format and valid qualifiers are as follows:

```
ANALYZE/ERROR_LOG[/qualifier[s]] datafile
    /BRIEF
    /COMMAND:n
    /DEVICES[: (ddnn:[,ddnn:,...]) or ALL]
    /ENTRY
    /FULL
    /INCLUDE
    /NODETAIL
    /OUTPUT[:outfil]
    /PREVIOUS_DAYS=n
    /REGISTER_S
    /SERIAL_NUMBER:snum
    /SINCE:(dd-mmm-yy[mm:ss])
    /THROUGH:(dd-mmm-yy[mm:ss])
    /TODAY
    /VOLUME_LABEL:label
    /[NO]WIDE
    /YESTERDAY
```

1.4.1.3 New SET and SHOW HOST Commands

After you log on to a system, you can use the DCL command SET HOST to connect your terminal to a different system. Both your current system and the remote system must run DECnet software. In addition, you need to have an account on the remote system. Otherwise, you will not be able to log on to the remote system after you enter the SET HOST command. The format is as follows:

```
SET HOST nodename
```

The SHOW HOST command displays the name of the processor to which your terminal currently is connected. The display also shows you the name and version number of the operating system running on the processor.

The SHOW HOST command is most useful after you have connected your terminal to a remote system with the SET HOST command. However, SHOW HOST works whether or not your system runs DECnet software. Without DECnet on your system, this command simply displays information about your local operating system. The format is as follows:

```
SHOW HOST
```

1.4.1.4 New SET FILE Command

The command SET FILE establishes certain file attributes. You can change an end-of-file marker, have an entry in one directory point to a file in another directory, remove an entry from a directory, or truncate files to their actual length. The format is as follows:

```
SET FILE[/qualifier[s]] filespec[s][/qualifier]
    /ENTER:synonymfilespec
    /NOWARNINGS
    /REMOVE
    /REWIND
    /TRUNCATE
```

RSX-11M NEW FEATURES AND RESTRICTIONS

File qualifier:

/ENDOFFILE: (BLOCK:n, BYTE:n)

1.4.1.5 Modified INITIALIZE/BADBLOCKS Command

The DCL command INITIALIZE/BADBLOCKS has been modified so that it is consistent with the MCR command INI/BAD. The changes are as follows:

- The command INIT/BAD:OVERRIDE is now equivalent to the MCR command INI /BAD=[OVR]. Previously, it translated to the MCR command INI /BAD=[NOAUTO].
- The INIT/BAD:NOAUTOMATIC command has been added to DCL. It is equivalent to the MCR command INI /BAD=[NOAUTO].

DCL Command	MCR Translation
INIT/BAD:OVERRIDE	INI /BAD=[OVR]
INIT/BAD:NOAUTOMATIC	INI /BAD=[NOAUTO]

1.4.1.6 New Qualifiers

RSX-11M Version 4.2 includes the following new DCL command qualifiers:

APPEND[/qualifier[s]]
/NOWARNINGS
/REWIND
/SHARED

COPY[/qualifier[s]]
/ALLOCATION:n[.]
/NOWARNINGS
/OVERLAY
/PRESERVE_DATE
/REWIND
/SHARED

CREATE/DIRECTORY[/qualifier[s]]
/OWNER_UIC:[uic]

DELETE[/qualifier[s]]
/NOWARNINGS

DIRECTORY[/qualifier[s]]
/REWIND
/NOWARNINGS

DISMOUNT[/qualifier[s]]
/TERMINAL:ttn:

INITIALIZE[/qualifier[s]]
/BADBLOCKS:arg
NOAUTOMATIC
(AUTOMATIC, MANUAL)
(OVERRIDE, MANUAL)
/DENSITY:arg
HIGH
LOW
/LABEL:VOLUME_ACCESSIBILITY:"c"
/PROFESSIONAL

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INITIALIZE/UPDATE[/qualifier[s]]
 /LABEL:newvolumelabel

INSTALL[/qualifier[s]]
 /[NO]INTERPRETER

LINK[/qualifier[s]]
 /[NO]PRINT

MOUNT[/qualifier[s]]
 /PROCESSOR:arg
 UNIQUE
 /OVERRIDE:arg
 IDENTIFICATION

PRINT[/qualifier[s]]
 /AFTER:TOMORROW

PURGE[/qualifier[s]]
 /NOWARNINGS

RENAME[/qualifier[s]]
 /NOWARNINGS

SET SYSTEM[/qualifier[s]]
 /NETWORK UIC:[g,n]
 /POOL/LIMITS=(arg[,arg,...])
 HIGH=n
 LOW=n
 MINIMUMSIZE=n
 TASKPRIORITY=n

SET TERMINAL[/qualifier[s]]
 /INQUIRE
 /DTC01
 /LA50
 /LA210
 /LN03
 /LQP02
 /LQP03
 /PRO SERIES
 /VT200 SERIES
 /[NO]ADVANCED VIDEO
 /[NO]ANSI CRT
 /[NO]BLOCKMODE
 /[NO]EDIT MODE
 /[NO]HOSTSYNCR
 /PRINTER PORT
 /[NO]REGIS
 /[NO]SOFT CHARACTERS
 /[NO]TTSYNCR
 /[NO]PARITY:arg
 ODD
 EVEN

SHOW SYSTEM[/qualifier[s]]
 /NETWORK UIC
 /POOL_LIMITS

SHOW TASKS[/qualifier[s]]
 /DEVICE:ddnn:

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1.4.2 DCL Restriction

The ANSI Standard recommends unloading the ANSI magnetic tape as the default action for dismounting a tape. Depending on which model magnetic tape drive is in use, this will either take the drive off line or actually unload the tape.

The DCL qualifier `/[NO]UNLOAD` and the MCR switch `/LOCK=[NO]UNLOAD` specify an action other than the default action to be taken.

When a volume switch is requested, you may, by using the MAG utility, cause error codes to be returned to the program that is reading or writing. (Previously, it was necessary either to mount a magnetic tape or to abort the program.) The MAG utility also allows a magnetic tape to be initialized if a new tape is needed for output and no previously initialized tape is available.

1.5 TDX

This section includes information about using the catch all task (TDX) on RSX-11M Version 4.2. The TDX facility has two purposes:

- It enables you to run uninstalled tasks.
- It allows you to abbreviate command names.

1.5.1 Installing TDX

Any task installed with the task name `...CA.` is treated as a catch-all task. If MCR receives an unrecognized command, it searches for a task with that name and passes the command line to this task. To use TDX as the catch-all task for your system, install it as follows:

```
>INS $TDX/TASK=...CA.
```

1.5.2 TDX Commands and MCR Translations

When installed, TDX checks the specified command against its list of commands. If the commands match, TDX translates the command specified into a valid MCR command. These commands and their MCR translations are as follows:

Command	Translation	Function
ATS	ACT /ALL	Displays the names of all active tasks in the system
ATS ttnn:	ACT /TERM=ttnn:	Displays the names of all active tasks of the specified terminal
CHD	SET /UIC	Displays the current default UIC for terminal TI:

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Command	Translation	Function
CHD g m	SET /UIC=[g,m]	Changes the default UFD to the UFD specified
CLR		Clears the issuing terminal's screen and sets cursor to 0,0. Returns exit status of EX\$\$SUC if terminal is CRT and EX\$WAR if it is not
CRE file	PIP file=TI:	Creates a new file without invoking an editor
CVT val		Evaluates an arithmetic expression, converts that expression into different formats, and displays all the formats on your terminal. CVT accepts input in octal (nnn or nn,nn) or decimal (nnn. or nn.,nn.) words or bytes, hexadecimal numbers (\$nnnn), Radix-50 (%ccc) or ASCII ('c or "cc) characters, or arithmetic expressions using +,-,/,* and < >
DEL file(s)	PIP file(s)/DE	Deletes the specified file(s)
DIR [file(s)]	PIP [file(s)]/LI	Displays a directory listing at the terminal
DLG	DEV /LOG	Displays information about all logged-in terminals on the system
DLN	NCP SHOW KNOWN NODES	Displays all known DECnet nodes
FRE	PIP /FR	Displays the amount of space available on SY:, the largest contiguous space on SY:, the number of file headers available and the number of file headers used
FRE ddu:	PIP ddu:/FR	Displays the same information as FRE for a specified device
PUR file(s)	PIP file(s)/PU	Deletes all but the latest version of a file

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Command	Translation	Function
SHQ	QUE/LI	Displays information about all entries in all print queues
SYS	SET /SYSUIC	Displays the current system UIC
TDX		Displays the current version of TDX
TYP file(s)	PIP TI:=file(s)	Prints files on your terminal

1.5.3 Modifying the TDX Source File

You may want to add other commands to TDX by modifying the source file in [24,10]TDX.MAC. The routines for the commands are at the end of the source file and serve as examples for user-tailored routines. To reassemble the source file after making additions, use the TDXASM.CMD file located in [24,20]. To rebuild TDX, follow the procedure in the Phase III section of the RSX-11M System Generation and Installation Guide. TDX comes preassembled ([1,24]TDX.OBJ) if you do not wish to make any changes.

The following table shows the location of files on multivolume kits:

Distribution	TDX.MAC	TDX.OBJ, TDXBLD.BLD
RL01/RL02	HLPDCL	EXCPRV
RK06	CLISRC	RSXM38
(all other)	RSXM38	RSXM38

If the command you enter does not match any of TDX's commands, TDX attempts to issue one of the following two MCR command options. In the examples that follow, xxx represents the first three characters of your command.

The option that TDX uses depends on whether the logical devices ZZ1: or ZZ2: exist on your system. You can assign one of these devices in your LOGIN.CMD file. Note that the presence of the ZZ1: assignment masks the presence of the ZZ2: assignment. If no assignment is made, TDX will not exercise either option.

1. MCR> RUN \$xxx/TASK=xxxTNN/CMD="params..."

This option installs, runs, and removes a task. "Params..." represents the command line that you enter. Your command line cannot exceed 39 characters because TDX adds other characters to this line. If you want this option, place the following command line in your LOGIN.CMD file:

ASN SY:=ZZ1:

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2. MCR> @SY:[loginuic]xxx.CMD or
MCR> @LB:[libuic]xxx.CMD or
MCR> @SY:[loginuic]CATCHALL.CMD or
MCR> @LB:[libuic]CATCHALL.CMD

For this option, TDX searches for one of the @[...]xxx.CMD indirect command files, in the order indicated. As soon as TDX locates one of these files, the search stops. You can design the indirect command file to perform a variety of functions, such as installing tasks, providing HELP, or issuing error messages.

To use this option, place the following command line in your LOGIN.CMD file:

```
ASN SY:=ZZ2:
```

RSX-11M Version 4.2 contains a sample indirect command file, [24,24]CATCHALL.CMD.

The ZZn option may be controlled for all users by placing the following command line in the system startup file:

```
ASN SY:=ZZn:/GBL
```

where n equals 1 or 2, depending upon which ZZn option you prefer.

If your command does not match a TDX command or if TDX cannot locate the necessary task, TDX issues the following message:

```
MCR -- Task not in system
```

1.5.4 Supplementary TDX Information

You may want to install some tasks permanently rather than invoke TDX to install them as you need them. It is advisable to permanently install the following:

- Tasks requiring a larger increment than the default (see the INSTALL command in the RSX-11M/M-PLUS MCR Operations Manual)
- Tasks that are used frequently

In the following instances, TDX may affect the execution of the command file when noninstalled tasks are invoked:

- If the command line's length exceeds 39 characters.
- If TDX has no means of returning the exit status of called tasks to Indirect. This problem occurs in systems without parent/offspring tasking. In this case, Indirect proceeds immediately to the next command line without waiting for the called task to finish. This has the same effect as preceding the command line with the Indirect .XQT directive.

1.6 INDIRECT

This section describes new features, a restriction, and supplementary information for using the Indirect Command Processor Library (Indirect). For more information, see the RSX-11M/M-PLUS Indirect Command Processor Manual.

1.6.1 New Indirect Features

The new features and changes to Indirect for RSX-11M Version 4.2 are listed as follows:

- Changes to <TITYPE> symbol
- New delimiters for symbols and expressions
- New special string symbols

1.6.1.1 Changes to <TITYPE> Symbol

The <TITYPE> symbol supports two new terminal types. The types and their corresponding octal codes are:

PC3xx (Professional-series)	35
VT2xx (VT200-series)	36

Also, the <TITYPE> symbol is now evaluated whenever the symbol is referenced by the user, not just when Indirect is initialized.

1.6.1.2 New Delimiters for Symbols and Expressions

Pound sign (#) characters as well as quotation mark (") characters can be used as delimiters for string symbols and expressions.

1.6.1.3 New Special String Symbols

The following special string symbols are new for RSX-11M Version 4.2:

<DIRECT>	Contains a null directory string ([]) for compatibility with RSX-11M-PLUS and Micro/R SX in no-named mode
<SYTYP>	Contains a string describing the system type (for example, "RSX-11M")
<VERSN>	Contains the current system's version number (for example, "4.2")

1.6.1.4 Indirect Restriction

The @/LB:module command line does not function on RSX-11M Version 4.2 when it is issued from a CLI prompt or from within a command file. No problem occurs when it is issued from within a library.

If the module name referenced is greater than six characters, Indirect truncates the name to six characters. When a file name is truncated, Indirect returns the following error message:

AT. -- File not found

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Indirect assumes that the module name you want to reference is only six characters long, because the module names are truncated to six characters by the Librarian utility when the files are included in the command library. This Indirect behavior will remain a restriction for RSX-11M Version 4.2.

To avoid this problem, always specify a module name of six characters or less when issuing the @/LB:module command line. Also, do not use the @/LB:module command line unless you plan to include command files in a command library.

1.6.2 Supplementary Indirect Information

This section describes how to use the Indirect Command Processor. Also described are the three versions of Indirect that are currently supported on RSX-11M Version 4.2.

1.6.2.1 Using the Indirect Command Procedure Library

To use the Indirect command procedure library, INDSYS.CLB (as documented in the RSX-11M/M-PLUS Indirect Command Processor Manual), you must copy it from the MCR source volume directory of the distribution kit to the system volume.

On single-disk distribution kits (RP04/RP05/RP06 or RM03, for example), copy the file as follows:

```
> PIP LB:[1,2]=LB:[12,10]INDSYS.CLB
```

On multidisk distribution kits (RL01/RL02, for example), mount the MCR source volume (MCRSRC) and copy the file as follows:

```
> PIP LB:[1,2]=dd:[12,10]INDSYS.CLB
```

The dd characters represent the drive on which the MCR source volume has been mounted.

For the RK06 kit, the file is located on CLISRC; and for the RL01/RL02 kit, the file is located on MCRSRC.

1.6.2.2 Indirect Command Processor Versions

RSX-11M Version 4.2 supports the following three versions of the Indirect Command Processor:

- ICP contains the same functional parameters as the IND task released in Version 4.1. This version requires a 12Kb partition size and must be used when you are doing a Version 4.2 system generation. ICP is the standard version of Indirect created during the Phase II privileged task build. There is no FCSRES version of this task.

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- ICQ is more heavily overlaid in order to fit in an 8Kb partition. This version supports the minimum of functional parameters necessary to execute a command file that does not exceed the following:
 - One concurrently open data file
 - One parallel .XQT directive
 - Two direct-access labels
 - One GOSUB nesting level
 - Two-level depth of open command files
 - 108(decimal)-byte command file input buffer

ICQ is designed for systems that lack sufficient memory space to support a 12Kb task. ICQ's execution time is slower than ICP's, and its symbol table space and functional parameters are insufficient to complete a system generation. ICQ is built during system generation only if the target system contains less than 24Kb of memory.

Due to task size constraints on ICQ, enhancements and corrections made to Indirect for Version 4.2 do not apply to the ICQ version. ICQ has the same features that it had in Version 4.1 with the exception of the new <DIRECT> symbol. The <DIRECT> symbol is set to the null directory string ([]) for compatibility with RSX-11M-PLUS and Micro/RSX systems.

- ICQRES is the resident FCS (FCSRES) version of ICQ. is also highly overlaid and is slower than ICP. It has the same functional parameters as ICP with approximately the same symbol table space. The task resides in an 8Kb partition and has the following parameters:
 - Four concurrently open data files
 - Sixteen parallel .XQT directives
 - Sixteen direct-access labels
 - Eight .GOSUB nesting levels
 - Four-level depth of open command files
 - 132(decimal)-byte command file input buffer

This version is designed for systems that lack sufficient memory space to support a 12Kb task, but still attempt to retain the full capabilities of the ICP task. It does not contain enough symbol table space to complete a full system generation procedure, and it must be built as a privileged task with FCSRES support using the SYSGEN Phase III procedure.

Due to task size constraints on ICQRES, enhancements and corrections made to Indirect for Version 4.2 do not apply to the ICQRES version. Except for a new symbol, <DIRECT>, no new features have been added to ICQRES since Version 4.1. The <DIRECT> symbol is set to the null directory string ([]) for compatibility with RSX-11M-PLUS and Micro/RSX systems.

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1.7 BRU

This section describes new features and restrictions for the Backup and Restore Utility (BRU) for RSX-11M Version 4.2. Also included is supplementary information on how to do multivolume backup operations. This information has not been incorporated into the RSX-11M/M-PLUS Utilities Manual.

1.7.1 New BRU Features

New BRU features for RSX-11M Version 4.2 are listed as follows:

- New device support for BRUSYS
- Location of BRU files on the distribution kit
- Ability to skip over a bootable system image

1.7.1.1 New Device Support for BRUSYS

BRUSYS supports the following new device:

Mnemonic	Type
MU:	TK50 (Cartridge Tape Drive)

1.7.1.2 Location of Files on the Distribution Kit

On RSX-11M, you can find BRU64K.SYS, BRU64K.STB, BRUSYS.SYS, and BRUSYS.STB in UFD [1,51] on the following disk volumes:

- Tape kit - RSXM38
- RK06/RK07 kits - RSXM38
- RL01 kit - RLUTIL
- RL02 kit - PRVBLD

1.7.1.3 Ability to Skip Over a Bootable System Image

BRU has a new feature that detects and skips over a bootable system image when appending to or restoring from a magnetic tape. This feature allows you to load a BRU backup set onto a magnetic tape volume that contains a bootable system image at the beginning. There is no longer a need for a separate magnetic tape containing the bootable system image.

When using this new feature, there will be a short delay while rewinding the tape and skipping over the bootable system image; otherwise, this feature is transparent.

1.7.2 BRU Restrictions

The following BRU restrictions apply to RSX-11M Version 4.2:

- Bootable system image magnetic tape restrictions
- BRU64K tape restrictions
- Specifying /NEW_VERSION and /VERIFY together

1.7.2.1 Bootable System Image Tape Restrictions

When placing the first backup set on a magnetic tape that contains a bootable system image, you must specify the /REW/APPEND qualifiers. You cannot leave the tape positioned at the end of the bootable system image and use the /APPEND qualifier.

The /TAPE_LABEL qualifier is ignored during a restore operation, if there is a bootable system image at the beginning of the tape.

1.7.2.2 BRU64K Tape Restrictions

On a BRU64K stand-alone system, you should not run BRU and BAD simultaneously. Because BRU and BAD use common buffer space, running both tasks at the same time can yield unpredictable results.

NOTE

MU: device support is NOT included on BRU64K.

1.7.2.3 Specifying /NEW_VERSION and /VERIFY Together

If you specify the /NEW_VERSION and /VERIFY qualifiers together, you will receive a "conflicting qualifiers" error message. BRU cannot verify a restore operation when the /NEW_VERSION qualifier is used. The version numbers of the files on the output device may not correspond to the version numbers of the files on the input device.

1.7.3 Supplementary BRU Information

The following information from the previous release notes, still applies to BRU for RSX-11M Version 4.2. This information has not been incorporated into the RSX-11M/M-PLUS Utilities Manual.

1.7.3.1 Multivolume Disk Backup Operations

BRU supports multivolume disk backup operations. You can copy a single disk onto several smaller disks. When you do this, however, the smaller disks are in BRU format, not Files-11. Therefore, before you can read what is on the smaller disk, you must restore it with BRU. This process is similar to magnetic tape backup and restore operations.

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To back up and restore a single disk to multiple disks, you use the following BRU command line:

```
BRU /IMAGE:SAVE
      :RESTORE
```

This command line specifies that you want to perform a multiple disk-to-disk backup or restore operation. If you are performing a backup operation, you must specify the SAVE option on the command line. If you are performing a restore operation, you must specify the RESTORE option on the command line.

1.7.3.2 Modified BRU Qualifiers

The function of the following BRU qualifiers were modified with the addition of multivolume disk backup capability.

/APPEND	Directs BRU to append a backup set from the input disk volume to the last backup set on the output tape, or on the output disk if you are using the /IMAGE qualifier.
/BACKUP_SET:name	Specifies the name of the backup set to be placed on tape or disk. For a mounted input or output disk during an image backup or restore operation, you can specify the full backup set file name with the /BACKUP_SET qualifier.
/DIRECTORY	Lists at your terminal the backup set names or files on the specified magnetic tape or disk volume.
/INITIALIZE	Specifies that you want to initialize the output disk during a tape-to-disk or disk-to-disk operation.
/INVOLUME	Specifies the volume label of the input disk.
/MOUNTED	Allows you to back up files from a disk that is mounted as a Files-11 volume.
/NEW_VERSION	Resolves file specification conflicts that occur during either backup or restore operations to a mounted disk.
/SUPERSEDE	Specifies that when file specifications on the mounted output volume are identical to those on the input volume, the file on the output volume is deleted and replaced with the file from the input volume.

1.7.3.3 Error Message for Tape Devices

If you use the /MOUNTED qualifier when the input device is a magnetic tape, BRU issues a syntax error message. The purpose of this error message is to emphasize that tapes cannot be mounted as Files-11 volumes. Previously, BRU ignored this qualifier if you issued it for a tape input device.

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1.8 FLX

This section describes a correction to a previous File Transfer Program (FLX) utility restriction. Also included is a list of FLX devices that do not support DOS-11 format. This information has not been incorporated into the RSX-11M/M-PLUS Utilities Manual.

The behavior of FLX in handling an error during a copy operation to an RT-11 device has changed. Previously, FLX allowed a partial file to be created on the output device when insufficient space existed on this device for the complete file on the output disk. Then, if a file existed on the output disk with the same name as the newly created partial file, FLX deleted the pre-existing file and substituted the partial file. Replacing an existing file with a partial file resulted in a loss of information.

Now, if an error occurs during the copy operation, the partial file is not substituted for an existing file on the output disk. The partial file no longer is closed as a permanent entry, and the definition and contents of the existing file remain intact.

The following FLX devices do not support DOS-11 format:

- RC25
- RA60
- RA81
- RD51
- RX50

1.9 FMT

The following devices are not supported by the Disk Volume Formatter (FMT) for RSX-11M Version 4.2.

- RD51
- RX50
- RA60
- RA81
- RC25

1.10 PIP

See Chapter 2, Corrections to the RSX-11M/M-PLUS Utilities Manual, for documentation corrections that apply to the Peripheral Interchange Program (PIP).

1.11 QUEUE MANAGER

This section describes a new feature and a restriction that apply to the RSX-11M Version 4.2 Queue Manager.

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1.11.1 New Queue Manager Feature

The MCR /NM switch suppresses messages from the Queue Manager (QMG) such as "Queue already exists." The equivalent DCL qualifier is /NOWARNINGS.

Once a queue has been established, it will remain until eliminated, in spite of system crashes. In case a queue has been inadvertently eliminated, however, you should try to reestablish the standard print queues each time the system is bootstrapped. Issuing a QUE LP0:/CR command, though, yields the "Queue already exists" message from the QMG if the LP0 queue has not been eliminated, as is generally the case.

The /NM switch is used in the prototype STARTUP.CMD supplied on the distribution kit. It reduces the "clutter" that is printed on the console terminal when STARTUP.CMD is invoked.

1.11.2 Queue Manager Restriction

The following restriction applies to setting up and running the queue manager. If you want to spool to the null device (NL:), you must specify the /SHAREABLE (/SHR) qualifier when you initialize the processor.

1.12 EXECUTIVE

This section describes new features and restrictions that apply to the RSX-11M Version 4.2 Executive. See the RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual for more information.

1.12.1 New Executive Features

The RSX-11M Version 4.2 Executive includes a new directive and a new high-level language interface described in the following sections.

1.12.1.1 New FEAT\$ Directive

The Executive supports the new Test for Specified System Feature (FEAT\$) directive.

NOTE

The RRST\$ and TFEAS\$ directives are for RSX-11M-PLUS systems only. These directives are incorrectly documented as RSX-11M directives in the RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual.

1.12.1.2 New High-Level Language Interface

All of the directives that can be called from a high-level language can be used from FORTRAN and from other high-level languages. Some of these other languages are BASIC-PLUS-2, Pascal, DIBOL-83, and COBOL-81.

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1.12.2 Changes to Code and Data Structures for Privileged Tasks

The changes to code and data structures in this section are not new for Version 4.2. They are included because they have not been documented in the appropriate RSX-11M manuals.

NOTE

Nonprivileged tasks should not be affected by any of these changes.

1.12.2.1 Executive Code

Many Executive routines have been moved into the Executive commons (if you selected Executive common support). Therefore, it may not be possible for privileged code to reference these routines as they may have done in a previous RSX release. To determine if an Executive entry point is in an Executive common, consult RSX11M.MAP. The entry point is in a common if its address falls between 120000 and 140000.

If the entry points are inaccessible to the task because they reside in the Executive commons, a procedure for accessing that routine is available. You must write a transfer routine that will permanently reside in the mapped Executive address space. See module DRSUB for examples of transfer routines. Note that transfer routines are already provided for the most commonly called subroutines moved into the commons. Their existence is transparent to any task referencing them.

The RSXMC.MAC symbol P\$\$D70, which indicated cache memory on a 22-bit processor, has been changed to C\$\$CHE.

1.12.2.2 Executive Data Structures

To enhance asynchronous buffered I/O, the bit T2.TIO, which allowed for only one buffered I/O per task, has been changed to the byte T.TIO. This byte enables a task to queue many buffered I/O requests simultaneously.

The word at offset O.STAT+2 of the Offspring Control Block is used to contain a secondary exit status, the TKTN abort code, which is filled in whenever the offspring task exits. Previously, only the word at O.STAT was used. Note that more words in the exit status region of the OCB may be used in the future and, therefore, should be considered as reserved for future expansion.

The addition of alternate CLI support has changed the way that CLIs are associated with individual users. On systems that include alternate CLI support, the word previously at offset U.CLI in the terminal UCB, (DV.TTY is set) has been redefined. On these systems, it is referred to as U.MUP since it currently contains a bit mask for various multiuser features. Bits 1 - 4 in this word are used to identify the CLI associated with that terminal. The bits form an offset into a table located at \$CPTBL in the Executive module SYSCM. This module contains a pointer to the CPB (CLI Parser Block) for the CLI. Since only 4 bits are used to form this offset, the system is limited to 16 CLIs. The bit used for the NOBROADCAST feature is also in this word, which is why this feature is available only on systems supporting alternate CLIs.

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1.12.2.3 I/O Data Structures

The bit DV.MXD in offset U.CW1 of the UCB (previously for mixed MASSBUS) has been changed to DV.MSD. This bit is set for all mass storage devices, and must be turned on for all user-written drivers that want to support error logging. In addition, error logging devices must have four words preceding each UCB (negative offsets).

The bit DV.SWL in offset U.CW1 of the UCB (previously unused) is now used to maintain the software write-lock status of the device.

Prior to Version 4.0, two words were added to the end of each DH11 UCB to contain the vector and CSR of an associated DM11BB. In Version 4.0, these two words were eliminated. The information is contained in fork block offsets in the SCB.

1.13 TASK BUILDER

This section describes new Task Builder (TKB) features and restrictions for RSX-11M Version 4.2. Information in this section has not been incorporated into the RSX-11M/M-PLUS and Micro/RSX Task Builder Manual.

1.13.1 New Task Builder Features

The new TKB features for RSX-11M Version 4.2 are listed as follows:

- /SB switch and /SLOW qualifier
- /CL switch and /CODE:CLI qualifier
- /FM switch and /FAST_MAP qualifier
- Creating a default Slow Task Builder
- FCSRES and FCSFSL

1.13.1.1 /SB Switch and /SLOW Qualifier

The Slow Task Builder and the Task Builder are included together in one task image in the distribution kit. Use the /SB switch to select the slow Task Builder.

Use the following command line format for the MCR /SB switch:

```
TKB>file.tsk/SB,,=file.obj
```

Use the following command line format for the DCL /SLOW qualifier:

```
$ LINK/TAS/SLOW/MAP/SYM INPUTFILE
```

The default for MCR is /-SB, or not /SLOW for DCL.

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1.13.1.2 /CL Switch and /CODE:CLI Qualifier

The /CL switch (MCR) or /CODE:CLI qualifier (DCL) indicates to the Task Builder that the task is a Command Line Interpreter (CLI). Use this switch when you build the DCL task or any other CLI task.

NOTE

The Fast Task Builder (FTB) does not support the /CL switch or the /CODE:CLI qualifier.

Use the following command line format for the MCR /CL switch:

```
TKB>file.tsk/CL,,=file.obj
```

Use the following command line format for the DCL /CODE:CLI qualifier:

```
$ LINK/TAS/CODE:CLI/MAP/SYM INPUTFILE
```

The default for MCR is /-CL, or not /CODE:CLI for DCL.

1.13.1.3 /FM switch and /FAST_MAP Qualifier

The MCR /FM switch or DCL /FAST_MAP qualifier informs the Task Builder that space must be allocated in memory between the task and the external header for use by the Fast Mapping feature. The /FM switch corresponds to the INSTALL processor switch /FMAP=YES.

NOTE

The /FM switch and the /FAST_MAP qualifier can only be executed on an RSX-11M-PLUS system. Therefore, you can only use the Fast Mapping feature if you are transporting tasks between RSX-11M and RSX-11M-PLUS systems. Also, the Fast Task Builder (FTB) does not support the /FM switch or the /FAST_MAP qualifier.

Use the following command line format for the MCR /FM switch:

```
TKB>file.tsk/FM,,=file.obj
```

Use the following command line format for the DCL /CODE:FAST_MAP qualifier:

```
$ LINK/TAS/CODE:FAST_MAP/MAP/SYM INPUTFILE
```

The default for MCR is /-FM, or not /CODE:FAST_MAP for DCL.

1.13.1.4 Creating a Default Slow Task Builder

To create a default slow task builder for RSX-11M Version 4.2, you must copy the MAKESTK.CMD file to the LB:[1,2] directory. MAKESTK.CMD is located in the [1,20] directory on the following disk volume:

- Tape kit - RSXM38
- RK06/RK07 kits - RSXM38

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- RL01 kit - RLUTIL
- RL02 kit - PRVBLD

The MAKESTK.COMD file is a command procedure that creates a version of STK (slow task builder) in LB:<LIBUIC>. The command procedure accepts a parameter that determines whether the FCSRES library is used. You can either supply no parameter, or RES.

If you supply no parameter, MAKESTK.COMD copies the TKB.TSK file (the latest version of the Task Builder on your system) into STK.TSK. This Task Builder contains the FCS routines that TKB may use.

If you supply RES, MAKESTK.COMD copies the TKBRES.TSK file (the latest version of the Task Builder on your system) into STKRES.TSK. This Task Builder uses the FCS resident library to resolve the symbols in the FCS routines that TKB may use.

In addition, MAKESTK.COMD puts the requested version of the Task Builder in LB:<LIBUIC>. Then, by using a ZAP command, MAKESTK.COMD changes the TKB default from task build to slow task build.

During system generation, a command procedure called STKBLD.BLD may be executed. It creates the Task Builder .CMD and .ODL files. The distributed Task Builder on the system uses these files to build one of the following files with the slow builder (/SB) as the default:

- STK.TSK
- STKRES.TSK

1.13.1.5 FCSRES and FCSFSL

FCSFSL is not included on the RSX-11M Version 4.2 distribution kit. The following information applies to RSX-11M only if you are transporting tasks between RSX-11M and RSX-11M-PLUS systems.

FCSRES and FCSFSL are merged into a single vectored-entry memory image that can be used in either user-mode libraries. This reduces both disk and memory space requirements. The [1,1]FCSRES.TSK image file installs under the library name FCSRES and is used to satisfy your library requests.

Existing tasks that reference FCSRES are unaffected by this change and need not be rebuilt except to use new features. To use the new library, you must rebuild existing tasks that reference FCSFSL, whether they reference FCSFSL directly or reference a library (such as F77RES) that has been built to reference FCSFSL.

The FCS resident library image ([1,1]FCSRES.TSK) has been built containing the supervisor mode library completion routine. However, because the user mode FCSRES library is a memory-resident overlaid library, it must be distinguished from the supervisor mode library (because the completion routine cannot be overlaid). Thus, the files for FCSFSL must be used to build tasks using supervisor mode (the .TSK file is needed for information contained in the label block; the .STB file is needed for symbol values and overlay structure).

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To supply the two different descriptions, but use the same library image, the Task Builder has been changed to force references to FCSFSL to become references to FCSRES in the resulting executable task image. In other words, the build command for RSX-11M remains the same as it has been (LIBR=FCSRES), and files remain in [1,1] (Although the FCSFSL.TSK file size is considerably reduced).

NOTE

Like the Task Builder, the Fast Task Builder also changes references to FCSFSL to FCSRES in the resulting executable task image.

1.13.2 Task Builder Restrictions

The following TKB restrictions apply to RSX-11M Version 4.2:

- Map problem for non-PIC shared region
- Cluster libraries
- Changing values in an installed common
- Using the /SS switch with the RSX11M.STB file

1.13.2.1 Map Problem for Non-PIC Shared Region

A non-PIC shared region's base address is displayed in the map as zero. The base address is not zero, but has a true base address. This problem is a map-generation problem of the Task Builder.

1.13.2.2 Cluster Libraries

When the primary library (the first library specified in the CLSTR option) is overlaid with a null root, the overlay run-time system cannot distinguish between the first library and the rest of the libraries in the cluster. Therefore, it uses the first library called by the task as the default library (the library that is usually mapped).

If the first library called by the task is not the first cluster library, no errors will result, but you may notice a severe performance degradation due to excessive mapping and unmapping of libraries. The first library called by the task should be the primary library specified in the CLSTR option.

NOTE

Clustering read-only and read-write libraries is not supported on RSX-11M Version 4.2.

1.13.2.3 Changing Values in an Installed Common

Changes made in the common are made only in the memory image of the common. If the common is subsequently removed, re-installing the common presents a fresh image in memory and the previously changed values are no longer present.

1.13.2.4 Using the /SS Switch with the RSX11M.STB File

When using the RSX11M.STB file as an input file to TKB, the /SS switch should always be appended to the file specification. This is because the .STB file contains so many symbols that, potentially, TKB could exhaust its virtual memory tables.

You must include the required library modules on the command line before specifying the Executive symbol definition file RSX11M.STB.

1.14 SYSTEM LIBRARY ROUTINES

This section describes a new FCSRES feature and a restriction for RSX-11M Version 4.2. This information has not been incorporated into the IAS/RSX-11 System Library Routines Reference Manual.

1.14.1 New FCSRES Feature

A new feature has been added to the directory parsing code in FCSRES. This enhancement makes it possible to maintain the transportability of FCSRES linked tasks between RSX-11M and RSX-11M-PLUS. You can obtain the directory string used in the parse. An extension has been created for the FDB, which has the following format:

.Byte	Extension length
.Byte	Reserved
.Byte	Length of buffer for directory string
.Byte	Length of directory string (filled in by .PRSDI)
.Word	Address of directory string buffer

The extension block and directory string buffer are allocated in your address space. First, you enter the address, the length of the buffer, and the length of the extension, into the proper words in the extension block. Then you insert the address of the extension block at the offset F.EXT in the FDB. When the directory parsing code detects that F.EXT has a value, it uses the value as an address and moves the directory string into the buffer. It also puts the length of the actual directory string into the byte in the extension. This directory will always be filled in, except when the directory is obtained from the default name block. This is because the default name block does not contain the directory string. In this case, the directory length will be set to zero.

1.14.2 FCSRES Restriction

Because the FCSRES enhancement adds approximately 60 decimal bytes to the size of the directory parsing code, the code is included ONLY in FCSRES. The system library routines do not include this change. If you want to use this feature in your task, you must reference the modules PARDIL and PRSDIL instead of PARDI and PARSDI in your TKB .ODL file.

NOTE

The FDB size has not increased to add this offset, but F.EXT occupies a previously unused location. Any code that used the offset F.SPDV will not work with this new enhancement.

1.15 DEVICE SUPPORT

This section describes new device support, device restrictions and other device-related information for RSX-11M Version 4.2.

- Processor support
- Controller support
- Driver support
- Terminal support
- Printer support
- Network Command Terminal (NCT) Support
- Digital Storage Architecture (DSA) Support

1.15.1 Processor Support

RSX-11M Version 4.2 includes the following new processor support:

- J11-series -- consists of the LSI-11/73, MicroPDP-11/73, MicroPDP-11/83, and PDP-11/84 (Note that, due to hardware restrictions, RSX-11M may not work properly with most configurations built around the LSI-11/73 processor module.)
- MicroPDP-11/23 processor

1.15.2 Controller Support

RSX-11M Version 4.2 includes the following new controller support:

- RQDX2 Controller -- quad height Q-BUS disk controller; supports the RDxx disk drives
- RQDX3 Controller -- dual height Q-BUS controller module; supports the RDxx disk drives
- KDA50-Q Q-BUS disk controller -- supports RA-type disks; the Q-BUS version of the UDA50 controller

See Section 1.16 of this manual for more information.

1.15.3 Driver Support

RSX-11M Version 4.2 includes the following new driver support:

- TK50 Cartridge Tape Subsystem -- an integrated subsystem that consists of a controller for the Q-BUS and a TK50 streaming tape drive
- DEUNA Driver -- for the UNIBUS Ethernet communications controller
- RUX50 UNIBUS interface -- for the 5 1/4-inch RX50 diskette drive
- RD53 Disk Drive -- 71Mb 5 1/4-inch fixed disk drive

See the Device Drivers section of this manual for more information.

1.15.4 Terminal Support

RSX-11M Version 4.2 includes the following new terminal support:

- PC380 -- a J11-based Professional-series computer supported as a VT102 or VT125 in emulation mode
- VT200-series -- can be specified as an MCR SET TERMINAL option

1.15.5 Printer Support

RSX-11M Version 4.2 includes the following new printer support:

- LN03 laser printer -- 300 dots x 300 dots per inch resolution, .lm-1 can be used as a shared resource for microsystems users and as a remote printer for local area networks
- LQP02 letter quality printer -- prints 32 characters per second (cps), with over 100 interchangeable daisywheel printing elements
- LQP03 letter quality printer -- designed for use with all DIGITAL microsystems, expanded character set, prints in portrait or landscape mode
- LA100 letterprinter -- prints 240 cps in dot-matrix mode; 30 cps in letter-quality mode
- LA210 letterprinter -- a microprocessor-driven, medium-speed, printer similar to the LA100 but also IBM compatibility

1.15.5.1 Selecting Printer Support During System Generation

You can select support for a specific printer while performing a system generation. This support is a task-build option for the Queue Manager (QMG) and the Line Printer Processor (LPP). The printer you select becomes the default.

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In order to use a printer, you set the printer type when you initialize the print processor by specifying a form type in the command line. The valid form types are as follows:

Form types	Printer type
124.	LN03
125.	LA50
126.	LA100
127.	LN01

For example, if you have an LN03 printer connected to terminal line TT6:, you use the following command to initialize the print processor:

```
(MCR)    QUE TT6:/SP/FO:124./FL:1/LOWER
```

```
(DCL)    INITIALIZE/PROCESSOR TT6:/FORMS:124./FLAG:1/LOWER
```

To print a file, select your desired printer mode by including one of the following form types in the command line:

Form types	Printer mode
3.	132-column, draft quality; also landscape mode for LN01/LN03.
4.	80-column, letter quality; also portrait mode for LN01/LN03.
5.	132-column, letter quality; also landscape mode for LN01/LN03.
6.	80-column, draft quality; also portrait mode for LN01/LN03.

For example, to print the 132-column draft quality TEST.LST file (that is, a normal listing file) and the 80-column letter quality TEST.TXT file on an LA50, use the following commands:

```
(MCR)    PRI /FO:3.=TEST.LST  
         PRI /FO:4.=TEST.TXT
```

```
(DCL)    PRINT/FORM:3 TEST.LST  
         PRINT/FORM:4 TEST.TXT
```

NOTE

These commands assume that you have assigned the default print queue, PRINT, to the processor handling the LA50.

1.15.5.2 Modifying Printer Support

The printer options are controlled by task-build parameters in the build files for the Queue Manager and the Line Printer Processor. These build files are, respectively, [1,20]QMGBLD.BLD and [1,20]LPPBLD.BLD on the distribution kits. You can modify these prior to building the Queue Manager and the line printer processor during system generation. You can modify these files in the following ways:

- You can change the form types that are used to represent printer types. To do so, modify the GBLDEF options that define the symbols Q\$LSPS and Q\$HSPS. The comments in the build files explain the values of the symbols. The normal defaults are 124. through 127.
- You can change the form types that are used to represent document types. To do so, modify the GBLDEF options that define the symbols Q\$LSPF and Q\$HSPF. The comments in the build files explain the value of the symbols. The normal defaults are 3. through 6. If you modify the range of form types, you must change the GBLPAT options that define the forms to include offsets appropriate for the new form types. (See the comments in the command file regarding form definition.)
- You can remove the support for these printers altogether. This may be necessary if you do not have any of these printers and if you use form types in the range 3. through 6. or 124. through 127. In order to remove the support, set the values of Q\$LSPS and Q\$LSPF to 1 and the values of Q\$HSPF and Q\$HSPS to 0. You may also wish to remove the four GBLPAT definitions for the form types 3. through 6.

1.15.6 Network Command Terminal (NCT) Support

Network Command Terminal (NCT) must be selected during system generation if you want to execute the SET /HOST command to gain access to another RSX host system.

NCT defines logical layers and peer protocols that provide physical and logical terminals in a distributed environment. These services are layered on top of DECnet to present a fully transparent remote command terminal facility across heterogeneous DIGITAL operating systems. NCT implementation is limited to providing support for an RSX system to serve as either a host or server system to an RSX or VAX/VMS system. Many of the NCT features, such as turning on/off terminal features, are also available to RSX systems without DECnet software.

NCT requires that input flow control be present. New MCR, DCL, and VMR commands and qualifiers have been added to RSX-11M Version 4.2 to make input flow control a settable terminal characteristic.

1.15.7 DIGITAL Storage Architecture (DSA) Support

DIGITAL Storage Architecture (DSA) is necessary to support the MU: tape devices such as the TK50 tape cartridge. DSA replaces the previous support for DU: disk devices such as the RD52 disk device. DSA breaks the host level into two independent layers: the class

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layer and the port layer. The class layer handles a class of devices, like tapes or disks. The port layer is responsible for the actual transmission of packets between the host and controller.

1.15.8 Device Restrictions

The following device restrictions apply to RSX-11M Version 4.2:

- Devices no longer supported
- RX50 restriction
- Transportability among 22-bit systems
- Bootstrapping a DB-, DM-, or DR-Based system
- LK201 keyboard restriction
- DLVJ1 restriction
- RQDX1 restriction
- TK50 restriction

1.15.8.1 Devices No Longer Supported

Version 4.2 of RSX-11M and RSX-11S does NOT contain the IP11 driver software. This software has been unbundled from the operating system and is available only as a separate layered product. Unbundling the IP11 driver software will allow DIGITAL to provide IP11 customers with new releases of the driver software in a more timely and effective manner.

With the introduction of this new IP11 driver layered product, DIGITAL will be providing services for this product separately from the RSX operating systems. Software Product Services contract customers are entitled to:

- Software Licenses and distribution kits for the IP11 Driver for a nominal charge.
- Support for the IP11 driver, at no extra charge, for the current term of their RSX contract.

For more information, please contact your Software Product Services representative.

Other products no longer supported on RSX-11M Version 4.2 include:

- The TC11 - TU56 dual-drive DECTape cartridge tape subsystem
- The DJ11 terminal interface
- The User Environment Test Package (UETP)

1.15.8.2 RX50 Restriction

The RX50 does not have a Bad Block Replacement Control Task (RCT) area.

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1.15.8.3 Transportability Among 22-Bit Systems

RSX-11M supports transportability among all 22-bit systems. These systems can differ as to whether the Executive handles NPR transfers by performing memory management functions, or the hardware has its own capabilities for 22-bit physical memory addressing.

To make these systems transportable, you must boot your target system on the processor selected during system generation and then save it. The saved system will then be hardware-bootable and transportable among the different 22-bit systems.

1.15.8.4 Bootstrapping a DB-, DM-, or DR-Based System

The MCR command BOOT can loop indefinitely when it boots a system from an RP04, RP05, RP06, RK06, RK07, RM03, RM05 or RM80. This problem occurs if the bootstrap driver encounters an ECC correctable error when reading the system image. The bootstrap driver is not large enough to include ECC logic. Therefore, it retries the read operation, but never succeeds.

To recover from this error, use PIP to copy the system image to another area on the disk and retry the boot operation. Alternatively, you can copy the entire image to another disk and boot from that one.

1.15.8.5 LK201 Keyboard Restriction

Some non-English LK201 keyboards do not have a backslash character. To generate the CTERM enter-control-mode sequence on an LK201 keyboard, press the CTRL key, then the numeral 4 and <RET>, instead of pressing the CTRL key, a backslash (\) and <RET>.

The LK201 keyboard generates the ASCII control characters 033(octal)-037(octal) with the keys CTRL/3 through CTRL/7.

1.15.8.6 DLVJ1 Restriction

Due to hardware restrictions, errors may be experienced when the DLVJ1 is configured with an RQDX1 or additional DLVJ1 modules.

1.15.8.7 RQDX1 Restriction

Only one RQDX1 is supported per system.

1.15.8.8 TK50 Restrictions

If the TK50 is used with utilities other than BRU, or is used with the verify pass of BRU, degraded performance and/or capacity of the TK50 should be expected. The TK50 is only supported on the MicroPDP-11/23/73/83. See the Device Drivers section for more information.

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1.16 DEVICE DRIVERS

This section describes new device drivers, restrictions, and changes to existing device driver support for RSX-11M Version 4.2. See the RSX-11M/M-PLUS I/O Drivers Reference Manual for more information.

1.16.1 New Device Driver Features

The new device driver features are listed as follows:

- Extended support for the full-duplex terminal driver
- TF.TMO subfunction
- Stall I/O on the RC25 disk subsystem
- RD53 disk drive
- DEUNA driver
- KDA50-Q controller
- RUX50 UNIBUS interface
- TK25 tape subsystem
- MSDRV device information
- MUDRV device information
- TK50 tape subsystem
- TK50 performance using RSX utilities
- TK50 indicators

1.16.1.1 Extended Support for the Full-Duplex Terminal Driver

A new I/O function IO.EIO, which contains new subfunctions, has been added to the full-duplex terminal driver. The description of the IO.EIO function includes the changes required for using the full-duplex terminal driver as a Network Command Terminal (NCT).

1.16.1.2 TF.TMO Subfunction

The TF.TMO subfunction with the tmo parameter has been modified. If 0 is specified, the read times out immediately after reading any data that may be in the typeahead buffer. In other words, if you enter a 0, no time is allowed for you to enter characters, and all characters are read from the typeahead buffer.

1.16.1.3 Stall I/O on the RC25 Disk Subsystem

Stall I/O support has been added for RSX-11M Version 4.2. The RC25 disk subsystem consists of two disks, one fixed and one removable, that share one drive spindle. The two RC25 disk units revolve on the

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same spindle and share the same head mechanics; therefore, you must spin down both units of the subsystem in order to spin down one unit.

The device driver (DUDRV) allows you to spin down the subsystem and still retain context on the fixed-media unit, provided it is mounted as a Files-11 or foreign volume. It does this by postponing input and output to the fixed-media unit until the subsystem is spun up again. This is called stalled I/O.

I/O is stalled to the fixed disk of the RC25 subsystem. The removable disk will lose context if the drive is spun down. Note that since context may be lost on the removable disk if the subsystem is spun down, all spin down requests are ignored for the fixed unit of the RC25. For the removable disk unit, you must be privileged in order to spin down the device while dismounting it.

When the driver receives an I/O request that it cannot process because the drive is spun down, it issues the following message to the console:

```
<ddnn:> - I/O stalled
```

When the driver is spun up again and I/O flow to the device is resumed, the driver issues the following message to the console:

```
<ddnn:> - I/O resumed
```

The Files-11 Ancillary Control Processor (Files-11 ACP or F11ACP) may delay response time when I/O is stalled to the RC25. To avoid this delay, always install a unique ACP for the RC25 fixed-media units. See the MOU command in the RSX-11M/M-PLUS MCR Operations Manual or the MOUNT command in the RSX-11M Command Language Manual for more information.

System users may find it difficult to distinguish between system crashes and system delays due to stalled I/O. Therefore, it is recommended that, before you spin down an RC25 subsystem, you inform all system users of your intentions.

For more information, see the RSX-11M/M-PLUS I/O Drivers Reference Manual.

1.16.1.4 RD53 Disk Drive

The RD53 disk drive is a 5 1/4-inch fixed disk with 2.3 times the capacity and 33 percent faster average access times than the RD52. The RD53 requires the RQDX2 or RQDX3 controller and a minimum of 128Kb of memory.

1.16.1.5 DEUNA Driver

For systems without DECnet, the RSX QIO DEUNA driver was designed to allow messages to be sent by using the DEUNA device. The DEUNA driver provides direct control over a line, allowing you to send data over a line to another system. To use the DEUNA driver, you issue the QIO\$ macro to the XE: device. DEUNA driver is compatible with DECnet's Direct Line Access interface (DLX), which permits easy migration to a DECnet system.

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1.16.1.6 KDA50-Q Controller

Support for the KDA50-Q controller has been added to RSX-11M Version 4.2. This controller is the Q-BUS version of the UDA50 controller.

1.16.1.7 RUX50 UNIBUS Interface

The RUX50 UNIBUS interface has been added to support the 5 1/4-inch RX50 diskette.

1.16.1.8 TK25 Tape Subsystem

The TK25 tape drive is supported on RSX-11M Version 4.2. The TK25 (MS:) consists of a TKQ25 controller for the Q-BUS, and a TK25 streaming tape drive. The TK25 uses a DC600A 1/4-inch cartridge, and stores data on serial data tracks in a serial serpentine recording method. The TK25 has storage capacity of 60Mb for 8Kb data records. Data recording is an 8000 bpi, modified GCR (group cyclical recording) method.

1.16.1.9 MSDRV Device Information

Please note the following information specific to the MSDRV devices:

- Read errors for the MSDRV devices are retried by rereading the erroneous block a predetermined number of times. For MS: devices except for TK25, on every eighth reread the block has passed by the tape cleaner blade. If the error persists after a predetermined number of retries, IE.VER is returned.
- If a file with an odd block size is written to a tape mounted with the /NOLABEL qualifier or switch, an additional byte is added to make the block size even.
- Completion of IO.RWD for MSDRV devices means that the rewind to BOT has been completed.

1.16.1.10 MUDRV Device Information

Please note the following information specific to MUDRV devices:

- MU: devices do not issue select errors. If the drive is taken off line, the condition is treated as "tape position lost." The cartridge must be unloaded and loaded in order to access the tape again. This action will result in the tape unit rewinding to BOT. No recovery by the application is possible in such an event. If the tape was mounted as an ANSI tape, the tape context maintained by MTAACP is invalid. The tape must be dismounted and remounted in order to reinitialize the data structures used by MTAACP. If the tape was being accessed in write mode, then the file being written is incomplete and the tape may no longer be in valid ANSI format.
- Completion of IO.RWD for MUDRV devices means that the rewind has been initiated.

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- Data Security Erase (IO.DSE) is valid only for the TK50 drive, and it takes approximately 35 minutes to complete. Once the operation is initiated, it is under the complete control of the TK50 controller. The IO.DSE command cannot be aborted by the host software; the controller ensures that the operation runs to completion.

1.16.1.11 TK50 Tape Subsystem

RSX-11M Version 4.2 supports the new TK50 tape drive. The TK50 (MU:) is an integrated subsystem that consists of a controller for the Q-BUS and a TK50 streaming tape drive. The controller handles all error recovery and correction, and internally buffers multiple outstanding commands. The TK50 driver (MUDRV) reads and writes data on a 1/2-inch tape cartridge that is recorded at 6667 bpi on serial data tracks in a serial serpentine recording (modified frequency modulation) method. The tape speed is 75 inches per second in streaming mode.

The TK50 is a streaming tape subsystem. As with all streaming tape subsystems, if I/O commands are not issued to the tape unit quickly enough, the tape unit drops out of streaming mode and into start/stop mode. While in start/stop mode, each I/O command issued incurs a time penalty (about one second for the TK50).

Because the tape unit expects the next I/O command to be ready for processing when the current command finishes, it keeps the tape moving in the forward direction. It is this processing that allows the tape to stream; that is, to maintain constant forward motion. However, if the next I/O command is not ready, the tape unit moves past the position on the tape where the I/O operation was to be performed. As a result, the tape has to be repositioned; that is, backed up to the correct position on the tape.

It is this reposition operation that takes approximately one second to complete before the next I/O command can be processed. This reposition time can severely impact the performance of tape utilities if they are unable to issue commands to the controller fast enough.

In order to alleviate the performance impact of the reposition time, a padding feature is available in the TK50 firmware. This allows the controller to issue up to a preset number of padding blocks during output to the tape. Before each pad block is written, the controller checks to see if the next host I/O is ready for processing. If it is, then no more pad blocks are written and the host's I/O request is performed. If the next host command is not ready, the controller writes out another pad block.

It continues to do this until either a host I/O command is ready for processing or the number of consecutive pad blocks written reaches a controller specified maximum. In the latter case, the tape unit will drop out of streaming mode and into start/stop mode. When the next write command is issued, the controller will reposition back over the pad blocks that it wrote before actually doing the write operation. Because of this, tape capacity is not lost if the application cannot keep the unit in streaming mode. If the application does keep the unit partially in streaming mode, then some tape capacity will be lost due to the pad blocks. On input from the TK50, the controller does not return any of these pad blocks to the application program. Because of this, padding is transparent to the user's application.

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The following section describes performance and capacity impact when using RSX utilities with the TK50. The performance indicated is to be used only as a guideline. The timings given will vary depending on system load, the type of disk used in disk/tape applications, and errors encountered on the tape.

1.16.1.12 TK50 Performance Using RSX Utilities

This section describes anticipated timings for various RSX utilities. These are only guidelines; the actual times will vary depending on system load, disk usage, and tape ECC errors encountered.

MOU When mounting a TK50 tape, either foreign or as an ANSI tape, the time taken is dependent upon the position of the tape when the MOUNT command is issued. If the tape is at or near the beginning of a track, the expected time for the mount operation is approximately 20 seconds. During this time the controller performs calibration functions on the tape. If the tape is near the end of a track, the time to mount the tape can increase to as much as two minutes. This time is taken up by the actual rewind of the tape (approximately 1.6 minutes) followed by the calibration functions by the controller.

When a cartridge is inserted, it will be at the beginning of tape so the expected time, on the average, for the mount operation will be about 20 seconds. If the tape is left positioned near the end of a track by an abnormal event (for example, the system crashes during a tape operation), then this time can approach two minutes. However, this is a very rare instance.

DMO When dismounting a tape, a REWIND command is generally issued to the tape unit as part of the dismount function. Depending on where the tape is positioned, this may take between one second (the tape is at the beginning of a track) and 1.6 minutes (the tape is at the end of a track).

BRU This utility will generally keep the TK50 in streaming mode. The exceptions to this are:

- During the initial set-up phase -- that is, when writing out the directory information to the tape -- BRU will not be able to issue I/O commands to the TK50 quickly enough. As a result, the TK50 will run in start/stop mode during this phase of BRU's operation. The time taken for this operation is dependent on the number of directories contained on the input disk. This process can take from one to ten minutes, based on the number of directories written.
- BRU generally will not stream if there is a load on the system at the time BRU is run. This load will slow BRU down sufficiently so that it will not be able to issue commands to the TK50 drive fast enough to keep it streaming.

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- Any use of the disk from which BRU is backing up or restoring will generally cause BRU to run the TK50 in the start/stop mode. The extra disk head movements will add sufficient time to BRU's processing time so that it will not be able to issue I/Os to the TK50 controller fast enough to keep it in streaming mode.
- BRU will not stream during its /VERIFY pass.
- BRU will not stream while it is sorting retrieval pointers. The number of such sort operations is dependent on the degree of disk fragmentation that exists on the input disk.

Once BRU begins copying data blocks out to the TK50, it will keep the TK50 unit in streaming mode provided that none of the five conditions above occur. A test case using a slow disk and 40MB of data was run. The save operation for this took 13 minutes, with the directory writes taking three minutes of this time. Estimating from the amount of tape used in this operation, and assuming that there is sufficient information on the disk to backup, BRU would have utilized approximately 83% of the total capacity (94MB) of the tape. Such a capacity rating would allow the backing up of a 75MB disk ($0.83 \times 94\text{MB} = 78\text{MB}$). In this test case, no verify operation was performed. However, the verify operation is estimated to take approximately one hour for this example.

- BRUSYS** This utility exhibits the capacity and performance characteristics mentioned above for on-line BRU.
- FLX** This utility will not keep the TK50 streaming. FLX's internal design does not permit the issuing of I/O commands to the TK50 at the rate required in order to keep the tape streaming. Because it does not stream, the padding blocks added by the controller will be over-written during the reposition operation. Tape capacity will not be diminished. A test case using 180 blocks contained in nine files was run. FLX copied the files in 1.8 minutes.
- PIP** This utility will not keep the TK50 streaming. Its internal design does not permit the issuing of I/O commands to the TK50 at the rate required in order to keep the tape streaming. Because it does not stream, the padding blocks added by the controller will be over-written during the reposition operation. Tape capacity will not be diminished. A test case was run using 180 blocks contained in nine files. PIP, using the TK50 as an ANSI tape, copied the information in 10.5 minutes. This time differs significantly from the FLX test case due to the overhead involved in ANSI tape processing. The default block size on ANSI tape was used for the test case.

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An optimization that can be performed to increase throughput to an ANSI tape on the TK50 drive. This optimization does not result in streaming; it does result in fewer I/Os to the tape unit and therefore fewer repositions. The size of the block written to ANSI tape can be increased by using the /BS switch in PIP. A value up to 8192. bytes can be specified (the default is 512. bytes). PIP should be installed with an increment if this value is used. If it is not, PIP may issue "Not enough buffer space" error messages during certain copy operations to the tape.

1.16.1.13 TK50 Indicators

Because the actual TK50 tape recording surface is hidden from view, it is often difficult to determine what the tape unit is actually doing. Two lights on the front of the TK50 tape unit provide some information as to what is happening.

- The green indicator serves a dual role. When the light is on consistently, it indicates that the tape cartridge can be safely removed from the unit. If this indicator is blinking or off, it is not safe to remove the cartridge. A blinking pattern indicates that the tape is in motion, either in a forward or reverse direction.
- The red indicator serves a multiple role. If the indicator is on consistently, a tape cartridge is loaded into the drive. Should the indicator blink slowly (for example, on for one second and then off for one second), this indicates that the tape is in use and is currently rewinding. If the indicator blinks more rapidly, it indicates a drive error has occurred. This latter condition can be cleared by depressing the LOAD/UNLOAD switch twice in succession. Please note that this will cause loss of tape context.

1.16.2 Device Driver Restriction

The following device driver restriction applies to RSX-11M Version 4.2:

The IO.EIO function will not work if your terminal has been set as a remote terminal (RT:) to another system. That is, after entering

```
>SET HOST xxxxx
```

and logging into an RT:, the RT: driver will reject a QIO issuing an extended I/O request from the RT:.

1.17 USER-WRITTEN DEVICE DRIVERS

This section describes new features and technical changes affecting user-written device drivers for RSX-11M Version 4.2. Information on user-written device drivers is documented in the RSX-11M Guide to Writing an I/O Driver.

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The information is included here because it has not been incorporated into the manual. See Chapter 2 for information on corrections to documentation for the RSX-11M Guide to Writing an I/O Driver Manual.

1.17.1 New Features

The new features for user-written device drivers for RSX-11M Version 4.2 are listed as follows:

- Asynchronous buffered I/O
- Overlapped I/O Completion

1.17.1.1 Asynchronous Buffered I/O

Data for input and output requests are usually transferred directly to and from task memory. To allow for the successful transfer of data, the task cannot be checkpointed until the transfer is completed. For most high-speed devices, the transfer occurs quickly so that a task does not occupy memory for too long. For slow-speed devices, however, some mechanism must be available to avoid binding memory to a task while the task is performing I/O operations.

Using the routines \$TSTBF, \$INIBF, and \$QUEBF in the Executive module IOSUB, a driver can execute an I/O request for a slow-speed device and allow the task to be checkpointed while the request is in progress.

To perform the I/O request, the driver buffers the data in memory allocated to the driver while the task is checkpointed and the I/O request is in progress.

To test whether a task is in a proper state to initiate I/O buffering, the driver calls the \$TSTBF routine and passes it the address of the I/O packet. By extracting the address of the task control block (TCB) from the I/O packet, \$TSTBF can examine various task attributes. For example, if the task is checkpointable, buffered I/O can be performed. \$TSTBF returns to the driver and indicates whether buffered I/O can be performed.

If buffered I/O can be performed, the driver performs two operations. First, it establishes the buffering conditions. For an output request, it copies the task buffers to dynamically allocated pool space. For an input request, it allocates sufficient pool space to receive incoming data.

Secondly, the driver calls the \$INIBF routine to initiate the I/O buffering. The \$INIBF routine decrements the task I/O count, increments the task's buffered I/O count in T.TIO, and then releases the task for checkpointing and shuffling. If the task is currently blocked, the task state is transformed into a stop state until the task is unblocked, buffered I/O is completed, or both. Checkpointing the task is subject to the normal requirements of an active or stopped state as described in the RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual.

After the driver transfers the data, it calls the \$QUEBF routine to queue the buffered I/O for completion. \$QUEBF sets up a KERNEL asynchronous system trap (KERNEL AST) for the buffered I/O request and, if necessary, unstops the task. When the task is active again, a

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routine in the Executive module SYSXT detects the outstanding AST and processes it. If the request is for input, the routine copies the buffered data to task memory.

This mechanism occurs transparently to the task. The routine then calls the driver to deallocate the buffer from pool. \$IOFIN completes the processing.

These routines are not always present in RSX-11M. If you selected the full-duplex terminal driver or networking support during system generation, they are included. To include them in systems without these options, add the symbol A\$\$BIO=0 to RSXMC.MAC during Phase I of system generation.

1.17.1.2 Overlapped I/O Completion

In general, overlapped I/O completion support causes the execution of the Executive's I/O completion code for each I/O request to be postponed until the next request has been initiated. If I/O requests are in the driver's queue, this action causes the Executive to complete the I/O processing while the physical device services the next request. A minor side effect of this feature is that multiple I/O requests to the same device may complete in an order other than the issued order.

When a driver requests the Executive to complete the I/O, the Executive checks the queue for requests to the driver. If the queue is not empty, the Executive defers I/O completion by placing the current completion at the end of the fork list. Control returns to the driver, which assumes that the Executive has completed I/O processing. The driver can then initiate the next I/O operation. After the driver has initiated an I/O operation on the device, the driver returns to the Executive and fork processing begins. Thus, the I/O completion for the previous I/O can be processed to the end. When a hardware I/O operation completes, the driver receives an interrupt and then "forks", which always causes the I/O completion to occur after the previously queued completion.

The exception to sequential completion occurs when an I/O operation does not require a hardware operation. In this case, the driver processes the I/O and then calls the Executive's I/O completion routine. If there is an additional I/O waiting in the queue, this completion also goes at the end of the fork list, and sequential processing is maintained. Non-sequential completion occurs when the very last request in the queue is a non-hardware oriented I/O. In this case, that I/O completes prior to any others waiting for completion. There are many cases of non-hardware oriented I/O, such as inquiries into device state, or attach and detach requests.

This feature speeds up I/O operation in the case of actual hardware operations because the new hardware I/O is initiated and the transfer may occur parallel to the final completion of the previous operation. The I/O processing speeds up by the amount of time necessary to process the remaining instructions in the Executive I/O finish routine.

There is one case where overlapped I/O completion does not occur. It does not occur when the last I/O request queued to the controller does not require a device interrupt to complete.

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1.18 I/O OPERATIONS

This section describes new features and changes to I/O operations for RSX-11M Version 4.2. See the RSX-11M/M-PLUS and Micro/RS/ I/O Operations Reference Manual for more information.

1.18.1 New I/O Operations Features

RSX-11M Version 4.2 includes the following changes and additions to I/O operations:

- Changes to parameters for the FDAT\$A, FDOP\$A, and OPEN\$X macros
- New information on block locking
- New information on directory identification
- A new file control routine, Buffer Flush (.FLUSH)
- Changes to the C.CMLD command line descriptor offset in the CSI control block
- Support for using FCS to queue files for printing
- New File Descriptor Block (FDB) offsets
- New volume label format
- New file header label (HDR3) format
- New keyword definitions for the magnetic tape control task
- New file attribute codes

1.18.1.1 Changes to Parameters for FDAT\$A, FDOP\$A, and OPEN\$X Macros

RSX-11M Version 4.2 includes changes to parameters for the following macro calls:

- The FDAT\$A macro has been changed. The FD.PRN parameter indicates that the record is preceded by a word containing carriage-control information; this value is the print file format attribute. Files that have this attribute set must also be sequenced files, that is, files that have the bit R.SEQ set in byte F.RTYP in the FDB.
- The FDOP\$A macro has been changed so that the FA.SHR parameter indicates that the file is to be opened for shared access. Shared access is also a precondition for block locking.
- The OPEN\$X macro has been changed so that the FD.PRN parameter requests the record be preceded by a word containing carriage-control information. Files with this attribute must also be sequenced files, that is, files with the bit R.SEQ set in the byte F.RTYP in the FDB.

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- The FD.RAN parameter requests that random access mode (GET\$ or PUT\$ record I/O) process the file. The file is opened and the first record is pointed to. If this parameter is not specified, sequential access mode results by default.

1.18.1.2 New Information on Block Locking

Block locking selectively controls access to blocks within a file while that file is being read from or written to by one or more users. Block locking can be used from FCS or RMS-11, or by issuing QIO\$ macros.

You can enable block locking only when the file is opened. Once block locking is enabled, you can establish "locks," which are structures allocated from system dynamic storage that control access to specific blocks in the file. See the RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual for more information.

1.18.1.3 New Information on Directory Identification

The Master File Directory (MFD) contains a list of all the User File Directories (UFDs) on the volume. Each UFD contains a list of that user's files. UFDs are identified by User Identification Codes (UICs). The MCR command, UFD, and the DCL command, CREATE/DIRECTORY, create the User File Directory.

The N.DID in the filename block contains the following information:

Word	Meaning
1	File ID
2	File Sequence Number
3	Reserved

The .PARSE routine moves these three words from the Master File Directory (MFD) to the filename block in the N.DID field. The file ID is associated with the header (in the index file) for a User File Directory (UFD).

The .FIND routine uses the file ID to locate and search a UFD and fill in the N.FID field in the filename block. The N.FID has the same format as the N.DID field, except that it is associated with the header for a user data file. The file sequence number is incremented each time a file header is reused for a new file.

1.18.1.4 New Buffer Flush Routine (.FLUSH)

The buffer flush routine (.FLUSH) writes the block buffer to the file being written in record mode. Also, the .FLUSH routine writes file attributes (including F.EFBK and F.HIBK, the end-of-file and high-allocation block numbers) each time the routine is called.

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Closing the file guarantees that the block buffer is flushed and that the file attributes are written back to the file header. However, closing and opening a file frequently to write to the block buffer results in high system overhead and many disk accesses that hoard system resources. For more information, see the RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual.

1.18.1.5 Changes to the C.CMLD Command Line Descriptor Offset

The C.CMLD command line descriptor offset in the CSI control block is a 2-word field that is initialized with the length (in bytes) and the address, respectively, of the compressed command line. In other words, the values returned to these cells constitute the output of CSI after scanning a file specifier and removing all nonsignificant characters from the string (that is, nulls, unquoted blanks and tabs, and RUBOUTs).

1.18.1.6 Support for Using FCS to Queue Files for Printing

FCS provides facilities at both the macro and subroutine level to queue files for subsequent printing. Therefore, your task can queue a print job. There are several ways for your task to spool output for printing. You cannot control the printing from your task as you can with the PRINT command. However, you can alter the attributes of the print job once the job appears in the queue by using the DCL command SET QUEUE.

A task issues the PRINT\$ macro call to queue a file for printing on a specified device. The specified device must be a unit record, carriage-controlled device such as a line printer or terminal. The file is placed in the default queue PRINT. If the device is not specified, LP: is used.

The file to be spooled must be open when the PRINT\$ macro is issued. PRINT\$ closes the file.

The PRINT\$ macro call has the following format:

```
PRINT$ fdb,err,,dev,unit,pri,forms,copies,presrv
```

The fdb parameter is the address of the associated FDB. This parameter need not be present if the address of the associated FDB is already in R0.

1.18.1.7 New File Descriptor Block (FDB) Offsets

New File Descriptor Block (FDB) offsets have been added for RSX-11M Version 4.2. See the RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual for more information.

1.18.1.8 New Volume Label Format

The new description of the accessibility byte in position 11 in the volume label reads as follows:

The accessibility byte (in position 11) can be any ANSI "a" character. A space indicates no accessibility restriction. You can specify the "a" character with the /VOLUME ACCESSABILITY:"c" qualifier in the DCL INITIALIZE commands. Any ANSI "a" character is allowed. The default character is a space. The Label Standard Version byte in position 80 contains a 3.

1.18.1.9 New File Header Label (HDR3) Format

The new description of the system-dependent field in character positions 5 through 68 (64 bytes) reads as follows:

File attributes are specified at creation time. Each of the 32 bytes of user file attributes is expanded into two hexadecimal characters. The first seven words of this area are a direct image of the first seven words of the FDB when the file is opened.

These are the same words in the file attribute section of the File Descriptor Block given in Appendix A. The other nine words are not used by FCS though they are used by RMS. See the RSX-11M/11M-PLUS and Micro/RSX I/O Operations Reference Manual for more information.

1.18.1.10 New Keyword Definitions for the Magnetic Tape Control Task

There are new keyword definitions for the magnetic tape control task. The new keyword definitions are as follows:

/BS

Specifies the number of bytes or the number of characters (bytes) per block on a mounted tape.

You can specify the number of characters in either decimal or octal. The default is octal. To specify a decimal number, terminate it with a period. This block size becomes the default for the tape. FCS uses this value on output when there is no HDR2 label present on an ANSI magnetic tape, and when no other value was specified when the file was created. FCS reads the file attributes to obtain the block size when opening an existing file on ANSI magnetic tape.

The value specified for block size must be greater than 14 (decimal) bytes. There is no maximum block size. FCS pads a block on ANSI magnetic tape to an even length to permit PUT\$ operations with odd fixed-length records.

/CC

Specifies the type of carriage control. The default is /CC=NONE.

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`/INITIALIZE="volume id"`

Specifies the volume label to which the tape will be initialized. This keyword allows you to create a new volume to satisfy a request from the ACP for a new output volume for an ANSI tape. The format of the volume identifier is identical to the format of the volume identifier specified for the MOUNT command.

1.18.1.11 New File Attribute Codes

MTAACP supports new file attribute codes (creation, revision, expiration, and backup dates). These new codes read and write the date in the file header using a 64-bit date format. MTAACP performs a computation to convert the date between ASCII and 64-bit binary form.

1.18.2 I/O Operations Restrictions

The following I/O operations restrictions apply to RSX-11M Version 4.2:

- Multibuffer processing in random mode is not very efficient
- Big Buffering in random mode requires a user task record buffer
- Block size on tapes mounted `/NOLABEL` will be even and one more than the value specified

1.18.2.1 Multibuffer Processing in Random Mode

Multiple buffering can improve performance for I/O-bound tasks under certain circumstances. However, multibuffer processing in random mode is not very efficient. When using multibuffering in random mode, a user task record buffer is always required. If one is not supplied, the task's low memory may be overwritten and the task may abort.

1.18.2.2 Big Buffering in Random Mode

When using big buffering in random mode, a user task record buffer is always required. If one is not supplied, the task's low memory may be overwritten and the task may abort. Using big buffering with random GET\$ and PUT\$ can cause loss of data from the end of a file. In this case, a directory of the file indicates that it has more blocks in use than it has allocated. To prevent data from being lost, perform the following steps:

1. Pre-allocate enough space to make writing an extension unnecessary
2. Issue a `.FLUSH` after the highest numbered record is written by a PUT\$
3. After a PUT\$, arrange not to issue any GET\$ that could cause the file to extend

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1.18.2.3 Block Size on Tapes Mounted /NOLABEL

Under certain conditions, if a file is written to a tape, its block size will be even and one more than the value specified in the MOUNT command. This occurs in the following circumstances:

- If the tape is mounted /NOLABEL
- If the MOUNT command specifies an odd record size
- If the MOUNT command specifies an odd block size

FCS adds the padding character, an octal 136 circumflex (^), to odd-sized byte blocks due to a hardware restriction; some tape drives will not allow an odd number of bytes to be transferred to or from tape. Therefore, blocks of data are padded with the circumflex character so that even blocks of data can be written to tape on any tape drive.

1.19 SYSTEM MANAGEMENT

This section includes new system management features for RSX-11M Version 4.2.

1.19.1 New System Management Features

New and modified keywords have been added to Virtual Monitor Console Routine (VMR) for RSX-11M Version 4.2. Also included is support for exercising terminals with IOX.

1.19.1.1 New and Modified VMR Keywords

The new and modified keywords for VMR are listed as follows:

New keywords:

```
SET [/keyword]
  /[/NO]AVO
  /[/NO]BLKMOD
  /[/NO]DEC
  /[/NO]EDIT
  /[/NO]HSYNC
  /[/NO]PARITY
  /[/NO]PASTHRU
  /[/NO]PRINTER_PORT
  /[/NO]REGIS
  /[/NO]SOFT[=ttnn:]
  /[/NO]TTSYNC
```

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Modified Keywords:

INSTALL [/keyword]
 /CLI
 /XHR

SET [/keyword]
 /BUF
 /POOLSIZE
 /[NO]REMOTE
 /SPEED
 /TERM

See the RSX-11M/M-PLUS System Management Guide for more information about VMR keywords.

1.19.1.2 Exercising Terminals

Exercising terminals has been added to the I/O Exerciser (IOX) for RSX-11M Version 4.2. A terminal is exercised by using the LOOPBACK parameter to the SELECT command. See the RSX-11M/M-PLUS System Management Guide for more information about this new feature.

1.20 DEBUGGING

RSX-11M Version 4.2 includes an enhancement that improves system debugging. The RSX-11M Executive contains code that detects certain types of internal system corruption. If XDT is included in the system, the Executive attempts to enter XDT as soon as the system corruption is detected.

1.21 ERROR LOGGING

This section describes new error logging features and restrictions for RSX-11M Version 4.2. This information has not been incorporated into the RSX-11M/M-PLUS Error Logging Manual.

1.21.1 New Error Logging Features

The changes to error logging for RSX-11M Version 4.2 are listed as follows:

- Error logging control files
- Error logging support for a non-DIGITAL device

1.21.1.1 Error Logging Control Files

The error logging control files have device-specific information for the following devices:

- RD51
- RX50
- TK50

1.21.1.2 Error Logging Support for a Non-DIGITAL Device

You no longer need to add a record to the `DEVICE_INFO` table in the `DEVSM1` module for the error logging system to recognize a user-written device level module.

Please add the following information, which describes how to use the new error logging feature, to Section 4.5.3 of your RSX-11M/M-PLUS Error Logging Manual.

After you write the device level module(s) for your devices, compile the module with the `DSP2Pl.SYM` file.

Next, insert your module(s) in `ERRLOG.ULB`. Note that the name of a user-written module must be in the following form:

`ExxUSR`

The letters `xx` stand for the device mnemonic. Do not use a DIGITAL-supplied device mnemonic as your device mnemonic.

Specify your module name in the `MODULE` statement as:

`MODULE ExxUSR`

If there is a `NOTES` module, the notes module name must be in the following form:

`NxxUSR`

1.21.2 Error Logging Restriction

By moving the error logging routines into the Executive common, the following restriction is introduced:

If a driver of an error logging device calls the `$CRPKT` routine to create an error logging packet, the data address for the data subpacket must not be an address within the driver. Specifically, the address must not be mapped by `APR 5`, because that `APR` is used to map the common. Any user-written driver that performs such a function must allocate a piece of pool, fill in the appropriate information, and pass the pool address to the create packet routine.

1.22 CRASH DUMP ANALYZER

This section describes new features and changes to existing features for the RSX-11M Version 4.2 Crash Dump Analyzer (CDA). For more information, see the RSX-11M/M-PLUS and Micro/RSX Crash Dump Analyzer Reference Manual.

1.22.1 New CDA Features

The following changes have been made to the Crash Dump Analyzer for Version 4.2:

- Assign Table
- Data structures
- Device support

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1.22.1.1 Assign Table

The system Assign Table, which is one of the report listings that CDA outputs, has been changed. The table lists logical assignments in two categories: system logical assignments and user logical assignments. The entry in the table for each assignment includes its size in blocks and its status (privileged or nonprivileged, and whether the translation of the assignment is final).

1.22.1.2 Data Structures

Some of the system data structures have changed for Version 4.2. Refer to the data structures included in Appendix B of the RSX-11M/M-PLUS and Micro/RSX Crash Dump Analyzer Reference Manual for more information.

1.22.1.3 Device Support

You may specify any of the following new devices as the crash dump device for your system:

Device Type	Mnemonic
RA60 removable disk	DU:
RC25 removable disk	DU:
RX50 flexible diskette	DU:
TU80 magnetic tape	MS:
TK25 magnetic tape	MS:
TK50 magnetic tape	MU:

1.23 MACRO-11

This section describes new features, restrictions, and supplementary information for MACRO-11.

1.23.1 New MACRO-11 Features

The following corrections to the MACRO-11 Version 5.3 assembler are included in this section because they have not been documented in the PDP-11 MACRO-11 Language Reference Manual:

1.23.1.1 Corrections to the MACRO-11 Version 5.3 Assembler

- Previous versions of MACRO-11 would hang in an infinite loop if they encountered a record with an invalid record size. That problem has been fixed.

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- MACRO-11 did not mark symbolic expressions as complex when they contained a symbol from a relocatable program section (psect) and a symbol from an absolute program section. This resulted in incorrect linker output if the base of the absolute psect was not zero. Those symbolic expressions are now correctly marked as complex.
- MACRO-11 did not mark symbolic expressions as complex when they contained symbols from different absolute psects. That resulted in incorrect linker output if the base of either psect was not zero. Those symbolic expressions are now correctly marked as complex.
- When MACRO-11 directly assigned the current location counter symbol "." to a global symbol in an absolute psect, MACRO-11 incorrectly bound the global symbol to the .ABS. psect. MACRO-11 now correctly binds the global symbol to the absolute psect in which the assignment occurred.
- If MACRO-11 encountered a label containing invalid characters, MACRO-11 would hang in an infinite loop if there existed a macro with the same name as the valid part of the label name. MACRO-11 now correctly returns an error.

1.23.2 Supplementary MACRO-11 Information

This section contains information from previous MACRO-11 Release Notes that still applies to MACRO-11 for RSX-11M Version 4.2. The following information is included in this section:

- Use of colon in .ASCII and .ASCIZ strings
- MCS support
- Version 5.1 RSX-specific changes
- Corrections to the Version 5.1 assembler
- Version 5.0 RSX-specific changes
- Corrections to the Version 5.0 assembler

1.23.2.1 Use of Colon in .ASCII and .ASCIZ Strings

MACRO-11 does not allow the colon (:) character as a delimiter for .ASCII or .ASCIZ strings. This is documented in Chapter 6 of the PDP-11 MACRO-11 Language Reference Manual.

1.23.2.2 MCS Support

MACRO-11 Version 5.2 provided support for the eight-bit DEC Multinational Character Set (MCS). A chart showing the MCS is located in Appendix A of the PDP-11 MACRO-11 Language Reference Manual.

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The following directives support the MCS. For specific support information, consult the description of each directive in the PDP-11 MACRO-11 Language Reference Manual.

<u>MACRO</u>		<u>SECTION</u>
.ASCII	directive	6.3.4
.ASCIIZ	directive	6.3.5
.ERROR	directive	7.5
.IF	directive	6.9.1
.IF DIF		
.IF IDN		
.IFF	directive	6.9.2
.IFF DIF		
.IFF IDN		
.IRP	directive	7.6.1
.IRPC	directive	7.6.2
.NCHR	directive	7.4.2
.PRINT	directive	7.5
.REM	directive	6.1.6
.SBTTL	directive	6.1.3
.TITLE	directive	6.1.2

More information on the eight-bit DEC Multinational Character Set is located in the following sections of the PDP-11 MACRO-11 Language Reference Manual::

- Section 2.2.4 Comment field
- Section 6.3.3 ASCII conversion characters
- Section 7.3 Arguments in macro definitions and macro calls
- Section 7.3.6 Keyword arguments

1.23.2.3 Version 5.1 RSX-Specific Changes

Tasks running on previous versions of MACRO-11 would exit with SUCCESS exit status, even though errors were reported. That problem has been fixed.

If MACRO-11 detected an I/O error while reading a command file, MACRO-11 would produce an odd-address trap. Now, MACRO-11 reports the error message "MAC -- Command I/O error."

1.23.2.4 Corrections to the Version 5.1 Assembler

The following corrections apply to the Version 5.1 Assembler:

- MACRO-11 Version 5.1 processed some index deferred arguments as floating point numbers by default. MACRO-11 now processes all index deferred arguments as octal by default.
- MACRO-11 did not mark internal displaced relocatable statements as relocatable with an apostrophe (') in the assembly listing. They are now marked correctly.

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- MACRO-11 set bit 3, an unused bit, in all .PSECT object records. MACRO-11 no longer sets bit 3. That change makes object files created with the new version of MACRO-11 different from object files created with previous versions of MACRO-11. As a result, they will have different PAT checksums, and a binary comparison of the files will show differences. However, the resulting task or .SAV image files will be the same.

1.23.3 Version 5.0 RSX-Specific Changes

The cross-reference options, SEC and ERR, were added to MACRO-11 Version 5.0.

NOTE

The RSX-11 CREF program (CRF) has been updated to include support for these two new macro cross-reference options. Only the new RSX-11 CRF version (Version 2) distributed with RSX-11M Version 4.1 and RSX-11M-PLUS Version 2.1 should be used with this version of MACRO-11.

The default for the command line option `/[-]SP` has been modified from `/SP` to `/-SP`. The new default may be modified by the system manager using the TKB GBLPAT option described in the MACRO-11/RSX task build command file.

1.23.3.1 Corrections to the Version 5.0 Assembler

The following corrections apply to the Version 5.0 Assembler:

- The macro CALLR addr (Call-Return), has been added to the permanent symbol table (PST). This macro is equivalent to the mnemonic JMP addr. The CALLR addr macro was added to complement the CALL addr macro, which is equivalent to the mnemonic JSR PC addr.
- The previous version of MACRO-11 used a range of 64\$ to 127\$ for automatic local symbol generation. MACRO-11 now uses a range of 30000\$ to 65535\$ when generating local symbols.
- Most assembler-generated listing text is now in upper/lower case. This change was made to increase the readability of MACRO-11 code. Lines of code that include the .SBTTL or the .TITLE directive are not converted to uppercase.
- Lines of code that include the .SBTTL directive are listed in the table of contents of an assembly listing, even if an .NLIST statement is in effect at the time the .SBTTL lines are encountered. You may specify the .NLIST directive with the TOC argument to prevent the table of contents from being printed.
- The symbol table is printed at the end of an assembly, even if the .NLIST directive is in effect. You may specify the .NLIST directive with the SYM argument to prevent the symbol table from being printed.
- All page headers include the day of the week.

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- The assembler statistics information that appears at the end of the assembly listing file has been updated to include the following additional information:
 - Total number of virtual work file reads
 - Total number of virtual work file writes
 - Maximum amount of virtual memory used (in words and pages)
 - Size of physical memory free space (in words and pages)
 - Operating system and environment that the assembler is running under
 - Total elapsed assembly time
 - MACRO-11 command line
- The PSECT synopsis that is printed in the listing file, after the symbol table, includes the psect attributes.
- The maximum number of relocatable terms in a complex expression has been changed. The maximum size of an .OBJ record that MACRO-11 can produce was increased from 42(decimal) bytes to 128(decimal) bytes.

Do not compare .OBJ files that have been created by different versions of MACRO-11, when verifying whether your code generation is correct. Changes that have been made for this version of MACRO-11 (mentioned above) will invalidate a direct comparison of assembler .OBJ output. Verify code generation by linking or taskbuilding the .OBJ files involved and then comparing the .SAV or the .TSK image files.

NOTE

Because the .OBJ files produced by this new version of MACRO-11 are different, users of the PAT (Object Module Patch Utility) are warned that checksums must be recomputed on any object patches assembled with this new version of MACRO-11.

- The default for the LC argument has been changed from .DSABL LC to .ENABL LC.
- The following .ENABL/.DSABL options have been added:
 - .ENABL LCM/.DSABL LCM
 - .ENABL MCL/.DSABL MCL

RSX-11M NEW FEATURES AND RESTRICTIONS

- The following directives have been added to MACRO-11.

.CROSS

.INCLUDE

.LIBRARY

.MDELETE

.NOCROSS

.REM

.WEAK

CHAPTER 2

RSX-11M DOCUMENTATION CORRECTIONS

This chapter describes errors and omissions in the RSX-11M manuals and refers you to the appropriate sections of the manuals in the documentation set to make corrections. The chapter is organized according to the titles of manuals in the RSX-11M documentation set.

2.1 RSX-11M SYSTEM GENERATION AND INSTALLATION GUIDE

The following new documentation sections have been added to Chapter 2 of the RSX-11M System Generation and Installation Guide:

- The installation procedures for applying software updates
- The instructions for performing an RSX-11M system generation on a VAX/VMS host system running in VAX-11 RSX compatibility mode

Also, please note that the reference to RMS in Question 3 of the Executive Options section of SYSGEN Phase I has been removed. The Files-11 ACP (FCP) supports file sharing and placement control, so SYSGEN asks this question if your system includes the FCP, regardless of whether your system also includes RMS.

2.2 RSX-11M/M-PLUS MCR OPERATIONS MANUAL

The description of the /BAD=[option] keyword of the MCR command INI[TVOLUME] is partially incorrect. Please add the following information to the section describing the INI /BAD command:

To prevent bad blocks from being allocated to files in a volume, first run the Bad Block Locator Utility (BAD). BAD tests volumes for the number and location of bad blocks. (Refer to the RSX-11M/M-PLUS Utilities Manual for a description of the BAD utility). Then when you initialize a volume with the INI command, INI creates a file named BADBLK.SYS and uses the data generated by BAD to allocate bad blocks to the BADBLK.SYS file. In this way, known bad blocks are not allocated to any other file.

The way in which INI creates BADBLK.SYS depends upon the input it receives from the BAD utility. In turn, the data generated by BAD differs according to the type of device it is testing. On non-last-track devices, BAD records the addresses of bad blocks on the last good block of the device. This list of bad block addresses is

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called the Bad Block Descriptor File. INI then uses the Bad Block Descriptor File to create BADBLK.SYS. However, on last-track devices, the last track can contain a Manufacturer's Detected Bad Sector File (MDBSF), and a Software Detected Bad Sector File (SDBSF). BAD writes a record of bad blocks to the SDBSF. INI then creates BADBLK.SYS by combining the input from the MDBSF and the SDBSF.

If you want BAD to treat a last-track device as a non-last-track device, specify the OVERRIDE switch in the BAD command line. In response to the /OVERRIDE switch, BAD writes a Bad Block Descriptor File on the last good block before the last track. Then, when you initialize the volume, you must also specify the /BAD keyword with the [OVR] option (INI /BAD=[OVR]) so that INI can locate the Bad Block Descriptor File and use it to create BADBLK.SYS.

If you do not specify the /BAD keyword with the INI command, the default action of the command is /BAD=[AUTO]. That is, INI automatically performs bad block processing. The other options of the /BAD keyword allow you to modify the default action of the command. Refer to the RSX-11M/M-PLUS MCR Operations Manual for a complete description of the INI /BAD keyword and its options.

2.3 RSX-11M/M-PLUS INDIRECT COMMAND PROCESSOR MANUAL

The RSX-11M/M-PLUS Indirect Command Processor Manual is new for RSX-11M Version 4.2. Please make the following documentation corrections to the manual in the designated sections:

In Section 2.4.1.2, the special symbol <SYSTEM> will have a value of 5 if Indirect is running on a VMS host under VAX-11 RSX.

In Section 2.6.22, for the .ONERR directive, the first item in the list of error conditions is not a valid condition. The item should read:

```
"Task not installed in system (.XQT, .WAIT)"
```

2.4 RSX-11M/M-PLUS BATCH AND QUEUE OPERATIONS MANUAL

The RSX-11M/M-PLUS Batch and Queue Operations Manual is not undergoing revision for RSX-11M Version 4.2. This section describes documentation changes that have not been incorporated into the manual.

2.4.1 /[NO]TRANSFER Qualifier

In Section 2.2, page 2-6, in the description of the PRINT command qualifier /[NO]TRANSFER, please note that when a file is copied from a private device and then printed, the copy is deleted. The original file, however, is not deleted from the private device.

2.4.2 DELETE Command Format Error

In Section 2.3, page 2-10, the format for the DCL command DELETE is incorrect. The correct format should read:

```
DCL>DELETE/JOB queue_name jobname[/FILE_POSITION:n]
```

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2.5 RSX-11M/M-PLUS UTILITIES MANUAL

The RSX-11M/M-PLUS Utilities Manual is not undergoing revision for the Version 4.2 release. This section describes documentation changes that have not been incorporated into the manual.

2.5.1 BRU

The following documentation changes and corrections should be added to the manual in the designated sections for the Backup and Restore Utility (BRU):

2.5.1.1 Wildcards in Input Specifications

In Section 7.2.2.1, page 7-8, the documentation states that BRU treats all omitted file specification elements as if they were wildcards. This is incorrect. BRU does not treat omitted file names or file types as wildcards. This behavior is consistent with other RSX utilities. BRU differs from other utilities in that:

- If the version number is omitted, it will be treated as a wildcard. For example, NAME.EXT is equivalent to NAME.EXT;*.
- If only the UFD is specified, the entire file specification will be treated as a wildcard. For example, [UFD] is equivalent to [UFD]*.*;*.

2.5.1.2 Additional /VER Switch Information

The /VERIFY switch description has been revised. Please add the following information to page 7-19 of Section 7.4.

The /VERIFY switch verifies that the output volume was written correctly. It does this by comparing the input volume to the output volume and reporting any differences.

During a backup operation, each tape or disk is verified before starting the next volume in the backup set. During a restore operation, however, the entire backup set is restored before beginning the verify operation.

2.5.1.3 Using the MANUAL Option

In Section 7.6.3, page 7-25, please replace the last two paragraphs with the following information:

To get a list of the LBNs you have typed so far, type a slash (/) or press the RETURN key.

When you have finished entering bad blocks, type two slashes (//). BRU will then allocate the bad blocks that you have entered to BADBLK.SYS and continue processing.

2.5.1.4 Tape Write Error Message

In Section 7.10, page 7-54, the "User Action" is incorrect for the message:

"BRU -- *WARNING* -- TAPE WRITE ERROR."

The correct user action should read:

User Action: Replace the tape that the error occurred on with another tape. BRU will rewrite this replacement tape from the same point that the previous "bad" tape began. This "bad" tape is NOT a part of the backup set and, consequently, should not be used in later verify or restore operations.

If the error recurs on the replacement tape, the problem might be the tape drive. If the problem is the tape drive, clean the heads on the tape drive or terminate BRU and start over on another drive.

2.5.1.5 Executing Command Files

You can execute a command file from BRU. To do so, type an at sign (@) followed by the file specification for the command file. (This is not stated anywhere in the documentation.)

2.5.1.6 Changes in the CNF Table for Stand-Alone BRU

CSR and vector information has changed for device types MM, MS, MT, and DU. The following table should replace the table in Section 7.5 of the RSX-11M/M-PLUS Utilities Manual.

Device	CSR	Vector	CSR Status
DB	176700	254	Present
DK	177404	220	Present
DL	174400	160	Not Present
DM	177440	210	Present
DP	176714	300	Present
DR	176300	150	Present
DU	172150	154	Not Present
MM FOR=0	172440	330	Present
MS	172522	224	Not Present
MT	160000	320	Not Present

NOTE

For BRUSYS, the CNF table also lists the following device information:

MU	174500	260	Present
----	--------	-----	---------

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2.5.1.7 /NOSUPERSEDE Qualifier

In Section 7.4, page 7-19, please add the following information:

When an output file and an input file have identical file specifications but different version numbers, the /NOSUPERSEDE qualifier causes the input file to be copied without deleting the output file.

2.5.2 DMP

The following documentation changes should be added to the RSX-11M/M-PLUS Utilities Manual for the File Dump Utility (DMP).

2.5.2.1 New /LIM Switch Description

In Table 11-1, page 11-6, the following new switch should be added to the table:

Switch	Description
/LIM:n:m	Specifies the range of bytes n through m of each record or block to be dumped. /OCT is still the default if no format switches are specified.

2.5.2.2 Correction to /HF Description

In Section 11.4, page 11-6, replace the last sentence before the example with the following:

Other blocks are output as a data dump in the format selected by /AS and /BY, in octal words by default.

2.5.3 FLX

The following documentation change should be added to the RSX-11M/M-PLUS Utilities Manual for the File Transfer Program (FLX):

In Table 4-1, page 4-5, the table entitled "FLX Transfer Mode Switches" should include the following additional information about the use of octal and decimal numbers with the switches listed:

The following switches accept octal numbers by default:

/FA:n /FB:n /IM:n /BL:n /BS:n /NU:n /ZE:n

If you want to assign decimal numbers to these switches, you must follow the value of n with a period (.). For example, to assign the decimal value 18 to the /IM:n switch, you type the following:

/IM:18.

The /DNS:n switch accepts decimal numbers by default. Therefore, you do not need to follow the value of the /DNS:n switch with a period (.) if the value is decimal.

2.5.4 FMT

In Section 5.4, page 5-9, of the RSX-11M/M-PLUS Utilities Manual, please add DL: to the list of devices supported by the /WLT and /VE switches.

2.5.5 LBR

The following documentation changes should be added to the RSX-11M/M-PLUS Utilities Manual for the Librarian Utility (LBR):

2.5.5.1 User File Attributes

In Figure 10-7, page 10-7, bytes 40(octal) to the end of the header are referred to as "user file attributes". (The documentation does not state what these attributes are or what their relationship is with the FDB of the original file from which the module was created.) Please insert the following paragraph:

The FDB of the original file from which the module was created has five sections of information, the first of which is the "user file attributes." These attributes are:

- Record type
- Record attribute
- Record size
- Highest virtual block
- End-of-file block number
- Optional information

When you create a file and insert it into a universal library, LBR copies the input file attributes to the module header. You can modify some of these attributes by using the modify header switch (/MH).

For more information, please see Sections 10.5.9 and 10.5.11 of the RSX-11M/M-PLUS Utilities Manual, and pages 1-10 and Appendix A of the RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual.

2.5.5.2 Create Switch (/CR) Error

In Section 10.5.2, page 10-12, the /CR switch format is incorrectly documented. The equal sign (=) should be replaced with a colon (:). The correct format should read as follows:

```
outfile/CR:size:ept:mnt:libtype:infiletype
```

2.5.5.3 /IN Switch for Macro Libraries

In Section 10.5.8, page 10-19, delete the following sentence, which is no longer true:

LBR only recognizes upper-case characters in macro directives.

RSX-11M DOCUMENTATION CORRECTIONS

2.5.6 PAT

In Section 14.2.4, page 14-7, the following new error message should be added to the section entitled "PAT MESSAGES":

UNABLE TO OPEN FILE filename

Explanation: There is insufficient work space in the internal File Storage Region (FSR) of the PAT utility.

User Action: Install or run the PAT utility with an increment.

2.5.7 PIP

The following documentation errors should be corrected in the RSX-11M/M-PLUS Utilities Manual under the designated chapter sections.

2.5.7.1 /DD Switch Format Error

In Section 3.2.2.4, page 3-17, the /DD switch format is incorrectly documented in the three examples. There should be an ampersand (&) before /LI when used with /DD. The correct examples are as follows:

Examples

1. PIP>/DD:01-JUN-85:01-JUL-85&/LI
2. PIP>/DD:*:1-JUN-85&/LI
3. PIP>/DD:1-JUN-85:*&/LI

2.5.7.2 /TD Switch Format Error

In Section 3.2.2.25, page 3-40, the /TD switch format is incorrectly documented. There should be an ampersand (&) before /LI when used with /TD. The correct format is as follows:

PIP>/TD&/LI

2.5.8 SLP

The following documentation errors and omissions should be corrected in the Utilities manual under the designated chapter sections.

2.5.8.1 Illegal Switch Error Message

In Section 13.5.2, page 13-20, the error message is incorrect. The correct error message should read:

**SLP -- *FATAL*-ILLEGAL SWITCH OR FILESPEC
SHIRLEY.MAC;2/CF**

RSX-11M DOCUMENTATION CORRECTIONS

2.5.8.2 Maximum Number of Characters in File Names

In Section 13.5.2, page 13-21, under the error message

SLP -- *FATAL*-ILLEGAL FILE NAME

the explanation indicates that file names can be a maximum of 30(octal) characters long. This is incorrect. SLP file names can be a maximum of 19(decimal) characters long.

2.5.8.3 Illegal Switch Error Message

In Section 13.5.2, page 13-22, the "Illegal Switch" error message is incorrect. It should read as follows:

SLP -- *FATAL*-ILLEGAL SWITCH OR FILESPEC

command line segment

Explanation: One of the following conditions results in this error message:

- The switch was not a legal SLP switch.
- A legal switch was used in an illegal manner.
- A file specification could not be parsed.

User Action: Reenter the command line, specifying the legal switch or correct file specification.

2.6 RSX-11M/M-PLUS AND MICRO/RSX I/O OPERATIONS REFERENCE MANUAL

The following new information has been added to the RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual for RSX-11M Version 4.2:

- Appendix C contains a summary of the I/O-related system directives in alphabetical order
- Appendix I includes a new QIOMAC.MAC module description

2.7 IAS/RSX-11 SYSTEM LIBRARY ROUTINES REFERENCE MANUAL

The IAS/RSX-11 System Library Routines Reference Manual is not undergoing revision for the Version 4.2 release. This section describes documentation changes that have not been incorporated into the manual.

RSX-11M DOCUMENTATION CORRECTIONS

2.7.1 New Program Section Names and SYSLIB Routines

The following program section names and SYSLIB routines should be added to Table 1-1 (page 1-3) of the IAS/RSX-11 System Library Routines Reference Manual:

Program Section Name	SYSLIB Routines	
	Module Name	Routine Name(s)
PUR\$D	CAT5B (data)	\$CAT5B
	EDTMG (data)	\$EDTMG
PUR\$I	CAT5B (instruction)	\$CAT5B
	EDTMG (instruction)	\$EDTMG

2.7.2 Save All Registers Routine (\$SAVAL)

In Section 2.1, page 2-3, the box at the top of the page should enclose the "Return Address to \$SAVAL" line.

2.7.3 Time Conversion Routine (\$TIM)

In Section 6.2.2, page 6-4, the information under NOTE should be changed. The correct information is as follows:

For HH, the \$TIM routine always returns two characters for all values specified.

2.7.4 Virtual Address Units

In Section 8.5.2, page 8-24, Convert Virtual to Real Address Routine (\$CVRL), please add the following information to the first paragraph.

Virtual address units are words, and dynamic memory addresses are bytes.

2.7.5 Allocate Virtual Memory Routine (\$ALVRT)

In Section 8.4, page 8-16, the words "virtual address" should replace "disk address", in the seventh bulleted list item.

RSX-11M DOCUMENTATION CORRECTIONS

2.7.6 Virtual Memory Initialization Routine (\$INIVM)

In Section 8.2, page 8-6, add the following global symbol definition to the second bulleted list:

\$WRKPT The address of the FDB must be stored in the
 word \$WRKPT before calling \$INIVM.

2.8 RSX-11M/M-PLUS AND MICRO/RSX DEBUGGING REFERENCE MANUAL

RSX-11M/M-PLUS and Micro/RSX Debugging Reference Manual is the new title for the manual previously titled IAS/RSX-11 ODT Reference Manual.

The RSX-11M/M-PLUS and Micro/RSX Debugging Reference Manual combines the IAS/RSX-11 ODT Reference Manual and information about XDT. Information specific to IAS has been deleted.

2.9 RSX-11M/M-PLUS AND MICRO/RSX TASK BUILDER MANUAL

The RSX-11M/M-PLUS and Micro/RSX Task Builder Manual has not been revised for the Version 4.2 release. This section describes documentation changes that have not been incorporated into the manual.

2.9.1 Double Brackets

The occurrence of double brackets in the manual is a typographical error. These double brackets occur in Chapters 1, 5, 6, and 8. The brackets currently appear, as follows:

```
TKB>DB2: [[300,53]]=DB1: [[5,7]]OBJECT.OBJ
```

The correct format is:

```
TKB>DB2: [300,53]=DB1: [5,7]OBJECT.OBJ
```

2.9.2 Manual References

References to the Executive Reference Manual are to the RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual. These references occur in Chapters 2, 3, 4, 5, 7, 10, 11, and Appendix H.

2.9.3 Reference to "/" for the /MP switch

In Section 1.3.1, page 1-9, the reference to the "/" character is incorrect. You should refer to the discussion of the /MP switch in Chapter 10 instead.

2.9.4 Incorrect Device Specification

In Section 5.2.3.5, the specification LB; is incorrect. It should be replaced with LB:.

2.9.5 Errors in Overlay Capability

In Section 3.6.1, Creating a .ROOT Statement by Using a Virtual Address Space Allocation Diagram, there are errors in steps 10 through 14. The steps should be as follows:

10. Step 3A: Write .ROOT CNTRL-(A0-(A1,A2-(A21,A22)),B0-(B1
11. Step 3B: Write .ROOT CNTRL-(A0-(A1,A2-(A21,A22)),B0-(B1,B2
12. Step 3C: Write .ROOT CNTRL-(A0-(A1,A2-(A21,A22)),B0-(B1,B2)
13. Step 3B: Write .ROOT CNTRL-(A0-(A1,A2-(A21,A22)),B0-(B1,B2),C
14. Step 3C: Write .ROOT CNTRL-(A0-(A1,A2-(A21,A22)),B0-(B1,B2),C)

In Section 3.6.2, Creating a .FCTR Statement by Using a Virtual Address Space Allocation Diagram, a factual error occurs in the .ROOT statement. The statement should read as follows:

```
.ROOT CNTRL-(A0-(A1,A2-(A21,A22)),B0-(B1,B2),C)
```

The root statement with AFCTR included (the last .ROOT statement in Section 3.6.2) should read as follows:

```
.ROOT CNTRL-(AFCTR,B0-(B1,B2),C)
```

In Section 3.6.3, Creating an ODL Statement for a Co-Tree by Using a Virtual Address Space Diagram, contains two .ROOT statements. The first, without the co-tree, should read as follows:

```
.ROOT CNTRL-(AFCTR,B0-(B1,B2),C)
```

The second .ROOT statement in Section 3.6.3 should be read as follows:

```
.ROOT CNTRL-(AFCTR,B0-(B1,B2),C),CNTRL2-(CNTRLX,CNTRLY)
```

2.9.6 TKB Switch Combinations of /-PI/LI

An error in the manual incorrectly documents the effect of using the /LI switch in the Task Builder. If you use this switch when building a library, the region psect name for the library is the same as that of the library root. The name of the library is not .ABS as documented.

2.9.7 References to the /-CO and /-LI Switches

In Section 5.1.1, pages 5-4 and 5-5, references are made to the /-CO and /-LI switches. These are implied defaults for not using the /CO and /LI switches, and they are not actual switch designations.

RSX-11M DOCUMENTATION CORRECTIONS

2.9.8 Offsets

In Appendix B, Figure B-5, the following offset changes should be added:

- 772 contains the Label Block Revision Number
- 774 contains the Second Task Flag Word
- 776 contains a zero (always) for VAX-11 RSX compatibility (the last word in Label Block 0)

2.9.9 New TKB Error Message

The Task Builder has the following new error message:

Cluster library element element-name is not resident overlaid.

The listed cluster element has been built without memory-resident overlays. This kind of element cannot be used as a cluster library element. Cluster libraries 2 through 6 must be memory-resident and overlaid.

2.10 RSX-11M/M-PLUS AND MICRO/RSX EXECUTIVE REFERENCE MANUAL

The RRST\$ and TFEAS directives are incorrectly documented in the RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual for RSX-11M Version 4.2. These two directives apply to RSX-11M-PLUS systems only.

2.11 RSX-11M GUIDE TO WRITING AN I/O DRIVER

This section describes documentation changes to the RSX-11M Guide to Writing an I/O Driver manual and directs you to the appropriate places in the manual to make corrections.

2.11.1 Changes to System Data Structures

The system data structures (control blocks) are changing for the RSX-11M Version 4.2 release. Changes to system data structures are normally documented in the RSX-11M Guide to Writing an I/O Driver. This manual, however, is not being revised for the Version 4.2 release. The current information on control blocks has been incorporated in the RSX-11M/M-PLUS and Micro/RSX Crash Dump Analyzer Reference Manual.

2.11.2 I/O Packet Description

In Section 2.3.4, page 2-8, please remove the DPB acronym in the second line from the bottom of the page.

2.11.3 I/O Queue Description

In Section 2.3.5, page 2-9, please remove the DPB acronym in the second line of the paragraph entitled, The I/O Queue.

2.11.4 Text for Driver Initiator Section

Please add the following text to the end of Section 2.4.2, entitled Post-Driver Initiation Services, which starts on Page 2-11 and ends after the list on page 2-12:

When the Executive enters the driver at any of the four entry points contained in the driver dispatch table, it accesses D.DSP, locates the appropriate address in the table, and calls the driver at that address. A zero table address indicates that the (loadable) driver is not in memory. For a loadable driver, this field must be initialized to zero. If the driver does not process a given function, this address points to a return instruction within the driver's code.

You must provide a driver dispatch table in the driver source. The label on this table is of the form \$xxTBL; it must be a global label. The designation xx is the 2-character generic device name for the device. Thus, \$TTTBL is the global label on the driver dispatch table for the generic device name TT. This table is an ordered, 4-word table containing the following entry points:

- I/O initiator
- Cancel I/O
- Device timeout
- Power failure

When a driver is entered at one of these entry points, entry conditions are as follows:

At initiator:

If UC.QUE=1
 R5 = UCB address
 R4 = SCB address
 R1 = address of the I/O packet

If UC.QUE=0
 R5 = UCB address

2.11.5 MACRO-11 Command Line Error

In Section 3.2.1, page 3-9, the command line at the bottom of the page is incorrect.

The correct command line should read as follows:

```
MAC>xxTAB,xxTAB=LB:[1,1]EXEMC/ML,LB:[11,10]RSXMC,xxTAB
```

2.11.6 Building User-Written Drivers

In Section 3.3, page 3-14, there is a section from SYSGEN Phase II regarding the building of user-written device drivers. Currently, the manual reads as follows:

```
>;      If you are not including a resident data base,
>;      add the line
>;          GBLDEF=$USRTB:0
>;      to the file instead.
```

The correct version should read as follows:

```
>;      Also, delete the line
>;          GBLDEF=$USRTB:0
>;      If you are not including a resident data base,
>;      this line should be left in the file.
```

2.11.7 I.PRM Description

In section 4.1.1.1, at the bottom of page 4-5, please add the following lines to the I.PRM description:

It is generally not recommended that drivers alter or use the I/O packet beyond the device dependent parameters. Should you find it necessary to use the area beyond the device dependent parameters, please clear them before calling \$IODON.

When the last word of the device-dependent parameters is nonzero, the value can have one of several special meanings to the Executive. For example, if the value is nonzero and could be an Executive address, the Executive assumes that the value is a block locking word. Therefore, if the driver uses the word, it should restore its contents before calling \$IODON.

2.11.8 S.VCT Description

In Section 4.1.4.1, page 4-21, please add the following paragraph to the S.VCT description:

If \$xxINT is defined, only the vector pointed to by S.VCT is initialized. If \$xxINP and \$xxOUT are defined, the vector pointed to by S.VCT is initialized to point to \$xxINP. The following vector (address + 4) is initialized to point to \$xxOUT.

2.11.9 U.BUF Description

In Section 4.1.4.1, page 4-32, please change the address description in U.BUF, which describes the address of NPR device drivers. Add the following sentence to the paragraph at the top of Page 4-32:

For a 22-bit machine without UMRs (PDP-11/23+), the high-order 6 bits of the address are placed in U.BUF+1.

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2.12 RSX-11M/M-PLUS ERROR LOGGING MANUAL

The RSX-11M/M-PLUS Error Logging Manual is not undergoing revision for the Version 4.2 release. Please note the following documentation change, which has not been incorporated into the manual.

Appendix C includes an example of the format of an error log packet in memory, as described in the system macro \$EPKDF.MAC. Please replace the information under "Type and Subtype Codes for Fields E\$HTYC and E\$HTYS" with the following information:

```

;
; Type and Subtype codes for fields E$HTYC and E$HTYS
;
; Symbols with names E$Cxxx are type codes for field E$HTYC.
; Symbols with names E$Sxxx are subtype codes for field E$HTYS.
;
E$CCMD      = 'B'      1 ; Error Log Control
E$SSTA      = 'B'      1 ; Error Log Status Change
E$SSWI      = 'B'      2 ; Switch Logging Files
E$SAPP      = 'B'      3 ; Append File
E$SBAC      = 'B'      4 ; Declare Backup File
E$SSHO      = 'B'      5 ; Show
E$SCHL      = 'B'      6 ; Change Limits

E$CERR      = 'B'      2 ; Device Errors
E$SDVH      = 'B'      1 ; Device Hard Error
E$SDVS      = 'B'      2 ; Device Soft Error
E$STMO      = 'B'      3 ; Device Interrupt Timeout (HARD)
E$SUNS      = 'B'      4 ; Device Unsolicited Interrupt
E$STMS      = 'B'      5 ; Device Interrupt Timeout (SOFT)

E$CDVI      = 'B'      3 ; Device Information
E$SDVI      = 'B'      1 ; Device Information Message

E$CDCI      = 'B'      4 ; Device Control Information
E$SMOU      = 'B'      1 ; Device Mount
E$SDMO      = 'B'      2 ; Device Dismount
E$SRES      = 'B'      3 ; Device Count Reset
E$SRCT      = 'B'      4 ; Block Replacement

E$CMEM      = 'B'      5 ; Memory Detected Errors
E$SMEM      = 'B'      1 ; Memory Error

E$CSYS      = 'B'      6 ; System Control Information
E$SPWR      = 'B'      1 ; Power Recovery

E$CCTL      = 'B'      7 ; Control Information
E$STIM      = 'B'      1 ; Time Change
E$SCRS      = 'B'      2 ; System Crash
E$SLOA      = 'B'      3 ; Device Driver Load
E$SUNL      = 'B'      4 ; Device Driver Unload
E$SHRC      = 'B'      5 ; Reconfiguration Status Change
E$SMES      = 'B'      6 ; Message

E$CCPU      = 'B'     10 ; CPU Detected Errors
E$SINT      = 'B'      1 ; Unexpected Interrupt

E$CSDE      = 'B'     11 ; Software Detected Events
E$SABO      = 'B'      1 ; Task Abort

```

RSX-11M DOCUMENTATION CORRECTIONS

2.13 RSX-11M/M-PLUS AND MICRO/RSX CRASH DUMP ANALYZER REFERENCE MANUAL

Chapter 2 of the RSX-11M/M-PLUS and Micro/RSX Crash Dump Analyzer Reference Manual includes a description of the new DCL command ANALYZE/CRASH DUMP. If your terminal supports the DIGITAL Command Language (DCL) command line interpreter, you can use the ANALYZE/CRASH DUMP command to run CDA. Command qualifiers let you choose which report listings you want CDA to generate. You can also use qualifiers to specify the format of the CDA report listings.

CHAPTER 3

RMS-11 VERSION 2.0 RELEASE NOTES

This chapter describes new RMS-11 features and restrictions for RSX-11M Version 4.2. Also included are corrections and additions to RMS-11 documentation.

RMS-11 Version 2.0 has not changed version numbers for this release of RSX-11M. Information in this chapter has not been incorporated into the RMS-11 manuals.

3.1 NEW FEATURES

RMS-11 has improved remote access to RSTS/E systems. New features have also been added to several RMS-11 utilities for RSX-11M Version 4.2.

3.1.1 Remote Access to RSTS/E Systems

RMSDAP supports remote access to indexed files on RSTS/E systems. See Appendix B of the RSX-11M/M-PLUS RMS-11 User's Guide for more information on remote access.

3.1.2 New Utilities Features

This section describes the new enhancements to the following RMS-11 utilities:

- RMSCNV
- RMSBCK
- RMSDSP
- RMSRST

3.1.2.1 RMSCNV

The RMSCNV utility supports a new /ER switch. The purpose of this switch is to allow RMSCNV to continue processing a file after encountering an exception record. The new switch uses the following format:

/ER:filename

RMS-11 VERSION 2.0 RELEASE NOTES

If no /ER switch is used, RMSCNV will terminate after encountering the first exception record. It will issue an error message indicating the type of exception record.

If the /ER:filename switch is used, RMSCNV will continue processing the file. If exception records are encountered, the exception records will be placed in the specified file.

3.1.2.2 RMSBCK, RMSDSP, and RMSRST

The RMSBCK, RMSDSP, and RMSRST utilities include enhancements to increase performance and decrease task size. These utilities now process file specifications that include the wildcard characters asterisk (*) and percent sign (%). These wildcard characters can be used in any position within the directory, file name, file type, and file version number fields. The following new switches have been added to these utilities:

RMSBCK New Switches	Function
/NOQU	Disables query mode
/NV	Creates a new version of the output file
/CD:date:A	Interprets the creation date as after (:A) the specified date, in normal creation/revision date format
/CD:date:B	Interprets the creation date as before (:B) the specified date, in normal creation/revision date format
/RD:date:A	Interprets the revision date as after (:A) the specified date, in normal creation/revision date format
/RD:date:B	Interprets the revision date as before (:B) the specified date in normal creation/revision date format

RMSDSP New Switches

/BR	Briefly displays attributes
/SU	Supersedes existing output file

RMSRST New Switches

/NOCV	Disables version radix conversion
/NV	Creates new version of output file

3.2 SOFTWARE RESTRICTIONS

This section describes software restrictions as well as other known problems that apply to RMS-11 Version 2.0. Suggested measures for preventing or correcting problems are also included.

3.2.1 RMS-11 Access Methods

- RMS-11 allows the creation of an indexed file with a maximum record size that exceeds its bucket size. However, the file is not usable. You should, therefore, avoid creating an unusable file.
- Locate mode does not work when accessing a sequential fixed file if the target record ends on the block boundary. This problem impairs performance. To avoid it, do not use a fixed record size that allows records to fit perfectly in a block.
- Default Extension Quantity (DEQ) does not work correctly for sequential files. When RMS-11 extends a file, it uses the Multiblock Count (MBC) size instead of the pack default. Until this problem is fixed you should specify an explicit DEQ value instead of 0. Consult your programming language documentation for implementation details.

3.2.2 RMS-11 Utilities

The following restrictions apply to RMS-11 utilities for Version 2.0.

RMSDES

- Using default areas - when the record size is greater than 1024 bytes, RMSDES selects area bucket sizes that are not large enough. In this case, the file is successfully created, but is unusable. To work around this problem, override the bucket size with the correct value before creating the file.
- Using default areas - when there is a larger number of duplicates than can fit in a bucket (see Chapter 6 of the RSX-11M/M-PLUS RMS-11 User's Guide for calculation), RMSDES sets up larger than necessary area allocations. These can be overridden by RMSDES SET commands, or the number of duplicates can be reduced and RMSDES will allocate more conservatively.
- Selecting a packed decimal key field - RMSDES never prompts for the length of this field. A subsequent Create operation returns an error "Invalid Key Field Specified for File." Therefore, you must explicitly set the segment length, if you select a packed decimal key.
- RMSDES uses the system device as the default device on a GET file DAT command. This default may be inconvenient if your login device is not the system device, or if you have set your default device to other than the system device by issuing the DCL SET DEF or MCR ASN commands. To work around this, you should supply the device name in the file specification.

RMSIFL

- RMSIFL aborts with a memory management violation when more than one file is processed in the same RMSIFL session and the /DE switch is used. A temporary means of working around this problem is to invoke RMSIFL for each file.
- RMSIFL uses a sort algorithm that, when called upon to sort on a key, does not preserve the FIFO ordering of duplicates.

RMS-11 VERSION 2.0 RELEASE NOTES

For alternate keys, it is necessary to work around this problem by using RMSCNV. If the only concern is ordering of duplicates in the primary key, then as long as your input file is an indexed file or a file sorted on primary key, you can use RMSIFL /NOSO.

RMSCNV and RMSIFL

- RMSCNV and RMSIFL ignore user provided area extension quantities when loading a file. The values that they use are large enough to reduce the number of file extensions in most cases.

3.3 CORRECTIONS TO PROBLEMS WITH THE PREVIOUS RELEASE

This section describes corrections to software problems relating to the previous release of RMS-11 Version 2.0.

3.3.1 RMS-11 Access Methods

The following corrections apply to RMS-11 access methods:

- Records loaded into an indexed file by descending key value were not all found when either random access or sequential access was used. This problem has been corrected.
- The first word of a block in a file was sometimes corrupted with a -1 when an \$UPDATE operation was performed on a sequential file. This occurred when a \$FIND or an \$UPDATE operation followed a \$GET operation on the last record in a block, if that record ended at the end-of-file or within one byte of end-of-file. The -1 appeared in the first word of the block. This problem has been corrected.
- In some cases there were problems with Update operations to an indexed variable file containing alternate keys when record sizes were increased during \$UPDATE operations. In cases where the new record no longer fit in the old bucket, the record was written to a new bucket with an incorrect RRV pointer. Later attempts to get that record by using the alternate key would return the ER\$RRV condition. If you have experienced this problem, reload your indexed files with RMSIFL in order to fix the alternate key tree(s).
- A problem with the single-precision multiply routine in the access methods has been corrected. When calculations were performed that would produce a value larger than 131073, an incorrect value resulted. This value transferred the bits in the high word of the two-word value to the low word. For example, in a relative file with 3 block buckets, an attempt to insert relative record 43692 by issuing a \$PUT operation, resulted in writing the record to block 3 rather than block 131076. This problem affected random \$PUT and \$GET operations in relative files and fixed sequential files. For relative files, the multiplication of the relative record number by the bucket size in blocks would be invalid. For sequential fixed files, the multiplication of the relative record number by the record size in bytes would be invalid. This problem has been corrected. You should reload your files if your applications were affected by this problem.

3.3.2 RMS-11 Utilities

The following corrections apply to RMS-11 utilities:

RMSCNV

- A problem with the /EO switch in RMSCNV has been fixed. This switch enables the conversion of the ASCII CTRL-Z EOF terminator to a null, and pads the rest of the file with nulls. This problem has been corrected.

RMSIFL

- Using the /DE switch allows the five RMSIFL sort files to be redirected to alternate devices rather than the device used in the input file specification. This switch failed in several ways. RMSIFL reported either "Failure to Create IFLA.TMP (ER\$CRE)" or "Extraneous Data in File Specification (ER\$XTR)" In some cases, it sent data output to the console device. This problem has been corrected.
- Using RMSIFL with an indirect command file (IFL @file.cmd) would return the message "?Output file must be empty" on any commands following the first command. This would abort a batch submission. This problem has been corrected.
- The RMSIFL utility was not functioning properly when it attempted to process a file with the /ER:filename switch. This problem has been corrected.
- RMSIFL was failing to display the correct exception record type in the exception record file if the exception record was detected on the alternate key. This problem has been corrected.
- RMSIFL was returning an incorrect output record count and exception record count after processing a file. Any exception detected in the alternate key caused these counts to be displayed as "????". This problem has been corrected.
- RMSIFL displayed an incorrect primary key value when exception records were detected on the primary key. Exceptions on alternate keys, however, worked fine. The problem only occurred when no /ER switch was specified. This problem has been corrected.
- There is a new form of IFLNON.CMD and IFLNRN.CMD that includes the PAR statement. This form of command file does not need to be modified when RMSIFL is rebuilt to incorporate new modules. This corrects the previous problem of needing to modify command files. See the RSX-11M/M-PLUS and Micro/RSX Task Builder Manual for further information on tailoring the command file to reduce the size of RMSIFL.
- RMSIFL did not correctly handle PACKED DECIMAL alternate keys. It rejected these as exception records during the alternate key loading phase. This problem has been corrected.

RMS-11 VERSION 2.0 RELEASE NOTES

- RMSIFL did not return correct exit status when it encountered a corrupted index. This caused batch jobs to run incorrectly. This problem has been corrected.
- RMSIFL that is built to use supervisor mode RMSRES was aborting with a memory protection violation in certain cases. This problem has been corrected.

RMSRST

- The /SE switch is used to selectively restore files from a container. RMSRST did not always find the files specified because of an incorrect order-based algorithm. This problem has been corrected.
- When an explicit file specification was given with the /SE switch, RMSRST found the file but continued "searching" through the tape. This problem has been corrected.
- The use of a wildcard directory in the output specification would not restore the file(s) to the original owner account. This problem has been corrected.

3.4 DOCUMENTATION CORRECTIONS

The RMS-11 Version 2.0 manuals are not being revised for this release. This section describes documentation errors and directs you to the appropriate sections in the manuals to make corrections. New information to be added to the manuals is also included in this section.

3.4.1 RSX-11M/M-PLUS RMS-11 User's Guide

In Section 2.2.3.3, please add the following information to the discussion of deadlock:

An application should use multistream rather than multi-channel access to write to the same indexed file. When RMS-11 updates an RRV in a bucket that is currently locked, it must wait for that lock to be released. Control will not be returned to the program until this release occurs. Deadlock will occur when the lock is held on another channel within the same program; however, RMS-11 can update an RRV in a bucket that is locked on another stream within the same program. See your programming language documentation for details on the implementation of multistreaming.

In Section 6.2.4, the discussion of writing a record, please add the following note:

In the event that the record includes a partial alternate key but is not large enough to include space for the full alternate key field, RMS-11 will act as follows:

RMS-11 will treat the alternate key as if it were not present in the record, making no entry in the alternate key index structure.

RMS-11 VERSION 2.0 RELEASE NOTES

In Section 6.3, the discussion of contiguity and areas, please add the following information:

You will obtain a small benefit by setting areas to contiguous on a noncontiguous multi-area file, however, there is no means for RMS-11 to determine if those areas remain contiguous. Consequently, RMSDSP and RMSDES will display them as noncontiguous. As long as the areas are preallocated, they will behave like contiguous areas; as soon as they need to be extended, they will not behave like contiguous areas.

In Section 8.1.2.1, the discussion of task building against the RMS-11 resident library, incorrect syntax is documented for the cluster option in the Task Builder command file. The correct syntax is as follows:

```
CLSTR = RMSRES,DAPRES:RO
```

In Appendix B, the discussion of remote file and record access using DECnet, the documentation states that the RSTS/E FAL does not support remote record access to indexed files. This is no longer true.

3.4.2 RSX-11M/M-PLUS RMS-11 Macro Programmer's Guide

In Section 2.3, the argument for P\$BUF is "bufcount". This is incorrect. The correct argument is "iopoolsize", as discussed in Section 2.3.4.

In Section 5.19, the last paragraph incorrectly describes the use of the FID field in the NAM block. It should read as follows:

"If this value is non-zero..."

In Appendix A, page A-8, please add the following sentence:

An attempt to insert a record that is too small to contain the whole primary key field may also cause the error ER\$KEY.

3.4.3 RSX-11M/M-PLUS RMS-11 Utilities

In the Section 3.3.2 discussion of exception records, modify the exception record codes to read as follows:

002: Record contains a duplicate key where not allowed

This change indicates a duplicate in either the primary or alternate key fields when no-duplicates was specified.

3.5 FILES AND PLACEMENT ON THE DISTRIBUTION KIT

The following table describes the contents of the RMS-11 Version 2.0 distribution kit.

File Name	Destination	Comments
RMSMAC.MLB	LB:[1,1]	Can be deleted if you are not using MACRO-11 RMS-11 programs.
RMSLIB.OLB	LB:[1,1]	Object library for RMS-11 local access.

RMS-11 VERSION 2.0 RELEASE NOTES

File Name	Destination	Comments
RMSDAP.OLB	LB:[1,1]	Object library for RMS-11 remote access. Can be deleted if you do not need remote access.
RMSBCK.TSK	LB:[1,54]	RMSECK utility; does not use RMSRES.
RMSRST.TSK	LB:[1,54]	RMSRST utility; does not use RMSRES.
RMSDEF.TSK	LB:[1,54]	RMSDEF utility; does not use RMSRES.
RMSDSP.TSK	LB:[1,54]	RMSDSP utility; does not use RMSRES.
RMSCNV.TSK	LB:[1,54]	RMSCNV utility; does not use RMSRES.
RMSDES.TSK	LB:[1,54]	RMSDES utility; does not use RMSRES.
RMSIFL.TSK	LB:[1,54]	RMSIFL utility; does not use RMSRES.
RMSDES.IDX	LB:[1,2]	Indexed help file used by RMSDES.
RMS11.ODL	LB:[1,1]	Prototype ODL file.
RORMS1.MAC	LB:[1,1]	For use with the prototype ODL.
RMS11S.ODL	LB:[1,1]	ODL file for sequential.
RMS12S.ODL	LB:[1,1]	ODL file for sequential.
RMS11X.ODL	LB:[1,1]	Standard indexed file ODL.
RMS12X.ODL	LB:[1,1]	Indexed file ODL.
RMSRLX.ODL	LB:[1,1]	ODL for use with RMSRES.
DAP11X.ODL	LB:[1,1]	ODL for use with overlaid RMSDAP.
DAPRLX.ODL	LB:[1,1]	ODL for use with DAPRES.
RMSRES.TSK	LB:[1,1]	TSK image for linking against RMSRES.
RMSRES.STB	LB:[1,1]	STB file for RMSRES.
RMSRES.MAP	LB:[1,34]	Map file for RMSRES.
RMSRESSUB.TSK	LB:[1,1]	Subset library.
RMSRESSUB.MAP	LB:[1,34]	Map file for subset library.
DAPRES.TSK	LB:[1,1]	Task image for RMSDAP resident library.
DAPRES.STB	LB:[1,1]	STB file for DAPRES.
DAPRES.MAP	LB:[1,34]	
RMSRES.CMD	LB:[1,24]	For rebuilding RMSRES.
RMSRES.ODL	LB:[1,24]	
DAPRES.CMD	LB:[1,24]	For rebuilding DAPRES.
DAPRES.ODL	LB:[1,24]	
BCKNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSECK.
BCKNON.ODL	LB:[1,24]	
BCKNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSECK.
BCKNRN.ODL	LB:[1,24]	
CNVNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSCNV.
CNVNON.ODL	LB:[1,24]	
CNVNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSCNV.
CNVNRN.ODL	LB:[1,24]	
CNVNOO.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSCNV with RMSDAP.
CNVNOO.ODL	LB:[1,24]	
CNVNRR.CMD	LB:[1,24]	For rebuilding the resident library version of RMSCNV with RMSDAP.
CNVNRR.ODL	LB:[1,24]	
DEFNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSDEF.
DEFNON.ODL	LB:[1,24]	
DEFNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSDEF.
DEFNRN.ODL	LB:[1,24]	
DESNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSDES.
DESNON.ODL	LB:[1,24]	
DESNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSDES.
DESNRN.ODL	LB:[1,24]	

RMS-11 VERSION 2.0 RELEASE NOTES

File Name	Destination	Comments
RMSDES.ODL	LB:[1,24]	
DSPNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSDSP.
DSPNON.ODL	LB:[1,24]	
DSPNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSDSP.
DSPNRN.ODL	LB:[1,24]	
IFLNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSIFL.
IFLNON.ODL	LB:[1,24]	
IFLNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSIFL.
IFLNRN.ODL	LB:[1,24]	
RSTNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSRST.
RSTNON.ODL	LB:[1,24]	
RSTNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSRST.
RSTNRN.ODL	LB:[1,24]	
RMSUTL.OLB	LB:[1,24]	For rebuilding several utilities.
RMSODL.ODL	LB:[1,24]	
GSA.MAC	LB:[200,1]	Demonstration program included as an illustration of how to extend an RMS-11 task in the event of pool exhaustion.
PARSE.MAC	LB:[200,1]	Demonstration programs for the new directory and wildcarding facilities.
SEARCH.MAC	LB:[200,1]	
RENAME.MAC	LB:[200,1]	
ERASE.MAC	LB:[200,1]	
PARSE.TSK	LB:[200,1]	
SEARCH.TSK	LB:[200,1]	
RENAME.TSK	LB:[200,1]	
ERASE.TSK	LB:[200,1]	

NOTE

All RMSDAP files can be deleted if you are not using RMS-11 to access files on remote nodes.

3.6 RMS-11 VERSION 2.0 INSTALLATION

On most RSX-11M systems, all RMS-11 files are automatically on your system after system generation. However, for systems that were generated using distribution kits on RL01/RL02 or RK06 disks or the magnetic tape versions of these kits, the RMS-11 files must be transferred after system generation. If your system was not generated using one of these kits, you may want to skip this section, and go to the section entitled, Startup Command Procedures.

3.6.1 RL01/RL02 and RK06 Procedures

To transfer RMS-11 files to RL01/RL02 and RK06 disks, you must execute the command procedure [1,2]RMSINSTAL.CMD. This procedure is fully documented in the RSX-11M System Generation and Installation Guide.

3.6.2 Startup Command Procedures

If all the RMS-11 files have been transferred to your system, all you need to do is install the resident libraries and RMS-11 utilities at system startup. To aid you in the installation process, the file LB:[1,2]STARTUP.CMD contains sample comments that can be edited to become system startup commands.

RMS-11 VERSION 2.0 RELEASE NOTES

You must allocate a partition for each resident library you specify by using the SET command(s). You must allocate a partition called RMSRES, and install in that partition either the full-function resident library (RMSRES) or the subset library (RMSRESSUB.TSK). If you always plan to use the same library (no alternating between the full-function and the subset library), and you want to save disk space, you can delete the task image that you are not using.

If you delete the full-function RMSRES.TSK and you plan to use only RMSRESSUB.TSK, then rename RMSRESSUB.TSK to RMSRES.TSK. Renaming these files will ensure that your programs and RMS-11 utilities will always link against the task named RMSRES.

NOTE

If you use the subset library and you rebuild the RMS-11 utilities in their resident library form, utility functions for indexed files will be invalidated.

You can include the SET commands in your startup command file, or you may want to include the RMSRES and DAPRES partitions permanently in your system by doing as follows:

- Use the SET commands to include the necessary partitions
- Use the INSTALL commands to install the tasks in the running system
- Use the SAVE command to save RMSRES and DAPRES into the system image

See your RSX-11M/M-PLUS MCR Operations Manual for more information about these commands.

3.6.3 Utility Configurations

The RMS-11 utilities that are provided on the distribution kit are built to use disk-overlaid RMS-11.

3.6.3.1 Utility Command and ODL Files

For each utility, a command and ODL file is provided that can be used to build the utility using disk-overlaid RMS-11. The names of the files are the following:

For RMSBCK: BCKNON.CMD, BCKNON.ODL, RMSODL.ODL
For RMSRST: RSTNON.CMD, RSTNON.ODL, RMSODL.ODL
For RMSCNV: CNVNON.CMD, CNVNON.ODL
For RMSDSP: DSPNON.CMD, DSPNON.ODL, RMSODL.ODL
For RMSDES: DESNON.CMD, DESNON.ODL, RMSDES.ODL
For RMSDEF: DEFNON.CMD, DEFNON.ODL, RMSODL.ODL
For RMSIFL: IFLNON.CMD, IFLNON.ODL

For RMSCNV, two additional configurations are available, if you want to use RMSCNV to access files on remote nodes. To build RMSCNV using the clustered RMS-11 and RMSDAP resident libraries, use the following files:

For RMSCNV: CNVNRN.CMD, CNVNRN.ODL

RMS-11 VERSION 2.0 RELEASE NOTES

To build RMSCNV using disk-overlaid RMS-11 and RMSDAP, use the following files:

For RMSCNV: CNVNOO.CMD,CNVNOO.ODL

For each utility, a command and ODL file are provided that can be used to build the utility with the resident library RMSRES. The names of the files are as follows:

For RMSBCK: BCKNRN.CMD,BCKNRN.ODL

For RMSRST: RSTNRN.CMD,RSTNRN.ODL

For RMSCNV: CNVNRN.CMD,CNVNRN.ODL

For RMSDSP: DSPNRN.CMD,DSPNRN.ODL

For RMSDES: DESNRN.CMD,DESNRN.ODL

For RMSDEF: DEFNRN.CMD,DEFNRN.ODL

For RMSIFL: IFLNRN.CMD,IFLNRN.ODL

3.6.3.2 Rebuilding the Utilities

To rebuild the utilities, follow these steps:

1. Log in to a privileged account.
2. Set your default account to [1,24] on the system disk.
3. Use TKB to build the utility or utilities.

The utilities and the corresponding map files will be built in the current account. You may then want to put the utility in the system account ([1,54]).

Each command file for a particular utility creates a utility of the correct name. For example, CNVNRN.CMD and CNVNON.CMD both produce task images called RMSCNV.TSK. One is built to use the resident library and one is built with disk-overlaid RMS-11.

3.7 REPORTING PROBLEMS

Software Performance Reports (SPRs) allow you to report any software problems directly to DIGITAL. The appendix of this manual includes the general procedures for filling out Software Performance Reports.

The following additional information should be submitted with SPRs for RMS-11 software:

1. Include the version number and patch level of the RMS-11 that you are using.
2. Indicate whether you are using a programming language to process the file(s) and, if so, include the version number and patch level of the language.
3. Include a Postmortem Dump and a map of the task involved, if RMS-11 aborts (or if some other task crashes and RMS-11 appears to be the cause).

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4. Include copy(s) of the file(s) involved, in RMSBCK format.
5. Include copies of the files that can cause the error, if the errors are reproducible. If the problem is not reproducible, include a copy of the corrupt file if possible.
6. Include a description of the command line(s) or interactive session that led to the error (for RMS-11 utilities).
7. Include a listing of the actual error, if possible.

**RSX-11S Release Notes
Version 4.2**

CHAPTER 4

RSX-11S NEW FEATURES AND RESTRICTIONS

RSX-11S Version 4.2 software is an update of the memory-resident RSX-11S operating system. This chapter documents the new features and restrictions that are specific to RSX-11S Version 4.2.

4.1 NEW FEATURES

RSX-11S Version 4.2 supports all of the new devices and most of the software enhancements that RSX-11M Version 4.2 supports. (There are differences in the support for NCT and RX50.) The following list summarizes the new features and changes to RSX-11S for Version 4.2.

- New RX50 (DU:) load device for OTL
- New TK50 (MU:) cartridge tape subsystem
- Changes to the distribution kit
- DIGITAL Storage Architecture (DSA) support
- Network Command Terminal (NCT) support

4.1.1 New Device Support

The following new devices are supported on RSX-11S Version 4.2:

- J11-series processors
- TK50 cartridge tape drive (MU:)
- DEUNA driver
- KDA50-Q controller
- RQDX2 controller
- RQDX3 controller
- LA100 letterprinter
- LA210 letterprinter
- PC380 (as a VT102/VT125 in emulation mode)
- LN03 laser printer

RSX-11S NEW FEATURES AND RESTRICTIONS

- LQP02 letter quality printer
- LQP03 letter quality printer
- DTC01 DECTalk
- VT200-series terminals
- RUX50 UNIBUS interface for the 5-1/4 inch RX50 diskette drive
- RD53 71Mb disk drive
- DHU11 UNIBUS multiplexer
- DHV11 Q-BUS multiplexer
- DZQ11 Q-BUS multiplexer

See Sections 1.15 and 1.16 for more information on new device support.

4.1.2 New RX50 (DU:) load device for OTL

The RSX-11S On-Line Task Loader (OTL) performs the same functions as the MCR commands INSTALL and FIX on RSX-11M. The RX50 diskette (DU:) is a new load device supported on the OTL for RSX-11S Version 4.2. OTL requires that the RX50 diskette to be written in RT-11 format.

4.1.3 New TK50 (MU:) Tape Subsystem

RSX-11S supports the new TK50 tape drive. The TK50 (MU:) is an integrated subsystem that consists of a controller for the Q-BUS and a TK50 streaming tape drive. The controller handles all error recovery and correction, and internally buffers multiple outstanding commands. The TK50 tape drive (MU:) reads and writes data on a 1/2-inch tape cartridge that is recorded at 6667 bpi on serial data tracks in a serial serpentine recording (modified frequency modulation) method. The tape speed is 75 inches per second in streaming mode. See Chapter 1, the Device Drivers section, for more information.

4.1.4 Changes to the Distribution Kit

RSX-11S Version 4.2 is distributed on the following media:

- One RK06 cartridge disk
- One RK07 cartridge disk
- Two RL01 cartridge disks
- One RL02 cartridge disk
- One magnetic tape, 9-track, 800 bpi, 2400-foot
- One magnetic tape, 9-track, 1600 bpi, 2400-foot
- One TK50 tape cartridge

RSX-11S NEW FEATURES AND RESTRICTIONS

4.1.5 DIGITAL Storage Architecture (DSA) Support

DIGITAL Storage Architecture (DSA) is necessary to support the MU: tape devices such as the TK50 tape cartridge. DSA replaces the previous support for DU: disk devices such as the RD52 disk device. DSA breaks the host level into two independent layers: the class layer and the port layer. The class layer handles a class of devices, like tapes or disks. The port layer is responsible for the actual transmission of packets between the host and controller.

4.1.6 Network Command Terminal (NCT) Support

Network Command Terminal (NCT) can be selected during system generation to execute the command RUN SETHST for accessing remote RSX host systems. Note that both your current system and the remote system must run DECnet software in order to use this feature.

NCT defines logical layers and peer protocols that provide physical and logical terminals in a distributed environment. These services are layered on top of DECnet to present a fully transparent remote command terminal facility across heterogeneous DIGITAL operating systems. NCT implementation is limited to providing support for an RSX system to serve as either a host or server system to an RSX or VAX/VMS system.

4.2 RESTRICTIONS

The following restrictions apply to RSX-11S Version 4.2:

- IP11 and IPV11 Process Control Subsystem software is no longer included in the RSX-11S distribution kit. This support is available as a separate layered software product
- RSX-11S, as a memory-resident system, does not provide directory or file support for any magnetic tape, disk, terminal, or print device.
- RSX-11S does not support the loading of tasks from any MSCP fixed disk device.

APPENDIX A

REPORTING PROBLEMS

RSX-11M/RSX-11S provides special features for handling questions or problems you might encounter while using your system. Software Performance Reports (SPRs) allow you to report problems directly to DIGITAL. This appendix provides information on filling out SPRs.

A.1 HOW TO FILL OUT A SOFTWARE PERFORMANCE REPORT FORM

When you fill out an SPR form, describe only one problem per form, to simplify record keeping and facilitate a more rapid response.

An SPR can be used to report the following:

- Software errors
- Documentation errors when the documentation comment form (included at the end of each manual) is not appropriate
- Inquiries
- Suggestions
- Follow-up on a previous SPR

An SPR cannot be used to report the following:

- Software license and price policies
- Obvious hardware problems
- Logistical or clerical problems with kits or with The Software Dispatch, such as blank media, or failure to receive The Software Dispatch
- Problems with user-written software

There are three categories of reports that you can send:

- Problem/error

This type of report should have a priority of one to five. (Answer is generated.)

REPORTING PROBLEMS

- Suggested enhancement

This type of report contains suggestions or queries that are brought to the development group's attention and has a priority of five. (No answer is generated.)

- Other

This type of report contains queries and suggestions that are priority five. (Answer may be generated.)

The priority numbers are as follows:

1. Most production work cannot be run:
 - a. Major system functions are unusable
 - b. System does not boot
 - c. Necessary peripherals cannot be used
2. Some production work cannot be run:
 - a. Certain functions are unusable
 - b. System performance has declined
 - c. Installation has insufficient excess capacity
3. All production work can be run with some user impact:
 - a. Significant manual intervention is required
 - b. System performance has declined but installation has excess capacity
4. All production work can be run with no significant impact on user:
 - a. Problem can be patched
5. No system modifications are needed to return to normal production:
 - a. This category includes suggestions, consultations, or errors in documentation

Because problems are often difficult to reproduce with a different system configuration, please define as precisely as possible the state of the system when the problem occurred. Illustrate a general problem with specific examples. When you refer to a manual, specify the full title and section, table, or page number.

Please supply the following information (in machine-readable form where applicable) when you report a problem:

1. Crash - A copy of the Executive task-build map, output from the console terminal, the SYSGEN saved answer file, the Executive STB file, and the crash dump. If the crash is reproducible, please accurately describe the details, supplying hard copy or user source code when necessary.
2. Drivers - Controller/device information, software options, error log output, copy of device registers, and a sample program.

REPORTING PROBLEMS

3. Utilities - A copy of your terminal output, showing setup commands, before and after effects, and relevant file information.
4. Task Builder - A copy of your terminal output command files, the task map, and a dump of the first few blocks of the task image.
5. File system - Corrupted Volume: Output from Verify utility and dump of the volume. - Improper results: Error code, file header dump, sample program.
6. Error Log Report generator (RPT) - A copy of the report file generated by RPT, either on a hard copy listing file or on machine-readable media.

If a failure occurs when you are running privileged, add-on software (for example, DECnet), try to reproduce the failure without the additional software. Indicate on the SPR the behavior of the system with and without the add-on software.

The SPR process takes time. Therefore, if you have a critical problem, contact the local DIGITAL office. In the meantime, read The Software Dispatch for news on RSX-11M, which includes changes and problems other people have found and solved.

APPENDIX B

THE DIGITAL EQUIPMENT COMPUTER USERS SOCIETY (DECUS)

DECUS, the DIGITAL Equipment Computer Users Society, is one of the largest and most active user groups in the computer industry. It is a not-for-profit association, supported and administered by DIGITAL, but actively controlled by members. DECUS headquarters, located in Marlborough, Massachusetts, administers all international policies and activities. Members include individuals who have purchased, leased, ordered, or used a DIGITAL computer, or anyone who has an interest in DECUS. Membership is free and voluntary.

B.1 DECUS GOALS

The primary goals of DECUS are as follow:

- To advance the art of computation through mutual education and exchange of ideas and information
- To establish standards and provide channels to facilitate the exchange of computer programs
- To provide feedback to DIGITAL regarding hardware and software customer needs
- To advance the effective use of DIGITAL computers, peripherals, and software by promoting the interchange of information

To further these goals, DECUS serves its members by holding symposia; maintaining a program library; publishing an association newsletter, technical newsletters, and books; and supporting a number of Special Interest Groups (SIGs).

THE DIGITAL EQUIPMENT COMPUTER USERS SOCIETY (DECUS)

B.2 DECUS ACTIVITIES

Local, regional, and national DECUS organizations give members the opportunity to meet other DIGITAL customers and employees in an informal setting. From the monthly local meetings to the national symposia, members can discuss their ideas, learn what others are doing, and give DIGITAL valuable feedback for future product development.

Often, the national meetings in the various countries also provide the stage for major new product announcements as well as a showplace for interesting developments in both hardware and software technology. At any meeting, members might describe ideas and programs they have implemented, or fine-tuning that has been achieved for a particular application. Members present papers, participate in panel discussions, lead workshops, and conduct demonstrations for the benefit of other members.

Many of the technical papers and presentations from each symposium are published as a book, the DECUS Proceedings. Copies of the DECUS Proceedings are supplied to symposia attendees and can be purchased by DECUS members. DECUS also publishes newsletters focusing on special interests and a society newsletter.

DECUS has a Program Library, which contains over 1,700 software packages that are written and submitted by users. A wide range of software is offered, including languages, editors, numerical functions, utilities, display routines, games, and other types of application software. Library catalogs are available that contain program descriptions and ordering information. The programs are available for a nominal service charge that covers the cost of reproduction and media.

Many DECUS members derive additional benefits from joining a DECUS Special Interest Group (SIG). SIGs often meet as subsets of regional and national meetings. They may also meet on their own, to discuss their special field, such as operating systems, languages, processors, and applications. There are at least 25 SIGs in the United States alone. Many of the SIGs print newsletters and disseminate valuable technical information to members.

To obtain a membership form for DECUS, contact a DIGITAL sales representative or the nearest DECUS chapter office.

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