

# RSX-11M/RSX-11S Release Notes

Order Number: AA-2573P-TC

## November 1998

This revised manual contains technical changes made to the RSX-11M and RSX-11S operating systems since the previous version, corrections to the documentation since Version 4.2, a summary of layered products supported on the operating system, and additional information on RMS-11.

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**Operating System:** RSX-11M/RSX-11S Version 4.8



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# Contents

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## Preface

xiii

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## Chapter 1 RSX-11M New Features, Restrictions, and Supplementary Information

1.1	Summary of New Features	1-1
1.2	Changes in the Distribution Kit and System Generation	1-1
1.2.1	Copying Magnetic Tape Kits Standalone	1-2
1.2.2	Copying Magnetic Tape Kits Online	1-2
1.2.3	Online System Generation Restriction	1-2
1.2.4	New AT. Task	1-3
1.3	Layered Product Files	1-3
1.3.1	BASIC-PLUS-2 DATE\$ Function	1-3
1.3.2	FORTRAN-77 DATE/IDATE Functions	1-3
1.3.3	Datatrieve-11 Report Writer Heading	1-4
1.4	New Hardware Support in Version 4.8	1-4
1.4.1	Expanded TOY Clock Support	1-4
1.4.2	MENTEC M-series Processor Support	1-4
1.4.3	RZ26L, RZ29B, Setasi RM06, TZ87 and TLZ07 Device Support	1-5
1.4.4	Supplementary Hardware Information	1-5
1.4.4.1	KDJ11-E TOY Clock Restrictions	1-5
1.5	Software Enhancements for Version 4.8	1-6
1.5.1	Additional changes for Year 2000	1-6
1.5.1.1	Support for Year 2000 in Date Format	1-7
1.5.1.2	MCR/DCL TIME Command	1-7
1.5.1.3	MCR/DCL CLOCK QUEUE Command	1-7
1.5.1.4	EDT Date Command	1-7
1.5.1.5	RPT Date Range Switch	1-8
1.5.1.6	PIP Date Range Comparison	1-8
1.5.1.7	DMP Header ID area display	1-8
1.5.1.8	VMR TIM Command	1-8
1.5.1.9	Macro-11 Listings	1-8
1.5.1.10	HELP Files	1-8
1.5.1.11	Layered Product Corrections	1-8
1.5.2	Year 2000 Certification	1-8
1.5.3	Inclusion of DCL DUMP command	1-8
1.5.4	PIP Enhancements	1-9
1.5.5	RMDEMO Enhancements	1-9
1.5.6	Virtual Device Subsystem	1-10
1.5.7	Enhancements to MCR DEVICE command	1-10
1.5.8	Enhancement to DUDRV to allow for large disks	1-11
1.6	Software Problems Corrected in Version 4.8	1-11

1.6.1	Backup and Restore Utility (BRU) Corrections . . . . .	1-11
1.6.1.1	BRU Error on Tape Dismount . . . . .	1-11
1.6.1.2	Tape Error Reported when No Files Found . . . . .	1-11
1.6.1.3	BRU Could Not Abort When Used With a TK50 . . . . .	1-11
1.6.1.4	Invalid Date or Time Error with /REVISED . . . . .	1-12
1.6.1.5	Improperly terminated tape during Incremental Backup . . . . .	1-12
1.6.2	VFY Incorrectly reports End of File on BIT.TMP . . . . .	1-12
1.6.3	Corrections to Peripheral Interchange Program (PIP) . . . . .	1-12
1.6.3.1	Allocation Failure on Files >32767 Blocks Does Not Delete File . . . . .	1-12
1.6.3.2	PIP Fails to Delete Large Contiguous File after Allocation Failure . . . . .	1-13
1.6.3.3	The year 2028 was considered the lowest possible year . . . . .	1-13
1.6.4	Corrections to Error Logging . . . . .	1-13
1.6.4.1	Undefined Format Code 11 Error Causes RPT to Abort . . . . .	1-13
1.6.4.2	Error Logging Support for PDP-11/84 and Later Processors . . . .	1-13
1.6.4.3	Support for Inputting Lower-Case Characters in TUNE.CMD . . . .	1-13
1.6.4.4	ELI Aborts with More than 35 Devices . . . . .	1-14
1.6.4.5	RPT incorrectly handles dates after 2000 . . . . .	1-14
1.7	Software Problems and Restrictions in Version 4.8 . . . . .	1-14
1.7.1	VT Terminal Support . . . . .	1-14
1.7.2	Error Logging Restrictions . . . . .	1-14
1.7.2.1	Support for Error Logging History Summaries . . . . .	1-14
1.7.3	Tasks Hang When Attaching to A Terminal Already Attached to a Task . . . . .	1-14
1.7.4	ELI/SH Reports No Errors if ELI/NOLIM Has Been Set . . . . .	1-15
1.7.5	Problem with Unused Terminal Ports . . . . .	1-15
1.7.6	Task Builder (TKB) Restriction . . . . .	1-15
1.7.7	FCSRES Restriction . . . . .	1-15
1.8	Supplementary System Generation, Programming, and Device Information . . . .	1-15
1.8.1	Supplementary Information on Changes in the Distribution Kit and System Generation . . . . .	1-15
1.8.2	Using Logical Names in Performing a System Generation on a VAX-11 RSX Host . . . . .	1-16
1.8.3	Copying the RSX-11M Distribution Tape on a VAX-11 RSX Host . . . . .	1-17
1.8.4	Selecting Printer Support During System Generation . . . . .	1-18
1.8.4.1	Modifying Printer Support . . . . .	1-19
1.8.5	System Generation Restrictions . . . . .	1-19
1.8.5.1	Minimum Requirements for System Generation and Installation . . . . .	1-20
1.8.5.2	SYSGEN Invokes VMR when Using a VAX-11 RSX Host . . . . .	1-20
1.8.5.3	Copying the Distribution Tape to Disk . . . . .	1-20
1.8.5.4	Saved Answer Files . . . . .	1-20
1.8.5.5	GBLDEF Enhancement . . . . .	1-20

1.8.6	System Generation Device Restrictions and Supplementary Information . . . . .	1-20
1.8.6.1	LPA-11K Device Restrictions for System Generation . . . . .	1-20
1.8.6.2	MSCP Device Restrictions for System Generation . . . . .	1-21
1.8.6.3	Indirect Command Processor Restrictions . . . . .	1-21
1.8.7	Supplementary Information on Device Support . . . . .	1-21
1.8.7.1	Device Support for RA70 and RA90 Disk Drives and for SA550 and SA650 Arrays . . . . .	1-22
1.8.7.2	VT300,400,500-series Terminal Functions in VT200 Mode . . . . .	1-22
1.8.7.3	CXF32/DHF11 Module Support . . . . .	1-22
1.8.7.4	CXA16, CXB16, and CXY08 Multiplexer Support . . . . .	1-22
1.8.7.5	Terminal Driver Support . . . . .	1-23
1.8.7.6	Asynchronous Terminal Interfaces Support . . . . .	1-23
1.8.7.7	J11-Series Processor Support . . . . .	1-23
1.8.7.8	Large Disk Support . . . . .	1-23
1.8.7.9	BRU64K Device Support . . . . .	1-23
1.8.7.10	Network Command Terminal Support . . . . .	1-24
1.8.7.11	Devices and Products No Longer Supported . . . . .	1-24
1.8.8	Hardware Restrictions . . . . .	1-24
1.8.8.1	RX50/RX33 Diskette Restriction . . . . .	1-24
1.8.8.2	Transportability Among 22-Bit Systems . . . . .	1-24
1.8.8.3	Bootstrapping a DB-, DM-, or DR-Based System . . . . .	1-25
1.8.8.4	LK201 Keyboard Restriction . . . . .	1-25
1.8.8.5	DLVJ1 Four-Line Terminal Interface Restriction . . . . .	1-25
1.8.8.6	RQDX1 Controller Restriction . . . . .	1-25
1.8.8.7	TK50/TZ30/TLZ07/TZ87 Restriction . . . . .	1-25
1.8.8.8	LSI-11/73 Processor Restriction . . . . .	1-25
1.8.8.9	KDJ11-E TOY Clock Restrictions . . . . .	1-26
1.9	Executive Supplementary Information . . . . .	1-26
1.9.1	Executive Code Changes . . . . .	1-26
1.9.2	Executive Data Structure Changes . . . . .	1-27
1.9.3	I/O Data Structure Changes . . . . .	1-27
1.10	Supplementary Information on the MAKESTK.COMD Command File . . . . .	1-28
1.10.1	FCSRES and FCSFSL . . . . .	1-28
1.11	System Library Routines Supplementary Information . . . . .	1-29
1.12	Device Drivers . . . . .	1-29
1.12.1	DU Driver Enhancement . . . . .	1-29
1.12.2	Device Driver Restriction . . . . .	1-30
1.12.3	TK50 Tape Subsystem Supplementary Information . . . . .	1-30
1.12.3.1	TK50 Performance when Using RSX Utilities . . . . .	1-31
1.12.3.2	TK50 Indicators . . . . .	1-33
1.12.4	Supplementary Information on User-Written Device Drivers . . . . .	1-33
1.12.4.1	Asynchronous Buffered I/O . . . . .	1-34
1.12.4.2	Overlapped I/O Completion . . . . .	1-35
1.13	I/O Operations . . . . .	1-35
1.13.1	Crash Driver Modification for 4Mb-Memory Systems . . . . .	1-35

1.13.2	I/O Operations Restrictions . . . . .	1-36
1.13.2.1	Multibuffer Processing in Random Mode . . . . .	1-36
1.13.2.2	Big Buffering in Random Mode . . . . .	1-36
1.13.2.3	Block Size on Tapes Mounted with the /NOLABEL Qualifier . . . . .	1-36
1.13.3	I/O Operations Supplementary Information . . . . .	1-36
1.13.3.1	Support for Using FCS to Queue Files for Printing . . . . .	1-37
1.13.3.2	File Attribute Codes . . . . .	1-37
1.14	Error Logging Enhancements, Restrictions, and Supplementary Information . . . . .	1-37
1.14.1	Bad Block Replacement Enhancement . . . . .	1-37
1.14.2	Error Logging Restriction . . . . .	1-38
1.14.3	Supplementary Information on Error Logging . . . . .	1-38
1.14.3.1	Possible Error in Error Logging History Summary . . . . .	1-38
1.14.3.2	Error Logging Support for a Non-Digital Device . . . . .	1-38
1.15	Previously Documented Supplementary Software Information . . . . .	1-39
1.15.1	Disk Save and Compress Utility . . . . .	1-39
1.15.2	File Control Services Changes Supplementary Information . . . . .	1-39

---

## Chapter 2 RSX-11S New Features, Restrictions, and Supplementary Information

2.1	Summary of New Features . . . . .	2-1
2.2	The Distribution Kit Media . . . . .	2-1
2.2.1	Supplementary Information on Device Support . . . . .	2-1
2.3	Restrictions . . . . .	2-2
2.4	New Hardware Support in Version 4.8 . . . . .	2-2
2.4.1	RZ26L, RZ29B, Setasi RM06, TZ87 and TLZ07 Device Support . . . . .	2-2
2.4.2	Supplementary Hardware Information . . . . .	2-2
2.5	Software Enhancements for Version 4.8 . . . . .	2-3
2.5.1	Additional changes for Year 2000 . . . . .	2-3
2.5.1.1	Support for Year 2000 in Date Format . . . . .	2-3
2.5.1.2	MCR TIM Command . . . . .	2-3
2.5.2	Year 2000 Certification . . . . .	2-4
2.5.3	Enhancement to DUDRV to allow for large disks . . . . .	2-4
2.6	Software Problems Corrected in Version 4.8 . . . . .	2-4
2.6.1	OTL Returned an Error When Trying to Load NCP/EVC . . . . .	2-4
2.7	Software Problems and Restrictions in Version 4.8 . . . . .	2-4
2.7.1	Tasks Hang When Attaching to A Terminal Already Attached to a Task . . . . .	2-4
2.7.2	Problem with Unused Terminal Ports . . . . .	2-5
2.8	Software Problems Corrected Since Version 4.5 . . . . .	2-5
2.8.1	INITL Module Fails to Clear Certain Memory Locations on Boot . . . . .	2-5
2.8.2	OTL Corrupts System After Task Load Error in Undersized Partition . . . . .	2-5

---

## Chapter 3 RMS-11 Version 2.0 Release Notes

3.1	RMS-11 Enhancements . . . . .	3-1
3.2	RMS-11 Corrections . . . . .	3-1
3.2.1	RMS-11 Local Access . . . . .	3-1
3.2.2	Partial Block Writes with Block I/O . . . . .	3-1
3.3	Restrictions to RMS-11 Remote Access Methods (RMSDAP) . . . . .	3-2
3.3.1	DAP Date Restrictions . . . . .	3-2
3.3.2	Incorrect Interpretation of Keysize Field Values . . . . .	3-2
3.3.3	Using RMSDAP on Your System . . . . .	3-2
3.4	Corrections to RMS-11 Utilities . . . . .	3-3
3.4.1	RMSIFL Correction . . . . .	3-3
3.4.2	RMSDES Correction . . . . .	3-4
3.4.3	RMSBCK Corrections . . . . .	3-4
3.4.4	RMSRST Corrections . . . . .	3-4
3.4.5	Additional Corrections to Three Utilities . . . . .	3-5
3.5	RMS-11 Supplementary Information . . . . .	3-5
3.5.1	Building Combined Supervisor Mode and Remote Access RMS Programs . . . . .	3-5
3.5.2	Enhancements to RMSDES Utility . . . . .	3-5
3.6	RMS-11 Restrictions . . . . .	3-5
3.6.1	RMS-11 Local Access . . . . .	3-6
3.6.2	Restrictions to RMS-11 Utilities . . . . .	3-6
3.6.2.1	RMSIFL Restrictions . . . . .	3-6
3.6.2.2	RMSCNV Restriction . . . . .	3-6
3.6.2.3	RMSDSP Restriction . . . . .	3-6
3.6.3	RMS-11 Version 2.0 Installation . . . . .	3-6
3.6.3.1	RL01/RL02 and RK06 Procedures . . . . .	3-6
3.6.3.2	Startup Command Procedures . . . . .	3-6
3.6.3.3	Utility Configurations . . . . .	3-7
3.6.3.4	Utility Command and ODL Files . . . . .	3-7
3.6.3.5	Rebuilding the Utilities . . . . .	3-8
3.6.4	Files and Placement on the Distribution Kit . . . . .	3-8
3.6.5	Reporting Problems . . . . .	3-10

---

## Chapter 4 Documentation Corrections

4.1	IAS/RXS-11 System Library Routines Reference Manual . . . . .	4-1
4.1.1	Additional System Library Routines . . . . .	4-3
4.2	RSX-11M Guide to Writing an I/O Driver . . . . .	4-3
4.2.1	Changes to System Data Structures . . . . .	4-3
4.2.2	I/O Packet Description . . . . .	4-3
4.2.3	I/O Queue Description . . . . .	4-3
4.2.4	Text for Driver Initiator Section . . . . .	4-4
4.2.5	MACRO-11 Command Line Error . . . . .	4-4
4.2.6	Building User-Written Drivers . . . . .	4-4
4.2.7	I.PRM Description . . . . .	4-5

4.2.8	S.VCT Description	4-5
4.2.9	U.BUF Description	4-5
4.3	RSX-11M System Generation and Installation Guide	4-5
4.4	RSX-11M-PLUS I/O Operations Reference Manual	4-6
4.5	RSX-11M/M-PLUS Batch and Queue Operations Manual	4-6
4.6	RSX-11M/M-PLUS Command Language Manual	4-7
4.6.1	Description of DUMP command	4-7
4.6.2	Corrections to /CREATED/BEFORE and /MODIFIED/BEFORE Qualifiers	4-7
4.6.3	BACKUP Command Qualifiers	4-8
4.6.4	Underscore Character Permitted in BACKUP Command Qualifier	4-8
4.6.5	ANALYZE/ERROR_LOG Command	4-8
4.6.6	/HEADERS:n and /MAXIMUM_FILES:n Qualifiers in the DCL Command INITIALIZE	4-9
4.6.7	Unloading Magnetic Tape	4-10
4.7	RSX-11M/M-PLUS Error Logging Manual	4-10
4.8	RSX-11M/M-PLUS Guide to Program Development	4-12
4.9	RSX-11M/M-PLUS I/O Drivers Reference Manual	4-12
4.10	RSX-11M/M-PLUS Indirect Command Processor Manual	4-12
4.11	RSX-11M/M-PLUS MCR Operations	4-16
4.11.1	/CTRLC Option keyword in the MCR Command CLI	4-16
4.11.2	/BAD Option Keyword in the MCR Command INI	4-16
4.11.3	/TERM Qualifier in the MCR Command SET	4-17
4.11.4	/TERM Qualifier in the MCR Command ASN	4-17
4.11.5	DEFER Option in the MCR MOUNT and SET Commands	4-17
4.11.6	/HSYNC Command Keyword in the MCR SET Command	4-17
4.11.7	/INF and /MXF Keywords in the MCR Command INI	4-18
4.11.8	Additional switches for MCR TIME command	4-19
4.12	RSX-11M/M-PLUS RMS-11 Macro Programmer's Guide	4-19
4.13	RSX-11M/M-PLUS RMS-11 User's Guide	4-20
4.14	RSX-11M/M-PLUS RMS-11 Utilities	4-21
4.15	RSX-11M/M-PLUS System Management Guide	4-25
4.15.1	ACNT Utility	4-25
4.15.2	RMDEMO	4-25
4.15.3	DCL INITIALIZE/PROCESSOR	4-25
4.15.4	SHUTUP Utility	4-26
4.15.5	Data Terminal Emulation	4-26
4.15.6	SET /TYPEAHEAD	4-27
4.15.7	Replacement Control Task	4-28
4.15.7.1	Replacement Control Algorithms	4-28
4.15.8	The TDX Catchall Task	4-28
4.15.8.1	Installing TDX	4-29
4.15.8.2	TDX Commands and MCR Translations	4-29
4.15.8.3	Modifying the TDX Source File	4-30
4.15.8.4	Installing Tasks Permanently	4-31
4.16	RSX-11M/M-PLUS Utilities Manual	4-32



4.16.1	Backup and Restore Utility (BRU) . . . . .	4-32
4.16.1.1	Selective Backups . . . . .	4-32
4.16.1.2	Wildcards in Input Specifications . . . . .	4-32
4.16.1.3	Options Added to /COMPARE and /VERIFY Qualifiers . . . . .	4-33
4.16.1.4	BRU /COMPARE and /VERIFY Examples . . . . .	4-34
4.16.1.5	/ERROR_LIMIT Qualifier . . . . .	4-34
4.16.1.6	/IDENTIFICATION Qualifier . . . . .	4-35
4.16.1.7	Removal of IMAGE Backup and Restore Code from BRU64K . . . . .	4-35
4.16.1.8	Locating and Booting Standalone BRUSYS . . . . .	4-35
4.16.1.9	Skipping Over a Bootable System Image . . . . .	4-36
4.16.1.10	Using the MANUAL Option . . . . .	4-36
4.16.1.11	Tape Write Error Message . . . . .	4-36
4.16.1.12	Executing Command Files . . . . .	4-36
4.16.1.13	Changes in the CNF Table for Standalone BRU . . . . .	4-37
4.16.1.14	/NOSUPERSEDE Qualifier . . . . .	4-37
4.16.1.15	BRU Error Messages . . . . .	4-37
4.16.2	Disk Save and Compress Utility . . . . .	4-38
4.16.3	File Dump Utility (DMP) . . . . .	4-39
4.16.3.1	New /LIM Switch . . . . .	4-39
4.16.3.2	Correction to /HF Switch Description . . . . .	4-39
4.16.4	File Transfer Program (FLX) . . . . .	4-39
4.16.5	Disk Volume Formatter (FMT) . . . . .	4-40
4.16.6	Librarian Utility Program (LBR) . . . . .	4-41
4.16.6.1	User File Attributes . . . . .	4-41
4.16.6.2	Create Switch Error . . . . .	4-41
4.16.6.3	The /IN Switch for Macro Libraries . . . . .	4-42
4.16.7	Object Module Patch Utility (PAT) . . . . .	4-42
4.16.8	Peripheral Interchange Program (PIP) . . . . .	4-42
4.16.8.1	The /DD Switch Format Error . . . . .	4-42
4.16.8.2	The /TD Switch Format Error . . . . .	4-42
4.16.9	Source Language Input Program (SLP) . . . . .	4-42
4.16.9.1	Error Message Format . . . . .	4-43
4.16.9.2	Maximum Number of Characters in File Names . . . . .	4-43
4.16.9.3	Illegal Switch Error Message . . . . .	4-43
4.17	RSX-11M/M-PLUS and Micro/RSX Crash Dump Analyzer Reference Manual . . . . .	4-43
4.18	RSX-11M/M-PLUS and Micro/RSX Debugging Reference Manual . . . . .	4-43
4.19	RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual . . . . .	4-44
4.20	RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual . . . . .	4-44
4.21	RSX-11M/M-PLUS and Micro/RSX Task Builder Manual . . . . .	4-44
4.21.1	Double Brackets . . . . .	4-45
4.21.2	Manual References . . . . .	4-45
4.21.3	Reference to "/" for the /MP Switch . . . . .	4-45
4.21.4	/SHAREABLE:LIBRARY Switch Description . . . . .	4-45
4.21.5	Incorrect Device Specification . . . . .	4-45
4.21.6	Errors in Overlay Capability . . . . .	4-45
4.21.7	TKB Combinations of the /-PI and /LI Switches . . . . .	4-46
4.21.8	References to the /-CO and /-LI Switches . . . . .	4-46

4.21.9	Offsets	4-46
4.21.10	New TKB Error Message	4-46
4.21.11	TKB Option – RNDSEG	4-47
4.21.12	Map Problem for Non-PIC Shared Region	4-47
4.21.13	Cluster Libraries	4-48
4.21.14	Changing Values in an Installed Common	4-48
4.21.15	Using the /SS Switch with the RSX11M.STB File	4-48
4.21.16	Slow Task Builder (STK) Restriction for Layered Products	4-48
4.21.17	The /CL Switch and the /CODE:CLI Qualifier	4-49
4.21.18	The /FM Switch and the /FAST_MAP Qualifier	4-49
4.22	RSX-11S System Generation and Installation Guide	4-50

---

## Chapter 5 Virtual Device Subsystem Reference

5.1	Introduction	5-1
5.2	VCP Command Line	5-1
5.3	Commands	5-2
5.3.1	The CONnect command	5-2
5.3.2	The DISconnect command	5-6
5.3.3	The SHOW command	5-7
5.3.4	The DUMp command	5-8
5.3.5	The COPY command	5-8
5.3.6	The CREate command (Privileged)	5-9
5.3.7	The SET command (Privileged)	5-10
5.4	Technical Overview	5-11
5.4.1	General	5-11
5.4.1.1	Access rights, and privileges	5-11
5.4.1.2	Create Function	5-12
5.4.2	Connect Function	5-12
5.4.2.1	File access	5-12
5.4.2.2	Device access	5-12
5.4.2.3	Virtual Unit selection	5-12
5.4.2.4	File linkage to virtual device	5-13
5.4.2.5	Multiple Device Transfers	5-13
5.4.3	Device Data Structures	5-13
5.4.4	U.DCBP,U.DCBS	5-15
5.4.5	U.IOPQ	5-15

---

## Chapter 6 Year 2000 Certification for RSX-11M/S V4.8

6.1	Internal Date Storage	6-1
6.2	Disk File System	6-2
6.2.1	Files-11 File Headers	6-2
6.2.1.1	ODS-I File Header Identification Area Description	6-2
6.2.1.1.1	Date format to support year 2000 and beyond	6-3
6.2.2	File system attributes	6-4
6.3	Magnetic Tape Standards	6-5

6.4	Foreign System Interchange . . . . .	6-5
6.5	Backup Utilities . . . . .	6-6
6.6	Networking . . . . .	6-6
6.6.1	Data Access Protocol V7.1 . . . . .	6-6
6.6.2	Network Management Protocol V4.2.0 . . . . .	6-6
6.7	File System Utilities . . . . .	6-7
6.7.1	Utility Date Format . . . . .	6-7
6.8	Assemblers, Compilers, and Linkers . . . . .	6-7
6.9	Batch and Queue . . . . .	6-8
6.9.1	Queue Manager Processing Options . . . . .	6-8
6.10	System Management . . . . .	6-9
6.11	Year 2000 issues in RSX-11M/S V4.7 . . . . .	6-9
6.11.1	Century inferencing . . . . .	6-9
6.11.2	MCR TIME . . . . .	6-9
6.11.2.1	RSX-11M V4.7 Correction for TIME . . . . .	6-10
6.11.3	RMSBCK, RMSRST . . . . .	6-11
6.11.4	CLQ . . . . .	6-11
6.11.5	EDT Date Command . . . . .	6-12
6.11.6	RPT Date Range Switch . . . . .	6-12
6.11.7	PIP Date Range Comparison . . . . .	6-12
6.11.8	DMP Header ID area display . . . . .	6-12
6.11.9	FLX . . . . .	6-12
6.11.10	VMR TIM Command . . . . .	6-12
6.11.11	Macro-11 Listings . . . . .	6-12
6.11.12	HELP Files . . . . .	6-13
6.11.13	SYSLIB.OLB . . . . .	6-13
6.11.14	FCSRES . . . . .	6-13
6.12	Certification . . . . .	6-13

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## Appendix A Reporting Problems

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### Index

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#### Tables

1-1	Version 4.8 Layered Products . . . . .	1-3
1-2	DEVICE command—Additional Switch Description . . . . .	1-10
1-3	TK50 Performance and RSX Utilities . . . . .	1-31
4-1	Table 6-1 \$EDMSG Routine Editing Directives . . . . .	4-1
4-2	Table 6-1 \$EDMSG Routine Editing Directives . . . . .	4-2
4-3	Number of Index File Headers . . . . .	4-9
4-4	Default Number of Files – Approximation . . . . .	4-9
4-5	Number of Index File Headers . . . . .	4-18
4-6	Default Number of Files – Approximation . . . . .	4-18
6-1	Identification Area . . . . .	6-2
6-2	Storage of Date Fields after 1990 . . . . .	6-3

6-3	F11ACP Date attributes . . . . .	6-4
6-4	RSX-11M ANSI tape dates . . . . .	6-5
6-5	Additional SYSLIB Entry Points . . . . .	6-13
6-6	RSX-11M/RSX-11S Utilities Tested . . . . .	6-14

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# Preface

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## Compaq Computer Corporation

Throughout this document, when Digital Equipment Corporation is used, it shall also include Compaq Computer Corporation.

---

## Manual Objectives

The *RSX-11M/RSX-11S Release Notes* contains important information for using the RSX-11M operating system. Read this document before generating and using your system.

This manual contains the following categories of information:

- Descriptions of new software features, as well as changes to existing software features
- Descriptions of software and hardware restrictions
- Supplementary information, which appeared in previous release notes but is still applicable
- Corrections to documentation errors and omissions
- Software modifications, restrictions, and supplementary information for RMS-11 Version 2.0
- Correction files and restrictions for layered products

---

## Intended Audience

This manual is intended for all users of the RSX-11M and RSX-11S operating systems.

---

## Document Structure

Chapter 1 describes software features, software and hardware restrictions, and supplementary information for the RSX-11M operating system.

Chapter 2 describes software features, software and hardware restrictions, and supplementary information for the RSX-11S operating system.

Chapter 3 describes software modifications, restrictions, and supplementary information for RMS-11 Version 2.0.

Chapter 4 corrects errors and omissions in the RSX-11M, RSX-11S, and RMS-11 documentation sets.

Chapter 5 contains a description of the Virtual Device utility.

---

### Conventions

The following conventions are used in this manual:

Convention	Meaning
>	A right angle bracket is the default prompt for the Monitor Console Routine (MCR), which is one of the command interfaces used on RSX-11M-PLUS systems. All systems include MCR.
\$	A dollar sign followed by a space is the default prompt of the Digital Command Language (DCL), which is one of the command interfaces used on RSX-11M-PLUS and Micro/RSX systems. Many systems include DCL.
xxx>	Three characters followed by a right angle bracket indicate the explicit prompt for a task, utility, or program on the system.
UPPERCASE	Uppercase letters in a command line indicate letters that must be entered as they are shown. For example, utility switches must always be entered as they are shown in format specifications.
command abbreviations	Where short forms of commands are allowed, the shortest form acceptable is represented by uppercase letters. The following example shows the minimum abbreviation allowed for the DCL command DIRECTORY:  \$ DIR
lowercase	Any command in lowercase must be substituted for. Usually the lowercase word identifies the kind of substitution expected, such as a filespec, which indicates that you should fill in a file specification. For example:  filename.filetype;version  This command indicates the values that comprise a file specification; values are substituted for each of these variables as appropriate.
/keyword, /qualifier, or /switch	A command element preceded by a slash (/) is an MCR keyword; a DCL qualifier; or a task, utility, or program switch.  Keywords, qualifiers, and switches alter the action of the command they follow.
parameter	Required command fields are generally called parameters. The most common parameters are file specifications.

Convention	Meaning
[option]	Brackets indicate optional entries in a command line or a file specification. If the brackets include syntactical elements, such as periods (.) or slashes (/), those elements are required for the field. If the field appears in lowercase, you are to substitute a valid command element if you include the field. Note that when an option is entered, the brackets are not included in the command line.
[, ... ]	Brackets around a comma and horizontal ellipsis points indicate that you can use a series of optional elements separated by commas. For example, (argument[, ... ]) means that you can specify a series of optional arguments by enclosing the arguments in parentheses and by separating them with commas.
{ }	Braces indicate a choice among required options. You must choose one of the options listed.
:argument	Some parameters and qualifiers can be altered by the inclusion of arguments preceded by a colon. An argument can be either numerical (COPIES:3) or alphabetical (NAME:QIX). In DCL, the equal sign (=) can be substituted for the colon to introduce arguments. COPIES=3 and COPIES:3 are the same.
( )	Parentheses are used to enclose more than one argument in a command line. For example:  <code>SET PROT = (S:RWED,O:RWED)</code>
,	Commas are used as separators for command line parameters and to indicate positional entries on a command line. Positional entries are those elements that must be in a certain place within the command line. Although you might omit elements that come before the desired element, the commas that separate them must still be included.
.	Periods immediately following a number indicate a decimal number. For example, 600. would mean 600 <sub>10</sub> .

## Preface

Convention	Meaning
[g,m] [directory]	<p>The convention [g,m] signifies a User Identification Code (UIC). The g is a group number and the m is a member number. The UIC identifies a user and is used mainly for controlling access to files and privileged system functions.</p> <p>This may also signify a User File Directory (UFD), commonly called a directory. A directory is the location of files.</p> <p>Other notations for directories are: [ggg,mmm], [gggmmm], [ufd], [name], and [directory].</p> <p>The convention [directory] signifies a directory. Most directories have 1- to 9-character names, but some are in the same [g,m] form as the UIC.</p> <p>Where a UIC, UFD, or directory is required, only one set of brackets is shown (for example, [g,m]). Where the UIC, UFD, or directory is optional, two sets of brackets are shown (for example, [[g,m]]).</p>
.	<p>Vertical ellipsis points show where elements of command input or statements in an example or figure have been omitted because they are irrelevant to the point being discussed.</p>
filespec	<p>A full file specification includes device, directory, file name, file type, and version number, as shown in the following example:</p> <pre>DL2:[46,63]INDIRECT.TXT;3</pre> <p>Full file specifications are rarely needed. If you do not provide a version number, the operating system uses the highest numbered version. If you do not provide a directory, the system uses the default directory. Some system functions default to particular file types. Many commands accept a wildcard character (*) in place of the file name, file type, or version number. Some commands accept a file specification with a DECnet node name.</p>
.	<p>A period in a file specification separates the file name and file type. When the file type is not specified, the period may be omitted from the file specification.</p>
;	<p>A semicolon in a file specification separates the file type from the file version. If the version is not specified, the semicolon may be omitted from the file specification.</p>
@	<p>The at sign invokes an indirect command file. The at sign immediately precedes the file specification for the indirect command file, as follows:</p> <pre>@filename[.filetype;version]</pre>



Convention	Meaning
...	<p>Horizontal ellipsis points indicate the following:</p> <ul style="list-style-type: none"> <li>• Additional, optional arguments in a statement have been omitted.</li> <li>• The preceding item or items can be repeated one or more times.</li> <li>• Additional parameters, values, or other information can be entered.</li> </ul>
KEYNAME	<p>This typeface denotes one of the keys on the terminal keyboard; for example, the Return key.</p>
print and enter	<p>As these words are used in the text, the system prints and the user enters.</p>
<code>Ctrl/x</code>	<p>The symbol <code>Ctrl/x</code> means that you are to press the key marked Ctrl while pressing another key. Thus, <code>Ctrl/Z</code> indicates that you are to press the Ctrl key and the Z key together in this fashion. Ctrl/Z is echoed on some terminals as ^Z. However, not all control characters echo.</p>



# 1

---

## RSX-11M New Features, Restrictions, and Supplementary Information

This chapter describes new features and restrictions and provides supplementary information for the Version 4.8 operating system.

The information on individual system components is divided into four categories:

New features and enhancements	Describes new features and enhancements to existing features for Version 4.8.
Corrections	Describes software problems and their corrections for Version 4.8.
Restrictions	Describes restrictions to software performance.
Supplementary information	Describes software changes that were documented in previous release notes and other information that is not included in the RSX-11M Version 4.2 documentation set but is still applicable to the software.

---

### 1.1

#### Summary of New Features

The changes to the RSX-11M operating system for Version 4.8 and previous versions are described throughout this chapter by operating-system component. Version 4.8 changes are summarized here as follows:

- Additional corrections and enhancements for year 2000 support and beyond.
- Year 2000 Certification using DISC PD2000-1 Standard.
- Support for the RZ26x, RZ29B, and Setasi RM06 devices.
- Support for the TLZ07, and TZ87 devices.
- Support for Mentec M-Series processors.
- Support for Virtual disks.
- Support for TYPE /PAGE in PIP.
- Support for large MSCP disks.
- Enhancement for RMDemo
- Enhancement for MCR DEVICE command.

---

### 1.2

#### Changes in the Distribution Kit and System Generation

The magnetic tape distribution kits that contain the files for generating the new system have been changed since RSX-11M Version 4.5. For Versions 4.5, 4.6, 4.7, and 4.8, the distribution kits are supplied on the following media:

- One TK50 magnetic tape cartridge. The tape contains BRU64K and the operating system files. BRU64K is at the beginning of the tape.

## RSX-11M New Features, Restrictions, and Supplementary Information

- One 9-track, 1600-bpi, 2400-foot magnetic tape. BRU64K is at the beginning of the tape.

Note that BRU64K replaces BRUSYS. BRU64K has included support for MU devices since Version 4.4 and can now be used to copy the system files to any supported device. The Disk Volume Formatter (FMT) and BRU image mode functions are not included in BRU64K but are included in the operating system. Users requiring BRUSYS can create it using the information in Section 4.16.1.8.

---

### 1.2.1 Copying Magnetic Tape Kits Standalone

Since Version 4.5, BRU64K has been placed at the beginning of the single distribution tape. When you load and boot the tape, it will bring up standalone BRU64K, which you can then use to copy the remainder of the tape to your system disk.

This means that some information in your Version 4.2 *RSX-11M System Generation and Installation Guide* is no longer applicable, as follows:

- The first sentence at the top of page 2-5 should read “The BRU64K System – Each tape distribution kit contains a BRU64K system.” The next two sentences should be deleted.
- Item 1 on page 2-6 should begin with “Load the distribution tape on the appropriate tape drive” instead of “Load the BRU64K tape on the appropriate tape drive.” The next sentence, which is enclosed in parentheses, should be deleted.
- Item 2 on page 2-7 should say “Hardware bootstrap the distribution tape” instead of “Hardware bootstrap the BRU64K or BRUSYS tape.”
- Item 6 on page 2-8 should be deleted.

---

### 1.2.2 Copying Magnetic Tape Kits Online

Version 4.6 and later magnetic tape kits can be copied (as indicated by the *RSX-11M System Generation and Installation Guide*, Section 2.3.2) on online systems that have been upgraded to at least RSX-11M Version 4.2 Update D, RSX-11M-PLUS Version 3.0 Update D, or VAX-11 Version 2.4.

---

### 1.2.3 Online System Generation Restriction

When performing a Version 4.6 or later online system generation, SYSGEN will always install the Task Builder (TKB) supplied on the distribution kit as . . . TKL.

**Note: You must be a privileged user to perform an online system generation.**

---

## 1.2.4 New AT. Task

Beginning with RSX-11M Version 4.7, a new version of the Indirect Command Processor, ICX.TSK, is used as the AT. task image on baseline systems. This version allows for a larger symbol table space, to accommodate larger system configurations in SYSGEN.

---

## 1.3 Layered Product Files

The following table lists the layered products that have been updated for this release.

Table 1-1 Version 4.8 Layered Products

Layered Product	Directories Used	Backup Set	Documentation File Name
PDP-11 BASIC-PLUS-2 Version 2.7	[211,200]	BP2	[211,200]BP2.DOC
DATATRIEVE-11/RSX Version 3.3	[222,200]	DTR	[222,200]DTRREL.DOC
PDP-11 FORTRAN-77 Version 5.4	[246,200]	F77	[246,200]F77.DOC

---

### 1.3.1 BASIC-PLUS-2 DATE\$ Function

Previously, The BASIC-PLUS-2 DATE\$ function would incorrectly display dates when the year was beyond 2000. This problem has been corrected.

It should be noted that the integer value input to the DATE\$ function is considered by BASIC-PLUS-2 to be a signed integer, while the actual DATE\$ function will treat the value as an unsigned integer, for the full date range available to be used.

---

### 1.3.2 FORTRAN-77 DATE/IDATE Functions

The FORTRAN-77 DATE function would incorrectly return the ASCII year value when the year was beyond 2000. This problem has been corrected.

The FORTRAN-77 IDATE function has been modified to return the year of century, which is compatible with VAX-FORTRAN. This will allow applications which display the date to continue without any change to the application; i.e. 00 through 99.

In addition, the list file header has been updated to correctly display the current system date for the list files.

**CAUTION:** This change is different from the behaviour which is documented in the FORTRAN-77 Users Guide, and may not be applicable for all users, where IDATE returns the number of years since 1900. If the result of IDATE is to compare various dates, the original behaviour would be desired, so that sequential dates will be maintained in ascending order. If the new behaviour is not desired, the original

**"\$IDATE" module should be preserved, and replaced into the appropriate OTS module after the update process is complete.**

---

### 1.3.3 Datatrieve-11 Report Writer Heading

Previously, The Datatrieve-11 Report Writer would incorrectly display the date at the top of the reports, after 31-December-1999. This problem has been corrected.

---

## 1.4 New Hardware Support in Version 4.8

The following new devices are supported:

- RZ26L (1.05Gb, using RQZX1 controller)
- RZ29B (4.3 Gb, using RQZX1 controller)
- Setasi RM06 (using RH11/RH70 controller)
- TLZ07 and TZ87 tape drives (using RQZX1 controller)
- MENTEC M-Series processors:
  - M70 (DCJ11 based )
  - M80 (DCJ11 based )
  - M90 (DCJ11 based )
  - M100 (DCJ11 based )
  - M11 (DCJ11 emulation )
- Expanded TOY clock support for KDJ11-E and MENTEC M-series processors

---

### 1.4.1 Expanded TOY Clock Support

Support for both the KDJ11-E and MENTEC M-series processors utilizing a TOY clock has been included in Version 4.8. This support is included in both SAVE and the STARTUP command file, and will define a default date and time for the system if the TOY clock option is present. If the date and time are not correct, the time may be changed in the TOY clock by appending the "/SETTOY" switch to the end of the corrected date and time. The bit definitions for the hardware feature mask (\$HFMSK) have been modified to reflect the expanded types of TOY clocks supported by the system. Refer to the Section 4.11 for an updated description of the MCR TIME command.

**KDJ11-E: Refer to section Section 1.4.4.1 for a description of the issues associated with the KDJ11-E firmware.**

---

### 1.4.2 MENTEC M-series Processor Support

Support for the MENTEC M-Series processors has been added to Version 4.8. The following features are supported:

- The module ID
- The TOY clock (Time of Year clock, if present)

## RSX-11M New Features, Restrictions, and Supplementary Information

- On-board serial lines (as terminal driver option)
- Enhanced block move instruction (M11 processor only)

Support has been added in SYSGEN, Error Logging, SAVE, the Executive, and the MCR SET TIME command for these processors. The M11 processor will be reported as an 11/95, while the other M-series processors will be reported as an 11/73.

---

### 1.4.3 RZ26L, RZ29B, Setasi RM06, TZ87 and TLZ07 Device Support

Support has been added in SYSGEN, ACF, Error Logging, SAVE, and the Executive where needed for the TZ87, TLZ07 tape devices, and the RZ26L, RZ29B, and SETASI RM06 disk devices. The SETASI RM06 disk drive is a massbus drive which supports various disk sizes. The system automatically determines the size when the device is brought online or mounted.

**Caution: ANSI tape processing for information interchange is not supported on any RQZX1 controller tape drive, including the TZ30, TLZ07, and TZ87.**

---

### 1.4.4 Supplementary Hardware Information

For a complete list of hardware supported by Version 4.8, refer to the *Software Product Description*.

---

#### 1.4.4.1 KDJ11-E TOY Clock Restrictions

The KDJ11-E processors have issues with the use of the console monitor Version 1.06 and the usage of the TOY clock.

These issues are summarized below:

- The year 2000 is not considered to be a leap year.
- The only dates which are valid range from 1-JAN-1990 through 31-DEC-2009.
- The day of the week may not be calculated correctly beyond the year 2000.
- Invalid dates will result in the date being reset to 1990.

These issues can only be worked around by using the MCR TIME or DCL SET TIME commands. If the system is rebooted at a time when the current date/time fall into an illegal range, the date will be retrieved as being 1990.

At that time, the user must specify the correct date and time, and include the "/SETTOY" option to reset the date and time to the current values.

Customers should upgrade their firmware from Version 1.06 to Version 2.01 as soon as possible, since this will have an impact on the "Year 2000 Readiness" of your system.

---

## 1.5 Software Enhancements for Version 4.8

This section describes software enhancements added to Version 4.8.

---

### 1.5.1 Additional changes for Year 2000

The following areas have been enhanced to allow for century inferencing when using two-digit year fields in commands. This will allow a two-digit year to be inferenced between the years 1965—2064.

- BRU /BEFORE/AFTER
- PIP /DD
- QUE /AF
- RPT /DA
- TIM
- VMR TIME

Below is shown an example of how dates will be inferenced.

RSX Date	Actual Date
01-JAN-98	01-JAN-1998
01-JAN-00	01-JAN-2000
01-JAN-15	01-JAN-2015
01-JAN-66	01-JAN-1966
01-JAN-64	01-JAN-2064

The following components have been updated to expand support for the year 2000:

- MCR/DCL
  - TIM
  - CLQ
- BRU
- EDT
- RPT
- PIP
- DMP
- VMR
- MACRO-11
- HELP files



## RSX-11M New Features, Restrictions, and Supplementary Information

- Layered product corrections:
  - BASIC-PLUS-2
  - FORTRAN-77
  - Datatreive-11

---

### 1.5.1.1 Support for Year 2000 in Date Format

The RSX operating systems have been changed to support dates beyond the year 2000. Generally, RSX treats the current year as a two-digit field. The following areas of the RSX system have been changed:

- Input—All areas of the system that allow input of a date will now accept two different forms of date input. First, the traditional date format of dd-mmm-yy (or mm/dd/yy for TIM) will still be accepted. These dates will be considered as a window occurring between the years 1965 and 2064. In addition, the date may now be specified as dd-mmm-yyyy or (mm/dd/yyyy for TIM only), to allow the system to recognize dates outside this window.
- Output—In order to preserve compatibility in applications that parse the output of system commands, the format of date output will not be changed. All places that output the date as 2 digits will continue to do so, representing 2000 as 00, and so forth. Places that currently output the date as 4 digits will still output the date as 4 digits. Some utilities allow for a switch, such as PIP "/Y4", to display years as four digits.
- Internal representations—As documented for the GTIMS directive, the year field of time vectors is the number of years since 1900. This is still accurate. This field will reach 100(10) in the year 2000.

---

### 1.5.1.2 MCR/DCL TIME Command

The TIM command has been modified to infer the century from the year retrieved from the Time of Year (TOY) clock. The valid range of dates which are supported for Version 4.8 is from 1965 through 2064.

Previously, the TIM command incorrectly set the number of days per month, which resulted in all months having thirty one days, unless the STIMS directive was issued. This issue has been corrected.

In addition, the display from time has been updated to display the year in four digit format.

---

### 1.5.1.3 MCR/DCL CLOCK QUEUE Command

Previously, the MCR CLQ command would incorrectly display the year in which a clock queue element became due after the year 2000. This problem has been corrected.

---

### 1.5.1.4 EDT Date Command

Previously, the EDT DATE command would always display the year with a leading "19", and would not correctly interpret the full year. This has been updated to show the correct year beyond 1-JAN-2000.

## RSX-11M New Features, Restrictions, and Supplementary Information

---

### 1.5.1.5 RPT Date Range Switch

RPT would not allow a date of the form dd-mmm-yyyy to be greater than 1999. This has been updated to allow date ranges beyond the year 2000, and also to allow two-digit year inferencing to be used between the years 1965—2064.

---

### 1.5.1.6 PIP Date Range Comparison

Previously, PIP compared dates using signed branches, which could result in incorrect year comparisons. This problem has been corrected.

PIP has also been modified to allow two-digit year inferencing to be used between the years 1965—2064.

---

### 1.5.1.7 DMP Header ID area display

Previously, DMP when displaying header information would fail to translate the encoded year when displaying file header information. This problem has been corrected.

---

### 1.5.1.8 VMR TIM Command

Previously, the VMR TIM command would only accept the time using a 2 digit year format. This has been updated to allow for either a 2 or 4 digit year field.

VMR TIM has also been modified to allow two-digit year inferencing to be used between the years 1965—2064.

---

### 1.5.1.9 Macro-11 Listings

Previously, the MACRO-11 assembler would output the year in the listing file as a relative year from 1900. This would result in a year of 100 to be displayed for the year 2000. This problem has been corrected.

---

### 1.5.1.10 HELP Files

HELP files have been updated to include those areas where four digit dates are specified.

---

### 1.5.1.11 Layered Product Corrections

The description of the corrections for the layered products is given in Section 1.3.

---

## 1.5.2 Year 2000 Certification

For a description of the standards and certification performed for RSX-11M and RSX-11S, refer to Chapter 6 for a complete summary.

---

## 1.5.3 Inclusion of DCL DUMP command

DCL has been updated to include the DUMP command. Refer to the Documentation Changes section for information regarding the format of the command.

## 1.5.4 PIP Enhancements

PIP has been updated to allow the use of the /PAGE option when outputting a file to the user's terminal. When used, PIP will output the number of lines specified in the terminal characteristics, and prompt to continue. If the terminal does not support Get Multiple Characteristics, the default number of lines will be 24. This option is only applicable when typing a file out on the user's terminal.

Below is an example of the command:

```
>PIP TI:=FILE.TXT/PA
$ TYPE/PAGE FILE.TXT
```

## 1.5.5 RMDEMO Enhancements

RMD has been updated to allow the TOP command for the MD page. In addition to the FREE, and RATE options, the TOP option allows the memory display to be limited to a particular upper boundary. Below is a description of the command page and the subsequent display:

The following commands are available for this page:

```
FREE=ddn: to change free entry 'n' (1-4) to ddn:
RATE=s    to change replot rate to 's' seconds
TOP=nnn   to change the upper limit of displayed memory
```

<CR> to return

```
COMMAND > TOP=128
COMMAND >
```

```
RSX-11M V4.8 BL70      (RSX11M) 2044K      2-OCT-27 15:15:30
TASK= *IDLE*          FREE= SY0:64827. DL1:OFL
                       DL0:OFL      DU0:DMO      PARS
POOL=7360.:7460.:7.
      7360.:7460.:7.
IN:                   E E L T DM D V M P
4                     X X D T LU U F C U
20K                   C C R : :: : : R C
OUT:                  O O . . O
0                     M M . . M
OK                    1 2 . .
                       !===!>=====) )=)===)->-!!--
0*****6*****12*****18*****24*****30*****36*****42*****
E-----P-----CC--C--TT-----D-----T--C--C-----
-----T--D-----
48*****54*****60*****66*****72*****78*****84*****90*****
-----!===]->-----<----->
F R P . F ERRSEQ
C C M . 1 0.
S T T . 1
R . . R A
E . . M C
S . . D P
```

---

## 1.5.6 Virtual Device Subsystem

Support has been included into Version 4.8 which allows files, devices, or memory to be configured as a virtual disk device. Chapter 5 describes the functions and commands associated with virtual devices, and is intended as a supplement to the RSX documentation set.

The Virtual Device Driver (VFDRV), and Control Program (VCP) allow the user to create a disk, appearing as a single RSX device (VF:), from either a file located on a mounted Files-11 volume, a set of physical devices bound into volume set, or a dynamic common region.

The Virtual Device Subsystem has the following features:

- Create a virtual disk from a container file on a physical or another virtual disk
- Create a bound volume set from two or more physical devices, accessed as a single virtual disk
- Create a virtual disk from a dynamic common memory region
- Create image copies of disks or tapes
- Hierarchical structure prevents inappropriate deletion or dismounting
- Permits dynamic expansion of the number of virtual units
- Provides diagnostic capabilities

To include the virtual disk subsystem, add VF as one of the devices when prompted

\* 15. Devices [S]:

in the Target Configuration section of SYSGEN Phase I.

---

## 1.5.7 Enhancements to MCR DEVICE command

The MCR DEVICE, and DCL SHOW DEVICE commands have been enhanced with the following additional switches:

**Table 1-2 DEVICE command—Additional Switch Description**

Switch	Meaning
/MOU	Display only mounted devices
/FUL	Include additional information regarding mounted devices
/ERR	Display only devices which have errors logged
/MAS	Display only mass storage devices

```
>DEV /ERR
```

```
$ SHOW DEV/ERR
```

```
DR0: Public Mounted Loaded Label=RSXM68 Type=RM80  
Free_blocks=119920. Trans_count=9. Errors=1.(soft)/0.(hard)
```

## RSX-11M New Features, Restrictions, and Supplementary Information

This example shows that DR0: has logged errors. The display format is identical to the output for mounted volumes when using the "/FUL" switch.

```
>DEV VF: /MOU
$ SHOW DEVICE/MOUNTED VF:
VF0: Public Mounted Loaded Label=SBINT26JAN90 Type=UTIL43
VF1: Public Mounted Loaded Label=11M_MASTER Type=RP06
VF2: Public Mounted Loaded Label=RMS11_MASTER Type=RM05
$
```

This example displays only the mounted virtual disks which are currently active on the system. All disconnected devices, and those which are not currently mounted are omitted from the display.

---

### 1.5.8 Enhancement to DUDRV to allow for large disks

MSCPDRV has been enhanced to allow for drives which are larger than 8 million blocks to be supported by the system. If a drive is greater than 8,388,591 blocks, the driver will automatically truncate the drive to the largest supported drive size.

---

## 1.6 Software Problems Corrected in Version 4.8

This section describes software problems corrected in Version 4.8, other than those previously described associated with the year 2000.

---

### 1.6.1 Backup and Restore Utility (BRU) Corrections

The following corrections have been made to the BRU utility.

---

#### 1.6.1.1 BRU Error on Tape Dismount

Dismounting a drive after a multivolume tape backup caused the following error message:

```
DMO -- I/O error on MU0:
```

This problem occurred because of an operational change in an earlier release. This change was implemented to prevent appending a backup set to a multivolume set, since BRU cannot restore backup sets that do not start on the first tape volume. To enforce this, the last tape was rewound and unloaded. When DISMOUNT subsequently attempts to dismount the tape, it is already offline. This problem has now been fixed.

---

#### 1.6.1.2 Tape Error Reported when No Files Found

When BRU read a tape and none of the files selected were found on the tape, it would report a tape error and not the correct "No files found" error. This has been corrected.

---

#### 1.6.1.3 BRU Could Not Abort When Used With a TK50

Previously, BRU could not be aborted when used with a TK50. Issuing a Ctrl/C key sequence followed by an ABO BRUT0 command resulted in BRU being marked for abort. However, BRU did not abort. You had to reboot the system to stop the BRU operation. This problem has been fixed.

## RSX-11M New Features, Restrictions, and Supplementary Information

---

### 1.6.1.4 Invalid Date or Time Error with /REVISED

When using the /REVISED switch, BRU issued the following error message on files that contained no revision date:

```
BRU --- *WARNING* --- Invalid date or time (filename)
```

This problem has been fixed.

---

### 1.6.1.5 Improperly terminated tape during Incremental Backup

During a BRU incremental backup with the following command, with no files after the specified date, BRU did not properly terminate the tape:

```
BRU /MOU/REW/TAP:label/BAC:name/REV:AFT:date DU1: MUO:
```

Without the /VER switch, BRU gave the message "No files found" and then appeared to terminate normally. A following "BRU /REW/DIR/BAC:name MUO:", gives the following error messages:

```
*FATAL* -- Tape read error  
I/O error code -10
```

With the /VER switch, BRU returned the following messages after the end of the writing pass:

```
*WARNING* -- EOT marker error  
I/O error code -4  
Mount another tape  
Mount Tape 1 on MUO:
```

BRU repeatedly issued the "Mount Tape 1 on MUO:" message.

These problems have been corrected.

---

## 1.6.2 VFY Incorrectly reports End of File on BIT.TMP

VFY would, under certain circumstances on disks with more than 1 million blocks, report the following error:

```
VFY - I/O error on input file  
DU0:[0,0]BIT.TMP--end of file detected
```

This has been corrected for this release.

---

## 1.6.3 Corrections to Peripheral Interchange Program (PIP)

The following corrections have been made to the PIP utility.

---

### 1.6.3.1 Allocation Failure on Files >32767 Blocks Does Not Delete File

During a PIP copy operation, if an allocation failure occurred creating files larger than 32767 blocks, the partial file would not have been deleted. This problem has been corrected.

---

### 1.6.3.2 PIP Fails to Delete Large Contiguous File after Allocation Failure

When requesting PIP to create a file to be contiguous with a file size of 32767<sub>10</sub> blocks (77777<sub>8</sub>) or less, PIP does not create the file and issues the following error message when there is not enough contiguous space:

```
PIP -- Allocation failure - no contiguous space
```

However, when the requested file size is 32768<sub>10</sub> blocks (100000<sub>8</sub>) or larger, PIP creates the file with zero blocks but still issues the same error message when there is not enough contiguous space. This has been corrected.

---

### 1.6.3.3 The year 2028 was considered the lowest possible year

When using the /DD:range option with PIP, the year is stored into a byte and subsequently compared to determine if the date is in the correct range.

This comparison was checked with a signed branch which could result in the year 2028 being the lowest possible year, rather than 1900. This problem has been corrected.

---

## 1.6.4 Corrections to Error Logging

This section describes corrections to error logging.

---

### 1.6.4.1 Undefined Format Code 11 Error Causes RPT to Abort

RPT would abort with an Undefined Format Code 11. This was caused by the incorrect processing of MSCP information messages. This has been corrected to report the correct information where appropriate.

---

### 1.6.4.2 Error Logging Support for PDP-11/84 and Later Processors

Previously, the system would not recognize a PDP-11/84 and other newer processors as valid device types when entered in the error logging tune command file, as shown in the following example:

```
UTRPSU$ * Enter CPU type [S]: 11/84
UTRPSU$ ;
UTRPSU$ ;      Unrecognized CPU type 11/84 - Please enter again
UTRPSU$ ;
UTRPSU$ * Enter CPU type [S]: 11/83
UTRPSU$ ;
UTRPSU$ ;      Now enter the devices in your configuration separated by
UTRPSU$ ;      commas
```

The TUNE.CMD file has been updated to include the PDP-11/84 and newer CPUs as valid.

---

### 1.6.4.3 Support for Inputting Lower-Case Characters in TUNE.CMD

Previously, the TUNE.CMD command file did not allow the user to enter the device names using lower-case characters. Now, both upper and lower-case characters are permitted.

## RSX-11M New Features, Restrictions, and Supplementary Information

---

### 1.6.4.4 ELI Aborts with More than 35 Devices

Due to lack of size in some internal tables, ELI would abort if there were more than 35 mass storage devices. The tables have been extended and the problem resolved.

---

### 1.6.4.5 RPT incorrectly handles dates after 2000

Previously, RPT would not allow dates after 2000 to be specified when specifying a date range, and would also sign extend the year field for dates after 2027.

This problem has been corrected.

---

## 1.7 Software Problems and Restrictions in Version 4.8

This section describes software problems and restrictions that have not been corrected for Version 4.8.

---

### 1.7.1 VT Terminal Support

While the system will recognize the VT300, 400 and 500 series terminals with a SET TERM/INQ command, these terminals will be treated as if they are VT2xx series terminals. None of the additional features of these terminals are supported by RSX and its utilities, although this will not preclude individual applications determining the exact terminal type and using the additional features directly

---

### 1.7.2 Error Logging Restrictions

This section describes restrictions to Error Logging.

---

#### 1.7.2.1 Support for Error Logging History Summaries

Error logging history summaries are no longer supported. See Section 4.7.

---

### 1.7.3 Tasks Hang When Attaching to A Terminal Already Attached to a Task

Tasks would occasionally hang when they attempted to attach a terminal that was already attached to another task. The attach QIO request never returned and the task had to be manually aborted.

As a workaround, the Marktime directive (MRKT\$) can be used to implement a timeout function within the application code. If the attach function is issued as a QIOW, you can precede it with a MRKT\$ directive, specifying the same event flag number using the I/O status block to distinguish between timeouts (IS.PND) and I/O completion (other values). Alternatively, the MRKT\$ directive can specify an AST routine to be entered at the expiration of the timer with a CMKT immediately following the QIOW. There are other workarounds such as using WTLO or WTSE with QIO and MRKT\$ directives. In these workarounds, the expiration of the time interval without I/O completion would signal the need for an I/O kill to be issued.



---

### 1.7.4 ELI/SH Reports No Errors if ELI/NOLIM Has Been Set

If error log limiting has been disabled with the ELI /NOLIM switch, then subsequent hard errors are not displayed by the ELI /SH switch even though a full report generated with RPT shows that device hard errors have been logged.

This restriction remains.

---

### 1.7.5 Problem with Unused Terminal Ports

The system can crash or suffer performance problems if there are unused terminal ports with cables connected to them. This can be eliminated by preferably removing the unused cables or setting the unused ports to a slaved state.

---

### 1.7.6 Task Builder (TKB) Restriction

To obtain the long version of the memory allocation file (map) when building an I&D task, you should specify only the /-SH switch (the DCL /LONG qualifier) after the map file in the command line. The /MA switch (the DCL /MAP qualifier) should not be specified with the /-SH switch for I&D tasks.

---

### 1.7.7 FCSRES Restriction

Because the File Control Services Resident Library Routines (FCSRES) enhancement adds approximately 60<sub>10</sub> 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 Task Builder ODL file.

For further information on the changes incorporated into FCSRES, refer to section Section 1.11.

---

## 1.8 Supplementary System Generation, Programming, and Device Information

The following sections contain useful information about system generation, programming, devices, and restrictions.

---

### 1.8.1 Supplementary Information on Changes in the Distribution Kit and System Generation

The following changes were made in the distribution kit prior to Version 4.5:

- The procedure for copying the baseline system from the distribution kits to a disk was simplified. The baseline system includes an indirect command file called TAPEKIT.COMD, which guides you through the copying process.

## RSX-11M New Features, Restrictions, and Supplementary Information

- For standalone system generations, the default control and status register (CSR) address that the Standalone Configuration and Disk Sizing Program (CNF) expects for MT-type devices was changed. Also, default values were added for MU-type devices.
- References in a previous release to an RC25 disk kit and an RC25-specific big disk magnetic tape kit were incorrect. Support for system generations targeted to RC25 system disks is provided in the magnetic tape distribution kit.
- References in a previous release to an RP07 big disk magnetic tape kit were incorrect. There is no support for system generation targeted to an RP07.

---

### 1.8.2 Using Logical Names in Performing a System Generation on a VAX-11 RSX Host

Because physical device names on VAX VMS systems are longer than those on RSX systems, the complete physical device name is not recognized by the SYSGEN procedure or RSX utilities such as the Backup and Restore Utility (BRU). This limitation is overcome by using what is known as a \$\$n logical name to refer to the device.

The \$\$n logical names are defined for the devices on your VAX VMS system or VAXcluster by VAX-11 RSX when it is started. Please see the *VAX-11 RSX Installation Guide* and the *VAX-11 RSX Release Notes* for additional information on how the \$\$n names for your system are defined. Section 2.7 of the *VAX-11 RSX Compatibility Mode Reference Manual* provides more detailed information on \$\$n logical names.

The \$\$n logical name for a device should be used in place of the VMS physical device name wherever a device specification is required. You can determine which \$\$n logical names correspond to the devices you are using with the following command:

```
>SHOW LOGICAL $$*
```

The following example illustrates how \$\$n names are used to copy a magnetic tape distribution kit and to prepare to invoke SYSGEN on a VAXcluster. The tape used is a TA78 on an HSC controller and the disk used is a local RK07 on controller B.

## RSX-11M New Features, Restrictions, and Supplementary Information

```
>SHOW LOGICAL $$*
(LNM$PROCESS_TABLE)
(LNM$JOB_803299A0)
(LNM$GROUP_000301)
(LNM$SYSTEM_TABLE)
  "$$0" = "ALEX$DMA0:"
  "$$12" = "ALEX$DMB1:"
  "$$11" = "BLKHOL$MUA1:"
  "$$13" = "SYS$SPECIFIC:"
  "$$14" = "SYS$COMMON:"
  "$$16" = "BLKHOL$MUA0"
  "$$2" = "ALEX$MMA0:"
  "$$3" = "BLKHOL$DUA0:"
  "$$4" = "BLKHOL$DUA4:"
  "$$5" = "BLKHOL$DUA5:"
  "$$6" = "BLKHOL$DUA6:"
  "$$7" = "BLKHOL$DUA7:"
>MOU $$16:/FOR
>MOU $$12:/FOR
>BAD $$12:/LIST
>BRU
BRU>/DENSITY:1600/VERIFY/INITIALIZE/BAC:DMSYS
From:  $$16:
To"    $$12:
BRU - Starting Tape 1 on $$16:
BRU - End of Tape 1 on $$16:
BRU - Starting verify pass Tape 1 on $$16:
BRU - End of Tape 1 on $$16:
BRU - Completed
BRU>[CTRL/Z]
>DMO $$12:/NOUNLOAD
>MOU $$12:RSXM70
>SET DEF $$12:
>SET /UIC=[200,200]
>@TAPEKIT
```

Although using the \$\$n logical name is recommended, because it allows the use of any device on the system, it is not necessary in all cases.

If the devices you are using to copy the distribution kit and perform the SYSGEN are on controller A (the first controller for that device type) and they are local to the system you are using (not on another system or HSC in a VAXcluster), you may simply use an abbreviated form of the device name that omits the controller letter and node name. For example, the devices that appear in the SHOW LOGICAL display above as ALEX\$MMA0: and ALEX\$DMA0: may be referred to as MM0: and DM0:, respectively.

---

### 1.8.3 Copying the RSX-11M Distribution Tape on a VAX-11 RSX Host

When you use TAPEKIT.CMD to copy the distribution kit on a VAX-11 RSX host, the command procedure asks several questions regarding the target volume and the location of the distribution kit. The answers to these questions inform the system of the type of kit you are using and determine the actions TAPEKIT.CMD will take.

The device \$\$12: in the example in the preceding section is an RK07 disk drive, and the device \$\$16: is a TA78 tape drive, which supports 1600 and 6250 bpi tape densities. Because TAPEKIT.CMD cannot determine the device type from the \$\$n: form of device mnemonic, you must supply that information. The following example is an excerpt from the execution of

## RSX-11M New Features, Restrictions, and Supplementary Information

TAPEKIT.CMD on a VAX-11 RSX host illustrates the correct responses to the questions asked.

```
> @TAPEKIT
> i
> i RSX-11M V4.8 BL70 tape distribution kit extraction procedure
> i Started on 22-Mar-93 at 13:58:46
> i
> * Enter device and unit for disk(s) [ddn:] [S]:$$12:
> * Enter device type [dd] [S]:DM
> * Enter disk type, RK06 or RK07[D:RK07]
> i
> * Enter drive and unit with tape distribution kit [ddn:] [S]:$16:
> * Enter device type [dd] [S]:MU
> i
> i Copying rest of RSXM70 to $12: . . .
> i
```

This example shows that only one disk volume was needed to copy the distribution kit from a 1600 BPI tape.

---

### 1.8.4 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. 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 Type	Printer Type
124.	LN03
125.	LA50
126.	LA100
127.	LN01

If you have an LN03 printer connected to terminal line TT6, use the command shown in the following examples to initialize the print processor:

```
> QUE TT6:/SP/FO:124./FL:1/LOWER 
$ 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:

## RSX-11M New Features, Restrictions, and Supplementary Information

Form Type	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 a 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 printer, use the commands shown in the following examples:

```
> PRI /FO:3.=TEST.LST [RET]
> PRI /FO:4.=TEST.TXT [RET]

$ PRINT/FORM:3 TEST.LST [RET]
$ PRINT/FORM:4 TEST.TXT [RET]
```

**Note:** Before using these commands, you must assign the default print queue, PRINT, to the processor handling the LA50 printer.

### 1.8.4.1 Modifying Printer Support

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

- Change the form types that are used to represent printer types.

To do this, 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 from 124 to 127<sub>10</sub>.

- Change the form types that are used to represent document types.

To do this, 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 from 3 to 6<sub>10</sub>. 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.)

- 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 of 3 to 6<sub>10</sub> or from 124 to 127<sub>10</sub>.

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 from 3 to 6<sub>10</sub>.

## 1.8.5 System Generation Restrictions

The following sections describe restrictions that apply to performing a Version 4.8 system generation.

For system generation information about specific devices, see Section 1.8.6 and Section 1.8.7.

## RSX-11M New Features, Restrictions, and Supplementary Information

---

### 1.8.5.1 Minimum Requirements for System Generation and Installation

To meet minimum requirements, the host computer for system generation must:

- 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)

---

### 1.8.5.2 SYSGEN Invokes VMR when Using a VAX-11 RSX Host

VMR is invoked automatically by SYSGEN when using a VAX-11 RSX host to perform an RSX-11M system generation.

---

### 1.8.5.3 Copying the Distribution Tape to Disk

You must mount the target disk with the /FOREIGN switch before using BRU to copy the distribution tape to the target disk with an RSX-11M-PLUS or VAX-11/RSX host.

---

### 1.8.5.4 Saved Answer Files

A Version 4.7 saved answer file (SYSSAVED.COMD) can be used when generating an RSX-11M Version 4.8 operating system. These files are upwardly compatible.

**Note: If you are using Version 4.4 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.**

---

### 1.8.5.5 GBLDEF Enhancement

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

---

## 1.8.6 System Generation Device Restrictions and Supplementary Information

The following subsections contain information about restrictions applying to certain devices when performing system generation.

---

### 1.8.6.1 LPA-11K Device Restrictions for System Generation

The following restrictions apply to the LPA-11K, an LA-type device:

- SYSGEN does not support fully the use of saved answers for the LPA-11K; therefore, questions will be asked during SYSGEN that must be answered in order for the SYSGEN to continue.
- When you use a VAX-11 host to generate systems that contain both Industrial Control System and Industrial Control Remote (ICS/ICR) support and LPA-11K devices, the task build of the ICS/ICR common fails because the symbol TKL, which is used to access the Task Builder, was deassigned when the LPA-11K device support was processed.

## RSX-11M New Features, Restrictions, and Supplementary Information

To solve this problem, pause SYSGEN at the next end-of-section breakpoint and then task build the common manually. Alternatively, you can mount the distribution disk as shareable and then task build ICOM manually from another terminal.

---

### 1.8.6.2 MSCP Device Restrictions for System Generation

The following restrictions apply to Mass Storage Control Protocol (MSCP) devices for RSX-11M Version 4.6 and later:

- The partition PUCOM for the MSCP-type device driver common may be created in the SYSVMR.COMD file with an incorrect size. This occurs because the task image size that is required for the partition varies according to device configuration and the system options.

To solve this problem, you must obtain the map for the PUCOM partition and examine the task image size to determine the partition size that is needed. You must then edit the SYSVMR.COMD file to use the correct size for the PUCOM partition. Then run VMR on the system image.

It is suggested that you pause SYSGEN before running VMR to examine the SYSVMR.COMD file and the PUCOM.MAP file for differences in the task image size.

- There is a restriction in the configurations for MSCP-type disk devices supported by SYSGEN. SYSGEN creates the device database by using the physical unit number 0 for the first unit on the first controller that is specified; then SYSGEN increments the physical unit number sequentially for all subsequent units and controllers. Because of this, the physical unit numbers are assigned sequentially in the order that the controllers are specified, starting with zero. Controllers must be specified in the order of the physical unit numbers attached, beginning with the controller used by physical unit number 0. The physical unit number is often determined and displayed by a plug or thumbwheel switch attached to the device unit.
- There is a restriction on the size a disk device to a maximum number of blocks not greater than 8,388,591 blocks. Any device which is larger than this size will be truncated to the maximum number of blocks allowed.

---

### 1.8.6.3 Indirect Command Processor Restrictions

Some configurations of RSX-11M may require the use of the ICX variant of the Indirect Command Processor. If your configuration requires ICX and you do not use ICX when you generate your system, you will receive a symbol table overflow error. Note that baseline systems for Version 4.8 use the ICX variant as the default.

For online system generations, remove AT. and then install INS \$ICX. Note that ICX is a privileged task with executive mapping. It must be linked with the executive being used for the online SYSGEN. For this reason, ICX is built as part of all V4.7, and V4.8 SYSGENs. In order to use ICX with other, previous versions of RSX, it must first be manually rebuilt.

---

## 1.8.7 Supplementary Information on Device Support

See the appropriate *RSX-11M Software Product Description (SPD)* for a list of supported devices on RSX-11M.

## RSX-11M New Features, Restrictions, and Supplementary Information

---

### 1.8.7.1 Device Support for RA70 and RA90 Disk Drives and for SA550 and SA650 Arrays

The RA70 and RA90 disk drives in the SA650 disk array have been supported since Version 4.6.

Both the SA550 disk arrays and the SA650 disk arrays are supported. The SA550 disk array contains RA70 and RA82 disk drives. The SA650 disk array contains RA70 and RA90 disk drives.

Error logging support has been added for RA70 and RA90 disk drives (in SA550 and SA650 arrays only).

---

### 1.8.7.2 VT300,400,500-series Terminal Functions in VT200 Mode

In RSX-11M Version 4.6 and later, the VT300-series terminals are supported in VT200 mode only. Additional support has been added in RSX-11M Version 4.8 for VT400, and VT500 series terminals in VT200 mode. Note that you cannot specify VT300, VT400, VT500 as a terminal type with the MCR SET/VTxxx=TI: command or the DCL SET TERMINAL/VTxxx command.

To set VT200 mode for your terminal, press the Set-Up key. Then press the Enter key until the display indicates VTxxx mode.

Use the right arrow key to light up the panel indicating VTxxx mode. Then press the Enter key again until the panel indicates VT200 mode.

Next, use the right arrow key to light up the panel indicating SAVE and press the Enter key. This will preserve the setting when you log out. To exit from the Set-Up Directory, press the Set-Up, or F3 key.

---

### 1.8.7.3 CXF32/DHF11 Module Support

The CXF32/DHF11 32-line serial line unit is a quad-height asynchronous terminal interface using fiber-optic technology to link the computer to the terminal concentrator boxes.

The CXF32/DHF11 device appears to the system as two separate 16-line devices, each emulating a CXA16 multiplexer. The device has two switch packs that enable you to select the starting control and status register (CSR) and interrupt vector addresses. The second set of CSR and vector addresses is automatically set by the device logic.

For example, if the CSR address is set to 160500 for the first 16 lines, the CSR address for the second 16 lines is set automatically to 160520. The same principle applies to the vector addresses: if the first 16 lines have the interrupt vector set to 300, then the second 16 lines will have an interrupt vector address of 310.

---

### 1.8.7.4 CXA16, CXB16, and CXY08 Multiplexer Support

The operating system includes support for CXA16, CXB16, and CXY08 multiplexers. However, although the CXY08 supports remote (dial-up) terminal lines, the system generation procedure (SYSGEN) does not assign these terminal lines automatically.



## RSX-11M New Features, Restrictions, and Supplementary Information

If you require support for remote lines, use SYSGEN to include the CXY08 controller in your target configuration. Then use the Monitor Console Routine (MCR) or Virtual Monitor Console Routine (VMR) command SET/REMOTE to assign the remote lines.

---

### 1.8.7.5 Terminal Driver Support

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.

---

### 1.8.7.6 Asynchronous Terminal Interfaces Support

RSX-11M supports the YV device for the DHV11 and DHU11 multiplexers. The DHV11 is a Q-bus multiplexer that handles 8 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. RSX-11M also supports the YZ device for the DZQ11 Q-bus multiplexer.

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### 1.8.7.7 J11-Series Processor Support

RSX-11M supports the J11-series processors, the PDP-11/84, the PDP-11/94, the MicroPDP-11/93, the MicroPDP-11/53, the MicroPDP-11/73, MicroPDP-11/83, and the Mentec M-Series processors. The LSI-11/73 processor is supported subject to the restrictions indicated in Section 1.8.8.8.

---

### 1.8.7.8 Large Disk Support

Large disk support has been included for the following RSX-11M tasks and utilities:

- Backup and Restore Utility (BRU)
- Files-11 Ancillary Control Processor (F11ACP)
- File Structure Verification utility (VFY)
- INITVOLUME (INI)
- Peripheral Interchange Program (PIP)

This support allows Files-11 initialization and access to disks that contain more than 1,044,480 logical blocks but fewer than 8,388,591 logical blocks. Although the Files-11 architecture allows for devices up to approx 16 million blocks, this is not supported for use.

---

### 1.8.7.9 BRU64K Device Support

The support for MU-type devices was added to BRU64K in RSX-11M Version 4.4.

## RSX-11M New Features, Restrictions, and Supplementary Information

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### 1.8.7.10 Network Command Terminal Support

Network Command Terminal (NCT) must be selected during system generation if you want to execute the MCR command SET/HOST (DCL command SET HOST) 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 the DECnet package 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 a VMS system. Many of the NCT features, such as turning on/off terminal features, are also available to RSX systems without the DECnet package software.

NCT requires that input flow control be present.

---

### 1.8.7.11 Devices and Products No Longer Supported

The operating system 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.

Other products no longer supported since Versions 4.5 and later of RSX-11M operating systems include the following:

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

---

## 1.8.8 Hardware Restrictions

The following are restrictions to hardware supported by the RSX-11M Version 4.6 and later operating system.

---

### 1.8.8.1 RX50/RX33 Diskette Restriction

The RX50 and RX33 diskettes do not have a Bad Block Replacement Control Task (RCT) area. This means that bad blocks on these devices are not replaced and blocks that become bad during the use of the disk are not written to the bad block file [0,0]BADBLK.SYS.

---

### 1.8.8.2 Transportability Among 22-Bit Systems

The RSX-11M operating system supports transportability among all 22-bit systems. These systems may differ: the Executive may handle nonprocessor request (NPR) transfers by performing memory management functions, or the hardware may have 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.

---

### 1.8.8.3 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, RK07, RM03, RM05, or RM80 device. This problem occurs if the bootstrap driver encounters an error correction code (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 it never succeeds.

To recover from this error, use the Peripheral Interchange Program (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.

---

### 1.8.8.4 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 Ctrl/4, and then press the Return key.

The LK201 keyboard generates the American Standard Code for Information Interchange (ASCII) control characters 033 to 037<sub>8</sub> with Ctrl/3 to Ctrl/7.

---

### 1.8.8.5 DLVJ1 Four-Line Terminal Interface Restriction

Due to hardware restrictions, errors may result when the DLVJ1 four-line terminal interface is configured with an RQDX1 controller or additional DLVJ1 modules.

---

### 1.8.8.6 RQDX1 Controller Restriction

Only one RQDX1 controller is supported per system.

---

### 1.8.8.7 TK50/TZ30/TLZ07/TZ87 Restriction

If the TK50, TLZ07, TZ87 or TZ30 magnetic tape cartridge is used with utilities other than the Backup and Restore Utility (BRU), degraded performance may result.

---

### 1.8.8.8 LSI-11/73 Processor Restriction

The LSI-11/73 processor is supported only when used in the following two configurations:

- 1 (Not supported with the RQDX1 controller)
  - KDJ11-A processor module
  - MRV11-D memory module with a MXV11-B2 boot read-only memory (ROM) set
  - DLVJ1 4-line terminal interface
- 2 (Supports only one DL11-type interface when using half-duplex terminal driver)
  - KDJ11-A processor module
  - MXV11-BF multifunction module with MXV11-B2 multifunction module with MXV11-B2 boot ROM set

## RSX-11M New Features, Restrictions, and Supplementary Information

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### 1.8.8.9 KDJ11-E TOY Clock Restrictions

The KDJ11-E processors have issues with the use of the console monitor Version 1.06 and the usage of the TOY clock.

These issues are summarized below:

- The year 2000 is not considered to be a leap year.
- The only dates which are valid range from 1-JAN-1990 through 31-DEC-2009.
- The day of the week may not be calculated correctly beyond the year 2000.
- Invalid dates will result in the date being reset to 1990.

These issues can only be worked around by using the MCR TIME or DCL SET TIME commands. If the system is rebooted at a time when the current date/time fall into an illegal range, the date will be retrieved as being 1990.

At that time, the user must specify the correct date and time, and include the "/SETTOY" option to reset the date and time to the current values.

**KDJ11-E Firmware Version 2.01: A new release of the console firmware has been released, and certified for RSX-11M/RSX-11S V4.8, and should be available through your *Digital Field Service Representative*, or *Hardware Supplier*. This version of the firmware is required for Year 2000 Readiness.**

---

## 1.9 Executive Supplementary Information

The following sections contain supplementary information on the Executive.

---

### 1.9.1 Executive Code Changes

The following changes have been made to the Executive:

- 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 previous RSX releases. 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<sub>8</sub> and 140000<sub>8</sub>.

If the entry points are inaccessible to a task because they reside in the Executive commons, you can make them accessible by writing 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 that have been moved into the commons. Their existence is transparent to any task referencing them.

- The RSXMC.MAC symbol P\$SD70, which indicated cache memory on a 22-bit processor, has been changed to C\$SCHE.

## RSX-11M New Features, Restrictions, and Supplementary Information

- The RSXMC.MAC symbol V\$\$RSN, which indicates the current version number has been changed from octal to decimal, due to the current version numbering for RSX-11M/RSX-11S. This change does not affect RSX-11M-PLUS, or Micro/RSX.

---

### 1.9.2 Executive Data Structure Changes

The following changes have been made to the Executive data structure:

- To enhance asynchronous buffered I/O, 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 (OCB) is used to contain a secondary exit status, the Task Termination Notification program (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 command line interpreter (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 Unit Control Block (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 to 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 CLI Parser Block for the CLI (CPB). 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.

---

### 1.9.3 I/O Data Structure Changes

The following changes have been made to the I/O data structure:

- The bit DV.MXD in offset U.CW1 of the UCB 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 control and status register (CSR) of an associated DM11BB. In Version 4.0, these two words were eliminated. The information is contained in fork block offsets in the Status Control Block (SCB).

---

### 1.10 Supplementary Information on the MAKESTK.COMD Command File

The command file MAKESTK.COMD uses the Task/File Patch Program (ZAP) to create a version of the Slow Task Builder (STK) in LB:[1,54] from the existing Task Builder file (TKB.TSK). When executed, the procedure checks the LB:[1,54]TKB.TSK image file to see if it was built against the File Control Services Resident Library Routines (FCSRES).

Previously, the MAKESTK.COMD procedure required the parameter RES to indicate that the Task Builder (TKB) that was being used to make STK had been built against FCSRES. The new MAKESTK.COMD procedure automatically determines if FCSRES was used to build TKB and uses one set of values if FCSRES was used and another if FCSRES was not used.

MAKESTK.COMD returns an informational message if it discovers that the version of TKB from which you are making STK has been built against FCSRES. If the version of TKB from which you are making STK has not been built against FCSRES, it returns the following message:

```
ZAP -- Verify failure
```

This message is the result of MAKESTK.COMD using ZAP to test TKB and does not indicate a failure. MAKESTK.COMD also verifies that ZAP is installed and, if not, exits with an error message.

---

#### 1.10.1 FCSRES and FCSFSL

FCSFSL is not supported on RSX-11M as a supervisor mode library. It is included, and may be used for the purpose of linking a "flat" FCSRES into a task which allows for 8.KW to be used to map the library. It should be linked using either the LIBR, or RESLIB options.

```
TKB>/  
TKB>LIBR=FCSFSL:RO
```

FCSRES and FCSFSL are merged into a single vectored-entry memory image that can be used in either of the 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).

## RSX-11M New Features, Restrictions, and Supplementary Information

To supply the two different descriptions but use the same library image, TKB 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 the files remain in directory [1,1]. The FCSFSL.TSK file size is considerably reduced.

**Note:** Like TKB, FTB also changes references to FCSFSL to FCSRES in the resulting executable task image.

---

### 1.11 System Library Routines Supplementary Information

A feature has been added to the directory parsing code in FCSRES.FCS. (FCSRES is the memory-resident version of the File Control Services (FCS) I/O routines.) 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 File Descriptor Block (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 except when the directory is obtained from the default name block. This occurs because the default name block does not contain the directory string. In this case, the directory length will be set to zero.

---

### 1.12 Device Drivers

The following sections include information on enhancements to device drivers, a restriction, and supplementary information.

---

#### 1.12.1 DU Driver Enhancement

The DU device driver has been enhanced to return more information in the IO.RSN (Read Serial Number) function. The added information is useful to the Bad Block Replacement Control Task (RCT). In addition to the volume serial number, the information returned now includes the controller identification number, the hardware and software version numbers of the controller, the unit identifier (device identification number), and the hardware and software version numbers of the device. RCT sends this information to the Error Logger. For more information on RCT, see the *RSX-11M/M-PLUS System Management Guide*.

## RSX-11M New Features, Restrictions, and Supplementary Information

The IQ.SEL (Suppress Error Logging), has been removed, and is no longer supported by DUDRV.

DUDRV will truncate devices which are greater than 8,388,591. blocks to this maximum drive size. This allows drives which exceed this maximum size to be used correctly by RSX-11M/RSX-11S.

---

### 1.12.2 Device Driver Restriction

The IO.EIO function will not work if your terminal has been set as a remote terminal (RT) to another system. After you enter the SET HOST xxxxx command and log in to an RT, the RT driver will reject a QIO that issues an extended I/O request from the RT.

---

### 1.12.3 TK50 Tape Subsystem Supplementary Information

RSX-11M supports the TK50 tape drive. The TK50 is an integrated subsystem that consists of a controller (for the Q-bus and UNIBUS) and a TK50 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.

If I/O commands are not issued to the tape unit quickly enough, the tape unit enters start/stop mode. While in start/stop mode, each I/O command issued incurs a time penalty (about 1 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. 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, rewound to the correct position on the tape.

It is this reposition operation that takes approximately 1 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 quickly enough.

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 I/O command is ready for processing. If it is, no more pad blocks are written and the host's I/O request is processed.

If the next host command is not ready, the controller writes out another pad block until either an I/O command is ready for processing or the number of consecutive pad blocks written reaches a maximum specified by the controller. In the latter case, the tape unit enters start/stop mode. When the next write command is issued, the controller repositions 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. The following section describes performance and capacity impact when you use RSX utilities with the TK50. The performance indicated is to be used only as a guideline. The timings given will vary according to system load, the type of disk used in disk/tape applications, and errors encountered on the tape.

---

### 1.12.3.1 TK50 Performance when Using RSX Utilities

This section describes anticipated timings for various RSX utilities. These are guidelines only; the actual times will vary according to system load, disk usage, and tape error correction codes (ECC) errors encountered.

**Note: The time values specified in this section are estimated values only. On your operating system, the amount of time that a utility needs to complete an operation may differ from these values.**

The information in Table 1-3 pertains to the use of the TK50 and RSX-11M utilities:

**Table 1-3 TK50 Performance and RSX Utilities**

RSX Utility	TK50 Performance
MOU	<p>The time required to mount a TK50 tape, either foreign or as an ANSI tape, 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 required to mount the tape can increase to as much as 2 minutes. This time is required for the actual rewind of the tape (approximately 1.6 minutes) followed by the calibration functions by the controller.</p> <p>When you insert a cartridge, the tape will be positioned at the beginning. Only rarely (for example, if the system crashes during a tape operation) is the tape left positioned near the end of a track.</p>
DMO	<p>When you dismount 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 1 second (the tape is at the beginning of a track) and 1.6 minutes (the tape is at the end of a track).</p>

## RSX-11M New Features, Restrictions, and Supplementary Information

**Table 1-3 (Cont.) TK50 Performance and RSX Utilities**

RSX Utility	TK50 Performance
BRU	<p>This utility will generally keep the TK50 in streaming mode during backup and restore operations. The exceptions to this are as follows:</p> <ul style="list-style-type: none"> <li>• 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 required for this operation is dependent on the number of directories contained on the input disk. This process can take from 1 to 10 minutes, based on the number of directories written.</li> <li>• BRU generally does not stream if there is a load on the system at the time BRU is run. This load will slow down BRU sufficiently so that it will not be able to issue commands to the TK50 drive quickly enough to keep it streaming.</li> <li>• Any use of the disk from which BRU is backing up or restoring to generally causes BRU to run the TK50 in the start/stop mode. The extra disk head movements add to BRU's processing time sufficiently so that it is not able to issue I/Os to the TK50 controller quickly enough to keep it in streaming mode.</li> <li>• BRU does not stream consistently during its verification pass. Modifications have been made to both BRU and the MU device driver to improve performance in verify and compare operations.</li> <li>• BRU does 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.</li> </ul> <p>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 listed previously occur. In a test case using a slow disk and running 40Mb of data, the save operation required 13 minutes, with the directory writes consuming 3 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 back up, BRU would have utilized approximately 83 percent of the total capacity (94Mb) of the tape. Such a capacity rating would allow the backing up of a 75Mb disk (<math>0.83 \times 94\text{Mb} = 78\text{Mb}</math>). In this test case, no verify operation was performed. However, the verify operation is estimated to take approximately 1 hour for this example.</p>
BRUSYS/BRU64K	<p>These utilities exhibit the same capacity and performance characteristics as online BRU.</p>
FLX	<p>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 to keep the tape streaming. Because it does not stream, the padding blocks added by the controller will be overwritten during the reposition operation. Tape capacity will not be diminished. A test case using 180 blocks contained in nine files was run, and FLX copied the files in 1.8 minutes.</p>

**Table 1-3 (Cont.) TK50 Performance and RSX Utilities**

RSX Utility	TK50 Performance
PIP	<p>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 to keep the tape streaming. Because it does not stream, the padding blocks added by the controller will be overwritten 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.</p> <p>An optimization 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 repositionings. The size of the block written to ANSI tape can be increased by using the /BS switch in PIP. A value up to 8192<sub>10</sub> bytes can be specified (the default is 512<sub>10</sub> 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.</p>

### 1.12.3.2 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 constantly, it indicates that the tape cartridge can be safely removed from the unit. If this indicator is blinking or if it is off, you cannot safely 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 1 second and then off for 1 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 pressing the LOAD/UNLOAD switch twice. Note that this will cause a loss of tape position.

### 1.12.4 Supplementary Information on User-Written Device Drivers

The following sections contain supplementary information on user-written device drivers.

---

### 1.12.4.1 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.

By using the \$TSTBF, \$INIBF, and \$QUEBF routines 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.

Second, 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 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. The \$IOFIN routine completes the processing.

These routines are not always present in a generated system. 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.

---

### 1.12.4.2 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. Nonsequential completion occurs when the very last request in the queue is a non-hardware-oriented I/O request. In this case, the non-hardware-oriented I/O completes before any others waiting for completion. There are many types of non-hardware-oriented I/O operations, 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.

---

## 1.13 I/O Operations

The following sections contain information, restrictions, and supplementary information on I/O operations.

---

### 1.13.1 Crash Driver Modification for 4Mb-Memory Systems

The MU routine in the crash driver has been modified to control the size of the memory dump in systems with 4Mb of memory. The crash driver now monitors the amount of memory dumped and terminates the dump when it reaches 2044K words of memory.

---

### 1.13.2 I/O Operations Restrictions

The following sections describe I/O operations restrictions.

---

#### 1.13.2.1 Multibuffer Processing in Random Mode

Multibuffering 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.

---

#### 1.13.2.2 Big Buffering in Random Mode

When you use 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\$ operations 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 Allocate enough space to make writing an extension unnecessary.
- 2 Issue a .FLUSH directive after the highest numbered record is written by a PUT\$ operation.
- 3 After a PUT\$ operation, do not issue any GET\$ operation that could cause the file to extend.

---

#### 1.13.2.3 Block Size on Tapes Mounted with the /NOLABEL Qualifier

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:

- The tape is mounted with the /NOLABEL qualifier.
- The MOUNT command specifies an odd record size.
- The MOUNT command specifies an odd block size.

File Control Services (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.

---

### 1.13.3 I/O Operations Supplementary Information

The following sections contain supplementary information on I/O operations.

---

### 1.13.3.1 Support for Using FCS to Queue Files for Printing

File Control Services (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 format is shown next.

**PRINT\$ fdb,err,,dev,unit,pri,forms,copies,presrv**

The parameter fdb is the address of the associated File Descriptor Block (FDB). This parameter need not be present if the address of the associated FDB is already in R0.

---

### 1.13.3.2 File Attribute Codes

The Magnetic Tape Ancillary Control Processor (MTAACP) supports new file attribute codes for the dates of creation, revision, expiration, and backup of the file. 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.

---

## 1.14 Error Logging Enhancements, Restrictions, and Supplementary Information

The following sections contain descriptions of an enhancement and a restriction and supplementary information on the Error Logging system.

---

### 1.14.1 Bad Block Replacement Enhancement

Since Version 4.5, the Bad Block Replacement algorithm of the Error Logging system has been modified to support the latest Mass Storage Control Protocol (MSCP) Disk Storage Architecture specification.

The number of bad block replacement messages that appear in the error log reports has been reduced, and the existing messages contain more information pertaining to the hardware and the block replacement status. In addition, the *Bad Block Replacement Attempt* message, which appears in the Entry Type column in brief- and full-format reports, has been changed to *RCT Device Error*.

---

### 1.14.2 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 APR5 because that active page register (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.

---

### 1.14.3 Supplementary Information on Error Logging

The following sections contain supplementary information on Error Logging.

---

#### 1.14.3.1 Possible Error in Error Logging History Summary

The History qualifier documents the History Summary Report in Section 3.3.3.4 of the *RSX-11M/M-PLUS Error Logging Reference Manual*, as the following:

```
RPT generates a summary report sorted by device error history. It displays the hard and soft error count and QIO count for every volume on each device.
```

The history summary database within the Report Generator (RPT), which is created by the /HISTORY qualifier, is updated by only a MOUNT, DISMOUNT, or ERROR\_LOGGING RESET record. Errors were noted that were for devices showing errors that were not followed by such a RESET record within the specified date/time range to force updates of the counts. The omitted device was mounted before the range and remained mounted for the entire duration. Thus, there was no record created for the device in the history summary database even though the device reported errors during the selection range. Also, the QIO counts were wrong because they were not updated after the last MOUNT record.

The use of a date/time range may make the history summary more prone to error.

The history summary information is valid only when there is a MOUNT (or RESET) followed by device activity followed by a DISMOUNT (or RESET) with no activity outside that interval. It seems likely that devices mounted before Error Logging is activated, or left mounted when it is turned off, will not be properly displayed in the history summary.

Also, any selection by date/time selection is likely to lead to more or less glaring errors in the history summary report.

This problem may be fixed in a later release.

---

#### 1.14.3.2 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.



---

### 1.15 Previously Documented Supplementary Software Information

#### 1.15.1 Disk Save and Compress Utility

Version 4.6 of RSX-11M was the last release to have the Disk Save and Compress utility (DSC) included on the software kit. Any data currently saved on media by the DSC utility will have to be restored using the DSC utility and then resaved using the Backup and Restore Utility (BRU). Beginning with Version 4.7, customers will have to use the save and compression features of BRU.

---

#### 1.15.2 File Control Services Changes Supplementary Information

File Control Services (FCS) has been modified to support VMS ancillary control process (ACP) functions that are needed for compatibility with future RSX products and versions of VAX-11 RSX. These modifications increase the size of the FCS code that is included in the task image. Because the increase in FCS code size may affect the building of some large tasks, FCS routine versions that do not have VMS ACP support are included in the object library [1,1]NOVACPLIB.OLB and in the concatenated object module [1,1]FCSNOVACP.OBS.

Some large tasks that have a complicated Overlay Description Language (ODL) may be affected by the internal reorganization of specific FCS modules. This situation is indicated by “multiply defined symbol” errors occurring in ODL structures that were previously valid. You must correct the situation by revising the ODL structure.

The object library [1,1]NOVACPLIB.OLB can be used to build individual tasks that do not have VMS ACP support. The default routines in the system library remain unchanged. If you replace the routines in the system library (SYSLIB) with the routines from the concatenated object module [1,1]FCSNOVACP.OBS, you will affect all the tasks that are built using the system library, and you will be unable to build tasks with VMS ACP support.

If this support is not desired, it can be removed from the system library. The concatenated object module [1,1]FCSNOVACP.OBS is included on the kits and contains the affected modules with the support removed. To remove this support from your system, replace [1,1]FCSNOVACP.OBS in the system library by using the following Librarian utility program (LBR) command:

```
LBR>[1,1]SYSLIB/RP=[1,1]FCSNOVACP.OBS 
```

If you also want to remove extended logical name support from the system library by replacing [1,1]FCSNOLOG.OBS in the system library, you must first replace FCSNOVACP.OBS. Some of the same modules are affected by both extended logical name support and VMS ACP support, and the modules are included in both of the concatenated object modules. If FCSNOLOG.OBS is replaced first, some modules in the system library will contain extended logical name support when FCSNOVACP is replaced because the modules in FCSNOVACP.OBS contain extended logical name support.



# 2

---

## RSX-11S New Features, Restrictions, and Supplementary Information

This chapter describes new features, corrections and device support, restrictions and provides supplementary information. Supplementary information is data that has appeared in previous release notes but is still applicable to the operating system. Section 2.1 summarizes new features. Section 2.2 lists the media on which the operating system is available. Section 2.2.1 and Section 1.4 deal with the hardware devices supported. Subsequent sections provide supplementary information and describe restrictions on individual operating-system components.

Information on individual system components is divided into three categories:

New features and enhancements	Describes new features and enhancements to existing features for Version 4.8.
Restrictions	Describes restrictions to software performance.
Supplementary information	Describes software changes that were documented in previous release notes and other information that is not included in the RSX-11S Version 4.2 documentation set but is still applicable to the software.

If no new information or restrictions are provided for a component, that component is unchanged in Version 4.8.

---

### 2.1 Summary of New Features

The changes to the RSX-11S operating system for Version 4.8 and previous versions are described throughout this chapter by operating-system component. Version 4.8 changes are summarized here as follows:

- Additional corrections for year 2000 support and beyond.
- Support for the RZ26x, RZ29B, and Setasi RM06 devices.
- Mentec M-Series Processors.

---

### 2.2 The Distribution Kit Media

The RSX-11S Version 4.8 operating system is distributed on the following media:

- One 9-track, 1600-bpi, 2400-foot magnetic tape
- One TK50 tape cartridge

---

#### 2.2.1 Supplementary Information on Device Support

See the appropriate *RSX-11S Software Product Description (SPD)* for a list of supported devices on RSX-11S.

---

### 2.3 Restrictions

The following restrictions apply to the RSX-11S Version 4.8 operating system:

- 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 by the Online Task Loader (OTL) from any Mass Storage Control Protocol (MSCP) fixed disk device. However, fixed disk devices are supported for standard I/O operations.

---

### 2.4 New Hardware Support in Version 4.8

The following new devices are supported:

- RZ26L (1.05Gb, using RQZX1 controller)
- RZ29B (4.3 Gb, using RQZX1 controller)
- Setasi RM06 (using RH11/RH70 controller)
- TLZ07 and TZ87 tape drives (using RQZX1 controller)
- MENTEC M-Series processors:
  - M70 (DCJ11 based) )
  - M80 (DCJ11 based) )
  - M90 (DCJ11 based) )
  - M100 (DCJ11 based) )
  - M11 (DCJ11 emulation) )

---

#### 2.4.1 RZ26L, RZ29B, Setasi RM06, TZ87 and TLZ07 Device Support

Support has been added in SYSGEN, ACF, and the Executive where needed for the TZ87, TLZ07 tape devices, and the RZ26L, RZ29B , and SETASI RM06 disk devices. The SETASI RM06 disk drive is a massbus drive which supports various disk sizes. The system automatically determines the size when the device is brought online or mounted.

**Caution: ANSI tape processing for information interchange is not supported on any RQZX1 controller tape drive, including the TZ30, TLZ07, and TZ87.**

---

#### 2.4.2 Supplementary Hardware Information

For a complete list of hardware supported by Version 4.8, refer to the *Software Product Description*.

---

## 2.5 Software Enhancements for Version 4.8

This section describes software enhancements added to Version 4.8.

---

### 2.5.1 Additional changes for Year 2000

The following components have been updated to expand support for the year 2000:

- MCR
  - TIM

---

#### 2.5.1.1 Support for Year 2000 in Date Format

The RSX operating systems have been changed to support dates beyond the year 2000. Generally, RSX treats the current year as a two-digit field. The following areas of the RSX system have been changed:

- Input—All areas of the system that allow input of a date will now accept two different forms of date input. First, the traditional date format of dd-mmm-yy (or mm/dd/yy for TIM) will still be accepted. These dates will be considered as a window occurring between the years 1965 and 2064. In addition, the date may now be specified as dd-mmm-yyyy or (mm/dd/yyyy for TIM only), to allow the system to recognize dates outside this window.
- Output—In order to preserve compatibility in applications that parse the output of system commands, the format of date output will not be changed. All places that output the date as 2 digits will continue to do so, representing 2000 as 00, and so forth. Places that currently output the date as 4 digits will still output the date as 4 digits. Some utilities allow for a switch, such as PIP "/Y4", to display years as four digits.
- Internal representations—As documented for the GTIMS directive, the year field of time vectors is the number of years since 1900. This is still accurate. This field will reach 100(10) in the year 2000.

---

#### 2.5.1.2 MCR TIM Command

The TIM command has been modified to infer the century from the year retrieved from the Time of Year (TOY) clock. The valid range of dates which are supported for Version 4.8 is from 1965 through 2064.

Previously, the TIM command incorrectly set the number of days per month, which resulted in all months having thirty one days, unless the STIMS directive was issued. This issue has been corrected.

In BASMCR, there was a correction to allow the input of four digit dates, which was incomplete. The result was that BASMCR could not set the date beyond 1999. It should also be noted that BASMCR has never set the days per month value in the executive, and this will continue to be a restriction.

In addition, the display from time has been updated to display the year in four digit format.

## RSX-11S New Features, Restrictions, and Supplementary Information

---

### 2.5.2 Year 2000 Certification

For a description of the standards and certification performed for RSX-11M and RSX-11S, refer to Chapter 6 for a complete summary.

---

### 2.5.3 Enhancement to DUDRV to allow for large disks

MSCPDRV has been enhanced to allow for drives which are larger than 8 million blocks to be supported by the system. If a drive is greater than 8,388,591 blocks, the driver will automatically truncate the drive to the largest supported drive size.

---

## 2.6 Software Problems Corrected in Version 4.8

This section describes software problems corrected in Version 4.8, other than those previously described associated with the year 2000.

---

### 2.6.1 OTL Returned an Error When Trying to Load NCP/EVC

The Online Task Loader (OTL) under RSX-11S Version 4.5 reported an error when attempting to load DECnet-11S Version 4.3 tasks. When attempting to load NCP or EVC from an RX50, OTL returned error code 42, "Not enough APRs for task image." This resulted when loading a privileged task that overmapped the I/O page, because the module OTLLB.MAC reserved an APR for mapping the I/O page.

This problem has been fixed.

---

## 2.7 Software Problems and Restrictions in Version 4.8

This section describes software problems and restrictions that have not been corrected for Version 4.8.

---

### 2.7.1 Tasks Hang When Attaching to A Terminal Already Attached to a Task

Tasks would occasionally hang when they attempted to attach a terminal that was already attached to another task. The attach QIO request never returned and the task had to be manually aborted.

As a workaround, the Marktime directive (MRKT\$) can be used to implement a timeout function within the application code. If the attach function is issued as a QIOW, you can precede it with a MRKT\$ directive, specifying the same event flag number using the I/O status block to distinguish between timeouts (IS.PND) and I/O completion (other values). Alternatively, the MRKT\$ directive can specify an AST routine to be entered at the expiration of the timer with a CMKT immediately following the QIOW. There are other workarounds such as using WTLO or WTSE with QIO and MRKT\$ directives. In these workarounds, the expiration of the time interval without I/O completion would signal the need for an I/O kill to be issued.

---

### 2.7.2 Problem with Unused Terminal Ports

The system can crash or suffer performance problems if there are unused terminal ports with cables connected to them. This can be eliminated by preferably removing the unused cables or setting the unused ports to a slaved state.

---

## 2.8 Software Problems Corrected Since Version 4.5

The software problems described in the following subsections were corrected since the release of RSX-11S Version 4.5.

---

### 2.8.1 INITL Module Fails to Clear Certain Memory Locations on Boot

A problem was noted with the INITL module in system code. INITL failed to clear certain memory locations during a boot operation and failed to size memory correctly if a parity error occurred at a 2K boundary.

A more specific description of the problem is as follows. INITL used the size of memory in 32K-word blocks that was contained in the location `$$SYSIZ`. The value in `$$SYSIZ` was obtained from a system generation query to the user about the size of memory. INITL then used this value as the location from which to start clearing memory. The problem occurred because some uncleared memory existed between the system image and the memory location specified in `$$SYSIZ`. These memory locations could contain parity errors.

The solution to the problem is as follows. The location `$$SYSIZ+10` contains the size of the system image in 256-word blocks if the system is booted by the BOO task or down-line loaded by DECnet. The value in this location is now used to ensure that all of memory is cleared. If the system was booted by other means, which does not place a value in `$$SYSIZ+10`, the code in INITL uses the value stored in `$$SYSIZ` as before. In this case, the user must ensure that the value specified in `$$SYSIZ` matches the size of the system image to avoid a potential problem.

---

### 2.8.2 OTL Corrupts System After Task Load Error in Undersized Partition

A problem was noted with using the On-line Task Loader (OTL) to load a task in a partition too small to contain it.

A more specific description of the problem is as follows. If you used OTL to load a task into a separate task partition too small to hold it, OTL reported the error *Partition too small*. Subsequent OTL requests for the same task get the error *Partition not in system* and then other privileged tasks (such as RSD) sometimes crashed the system.

The problem related to the error cleanup routines that deallocated Partition Control Blocks (PCBs) for tasks in a system-controlled partition. The routines did not function correctly for separate task PCBs that had their pool space deallocated but still linked into the system PCB list. These routines were corrected for Version 4.6 of the system.





# 3

---

## RMS-11 Version 2.0 Release Notes

This chapter describes RMS-11 corrections to the software, restrictions, and supplementary information.

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 RMS-11 Enhancements

RMS-11 has included the following enhancements:

- Include support for century inferencing within utilities
- Correct input date parsing to allow years beyond 1999.

These enhancements are described fully in Section 3.4.

---

### 3.2 RMS-11 Corrections

The following sections describe corrections for RMS-11.

---

#### 3.2.1 RMS-11 Local Access

RMS-11 applications, which performed multistreaming asynchronous record operations resulting in a high rate of competition for the same buckets, encountered the following set of problems:

- Executing a breakpoint trap in RMS modules R0RLSB and R0RSET.
- Looping indefinitely in RMS modules R0RSET and R0RLCH.
- Stalling indefinitely while waiting for the RMS event flag.
- Receiving “Dynamic Memory Exhausted” error (ER\$DME) on a \$FIND, \$GET, \$PUT, \$UPDATE or \$DELETE operations, which are operations that do not require new use of dynamic memory.
- Receiving “Bucket Header Checkbyte” error (ER\$CHK) when, in fact, the file does not have this problem.

The problems in the preceding list have been corrected.

---

#### 3.2.2 Partial Block Writes with Block I/O

Applications based on RMS-11 that used block I/O and attempted to execute partial block writes to an RP03 drive previously failed when the data length was not double-word aligned. RMS-11 returned primary status (STS) as ER\$WER (write error) and secondary status (STV) as IE.BYT (Illegal byte count for I/O). RMS-11 applications perform partial writes on the last block

of a file in order to have RMS-11 properly record the end-of-file attribute. However, RMS-11 was not rounding up to the double-word boundary as required for the RP03.

This problem, which affected the DECnet file transfer partners Network File Transfer (NFT), File Access Listener (FAL), and the RMS-11 utilities, has now been corrected.

---

### 3.3 Restrictions to RMS-11 Remote Access Methods (RMSDAP)

The following sections describe restrictions to RMS-11 Remote Access Methods.

---

#### 3.3.1 DAP Date Restrictions

The DAP specification limits the date range available for remote files. The Data Access Protocol (DAP) specifies a date range of 1970 through 2069. Files which have creation or revision dates outside of this range will not be interpreted correctly.

---

#### 3.3.2 Incorrect Interpretation of Keysize Field Values

RMSDAP does not interpret a keysize field value of zero correctly. This causes keyed access to a remote indexed file to fail. The application passes the value zero for access to a non-string key and issues the following error message:

```
ER$RNF (Record not found)
```

If your program is written in F77 or other high-level languages, you may have to use a USEROPEN routine in order to be able to set this value.

---

#### 3.3.3 Using RMSDAP on Your System

The RMSDAP provided on your system uses a 576 byte buffer for transfers between your program's record/user buffer and your DECnet-RSX system network buffer. This buffer must be large enough to hold the record and the DAP message overhead (approximately 36 bytes). In certain rare cases, this buffer length may be insufficient.

In particular, if you access a sequential variable file with a Maximum Record Size (MRS) of zero (used when no maximum has been set), and the sum of the largest record length (LRL) and the DAP message overhead exceeds the 576 byte length, your record access will fail with the RMS error, ER\$MRS. This occurs because RMSDAP functions at a DAP protocol level that does not allow reconfiguration of buffersize without actually closing and reopening the file (and that is an unacceptable alternative for RMSDAP). If it is within your control to create the remote file, then an explicit MRS should be used. If not, the local RMSDAP buffer can be lengthened by the system manager (prior to run time) depending on the following considerations:

- If your program was built with in-task RMSDAP, consult your map to determine the location of the variable \$BUF.M (current contents 1100 octal) in the module R0NFRT in your application. After saving a copy of your application, ZAP the desired buffer length (including DAP overhead) into your application. This change will only affect your application.

- If your program was built against the DAPRES library, consult the map (LB:[1,34]DAPRES.MAP) and determine the location of \$BUF.M in module R0NFRT. Remove the DAPRES from memory. After saving a copy of LB:[1,1]DAPRES.TSK, ZAP in the desired buffersize. Reinstall the DAPRES library. This change will affect all programs built and run against the DAPRES library.

In both cases the increased size of the buffer will be reflected in the size of your RMSDAP applications.

**Note: Network transfers rely on configuration of local RMSDAP and DECnet-RSX network buffers as well as remote FAL and DECnet-RSX network buffers. In all negotiations, the smaller buffer length is used. If your local RMSDAP buffer size exceeds the local DECnet-RSX buffer, the remote FAL, or the remote network buffer size the excess will be unusable, thus effectively eliminating the workaround.**

---

## 3.4 Corrections to RMS-11 Utilities

The following sections describe corrections to RMS-11 utilities. The corrections are listed by utility.

All utilities have been enhanced to support century inferencing, and support for four digit years. Dates may be input to utilities in one of the following formats:

- DD-MMM-YY
- DD-MMM-YYYY
- YYYY-MM-DD

The first format shows the standard date input, and the two digit year will be inferred to be in the range of 1965 through 2064. The second format allow a full year specification to be used, and allows the year to be in the range from 1900 through 2155. The third format conforms to ISO 8601:1988 format, and allows the year to be in the range from 1900 through 2155.

---

### 3.4.1 RMSIFL Correction

RMSIFL failed to correctly report exit status when errors occurred while loading a file with more than one alternate key. Once the first alternate key had been loaded without errors, internal exit status was set to success. Any errors on subsequent keys were not reflected in the final exit status of the task. This could cause command files or batch jobs to function incorrectly. This problem has now been corrected.

RMSIFL incorrectly determined exception records when the key was packed decimal and the value was negative. This problem has been corrected.

---

### 3.4.2 RMSDES Correction

RMSDES incorrectly shared channels between several commands. This resulted in the GET and SAVE commands using improper default devices (where explicit devices did not exist in the design buffer or in the actual command). The default device would have been set to LB: if HELP had been requested, or to either SY: or an explicit device when a CREATE command had been issued. The lack of an explicit device should have resulted in the GET or SAVE command using the SY: device. This problem has been corrected.

---

### 3.4.3 RMSBCK Corrections

RMSBCK failed to correctly back up more than one file to a tape container when the date qualifiers (/CD or /RD) were used. Task exit status reported failure; however, the summary listing for the file container reported no errors. Each file after the first file was not actually backed up (the header for the file was backed up, but no data was present). A summary listing would claim that all blocks were backed up. An ensuing restore operation would produce empty files. This problem has been corrected so that the date switch no longer interferes with the backup.

The utility failed to query the user about continuation in some cases in which read/write errors were discovered. The query is now performed.

RMSBCK skipped files whose attributes could not be backed up (due to I/O errors); however, these files were reported as fully backed up. These output files are now reported correctly as empty files.

Backup sets created on RSX-11M, or octal-based RSX-11M-PLUS systems, were restored with incorrect version numbers. Backup incorrectly assumed that the source file came from a system that used decimal-based version numbers. For example: file FOO.DAT;10 was restored as FOO.DAT;12 even though both the input and output systems used octal-based version numbers. When this same file was restored to an RSX-11M-PLUS system, which supported decimal-based version numbers, the version number remained FOO.DAT;10 rather than being converted to FOO.DAT;8. This problem did not exist if the input system supported decimal-based version numbers. This problem has been corrected.

---

### 3.4.4 RMSRST Corrections

RMSRST failed to query the user about continuation where read/write errors were discovered.

The utility did not count write errors in the summary listing. Exit status was reported as failure; however, the summary listing reported "no errors."

RMSRST ignored certain information in backup when creating output files. This caused the files to misrepresent the Longest Record Length (LRL) for the file. Some applications depend on this field to set up minimum-sized buffers. RMS-11 (or remote RMS implementations) reported "record too big for buffer" when attempting record-mode access on the file.

---

### 3.4.5 Additional Corrections to Three Utilities

RMSDSP, RMSBCK, and RMSRST have been fixed to accept extended logical names. Previously, these utilities did not accept logical names containing an underscore ( \_ ) or a dollar sign ( \$ ) if the logical name was not followed by a colon. They will now accept these characters as well as the dollar sign or a number as the first character of a logical name. The logical name need not be followed by a colon.

Parsing problems were corrected across several utilities.

---

## 3.5 RMS-11 Supplementary Information

The following section describes information that has been documented in the previous release notes.

---

### 3.5.1 Building Combined Supervisor Mode and Remote Access RMS Programs

A new Overlay Description Language (ODL) file has been added to simplify the building of RMS programs that combine supervisor mode RMS with remote access RMS (DAPRES). The file is LB:[1,1]DAPSLX.ODL.

---

### 3.5.2 Enhancements to RMSDES Utility

The following enhancements have been made to the RMSDES utility:

- There are two additional RMSDES commands: SAVE\_S[UPERSEDE] and EXIT\_S[UPERSEDE].
- RMSDES issues the warning message “%DES-W-CBK, Continuation buckets will be allocated for this key” when continuation buckets are required. (Continuation buckets may result in decreased performance; see the *RSX-11M/M-PLUS RMS-11 User's Guide*.)
- The informational message “?DES-F-VOR, Value out of legal range” is issued if overflow occurs during calculations of indexed file area allocations. Also, the “Number of duplicates:” prompt has been expanded to “Number of duplicates per record on this key:” for clarity.
- The new error message “%DES-F-NHF, Help file is not available. Check release notes for the location of RMSDES.IDX on your installation media.” is issued if the help file LB:[1,2]RMSDES.IDX is not found. This is a feature for small systems that have limited disk space.

---

## 3.6 RMS-11 Restrictions

The following sections describe software restrictions that apply to RMS-11 Version 2.0.

## RMS-11 Version 2.0 Release Notes

---

### 3.6.1 RMS-11 Local Access

When accessing a date XAB for a file, if the year of the requested information is greater than 2036, the results will not be correct, and will roll back to 1900.

---

### 3.6.2 Restrictions to RMS-11 Utilities

The following sections describe restrictions to the RMS-11 utilities for Version 2.0.

---

#### 3.6.2.1 RMSIFL Restrictions

RMSIFL uses a sort algorithm that, when called upon to sort on a key, does not preserve the first-in/first-out (FIFO) ordering of duplicates. 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.

---

#### 3.6.2.2 RMSCNV Restriction

RMSCNV ignores user-provided area extension quantities when loading a file. The values that are used are large enough to reduce the number of file extensions in most cases.

---

#### 3.6.2.3 RMSDSP Restriction

RMSDSP is restricted by the operating system attributes as to the maximum valid date which is displayed for a file's creation and revision dates. For RSX-11M, the maximum year allowed in a file header date field is 2036.

---

### 3.6.3 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 the next section and go to Section 3.6.3.2.

---

#### 3.6.3.1 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.COMD. This procedure is fully documented in the *RSX-11M System Generation and Installation Guide*.

---

#### 3.6.3.2 Startup Command Procedures

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

You must allocate a partition for each resident library you specify by using the SET command. You must allocate a partition called RMSRES, and you must 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 performing the following steps:

- 1 Use the SET commands to include the necessary partitions.
- 2 Use the INSTALL commands to install the tasks in the running system.
- 3 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.

---

### 3.6.3.3 Utility Configurations

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

---

### 3.6.3.4 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 as follows:

Utility	Files
RMSBCK	BCKNON.COMD, BCKNON.ODL, and RMSODL.ODL
RMSRST	RSTNON.COMD, RSTNON.ODL, and RMSODL.ODL
RMSCNV	CNVNON.COMD and CNVNON.ODL
RMSDSP	DSPNRN.COMD, DSPNON.ODL, and RMSODL.ODL
RMSDES	DESNON.COMD and DESNON.ODL
RMSDEF	DEFNON.COMD, DEFNON.ODL, and RMSODL.ODL
RMSIFL	IFLNON.COMD and IFLNON.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:

## RMS-11 Version 2.0 Release Notes

Utility	Files
RMSBCK	BCKNRN.CMD and BCKNRN.ODL
RMSRST	RSTNRN.CMD and RSTNRN.ODL
RMSCNV	CNVNRN.CMD and CNVNRN.ODL
RMSDSP	DSPNRN.CMD and DSPNRN.ODL

  

Utility	Files
RMSDES	DESNRN.CMD and DESNRN.ODL
RMSDEF	DEFNRN.CMD and DEFNRN.ODL
RMSIFL	IFLNRN.CMD and IFLNRN.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 files CNVNRN.CMD and CNVNRN.ODL. To build RMSCNV using disk-overlaid RMS-11 and RMSDAP, use files CNVNOO.CMD and CNVNOO.ODL.

### 3.6.3.5 Rebuilding the Utilities

To rebuild the utilities, perform the following steps:

- 1 Log in to a privileged account.
- 2 Set your default account to directory [1,24] on the system disk.
- 3 Use the Task Builder (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.

### 3.6.4 Files and Placement on the Distribution Kit

The following list 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.
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]	RMSBCK 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.



## RMS-11 Version 2.0 Release Notes

File Name	Destination	Comments
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.
R0RMS1.MAC	LB:[1,1]	For use with the prototype ODL.
RMS11S.ODL	LB:[1,1]	ODL file for sequential file organization.
RMS12S.ODL	LB:[1,1]	ODL file for sequential file organization.
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]	Map file for DAPRES
RMSRES.CMD	LB:[1,24]	For rebuilding RMSRES.
RMSRES.ODL		
DAPRES.CMD	LB:[1,24]	For rebuilding DAPRES.
DAPRES.ODL		
BCKNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSBCK.
BCKNON.ODL		
BCKNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSBCK.
BCKNRN.ODL		
CNVNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSCNV.
CNVNON.ODL		
CNVNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSCNV.
CNVNRN.ODL		
CNVNOO.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSCNV including the overlaid remote access code RMSDAP.
CNVNOO.ODL		
CNVNRR.CMD	LB:[1,24]	For rebuilding the resident library version of RMSCNV including resident library remote access code DAPRES.
CNVNRR.ODL		
DEFNON.CMD	LB:[1,24]	For rebuilding the overlaid version of RMSDEF.
DEFNON.ODL		
DEFNRN.CMD	LB:[1,24]	For rebuilding the resident library version of RMSDEF.
DEFNRN.ODL		

## RMS-11 Version 2.0 Release Notes

File Name	Destination	Comments
DESNON.CMD DESNON.ODL	LB:[1,24]	For rebuilding the overlaid version of RMSDES.
DSPNON.CMD DSPNON.ODL	LB:[1,24]	For rebuilding the overlaid version of RMSDSP.
DSPNRN.CMD DSPNRN.ODL	LB:[1,24]	For rebuilding the resident library version of RMSDSP.
IFLNON.CMD IFLNON.ODL	LB:[1,24]	For rebuilding the overlaid version of RMSIFL.
IFLNRN.CMD IFLNRN.ODL	LB:[1,24]	For rebuilding the resident library version of RMSIFL.
RSTNON.CMD RSTNON.ODL	LB:[1,24]	For rebuilding the overlaid version of RMSRST.
RSTNRN.CMD RSTNRN.ODL	LB:[1,24]	For rebuilding the resident library version of RMSRST.
RMSUTL.OLB RMSODL.ODL	LB:[1,24]	For rebuilding several utilities.
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 SEARCH.MAC RENAME.MAC ERASE.MAC PARSE.TSK SEARCH.TSK RENAME.TSK ERASE.TSK	LB:[200,1]	Demonstration programs for the new directory and wildcarding facilities.

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

### 3.6.5 Reporting Problems

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

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 or files and, if so, include the version number and patch level of the language.
- 3 Include a Postmortem Dump (PMD) 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).
- 4 Include a copy or copies of the file or files 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 or lines or interactive session that led to the error (for RMS-11 utilities).
- 7 Include a listing of the actual error, if possible.



# 4

## Documentation Corrections

This chapter describes errors and omissions in the RSX-11M, RSX-11S, and RMS-11 documentation sets. The chapter is organized according to the titles of manuals, and the information that needs correction is listed by its section number in the manual.

### 4.1 IAS/RSX-11 System Library Routines Reference Manual

Please make the following corrections to the manual:

- 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	Module Name	Routine Name
PUR\$D	CAT5B (data)	\$CAT5B
	EDTMG (data)	\$EDTMG
PUR\$I	CAT5B (instruction)	\$CAT5B
	EDTMG (instruction)	\$EDTMG

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

A documentation error occurs in the *IAS/RSX Library Routines Reference Manual*. The following is documented in error in Table 6-1 for the \$EDMSG routine:

Table 4-1 Table 6-1 \$EDMSG Routine Editing Directives

Directive	Form	Operation
X	%X	Converts a Radix-50 filename string in ARGBLK to an ASCII string in the format name.typ; converts the octal version number, if present, to ASCII and stores the results in OUTBLK.
X	%nX	Converts the next n Radix-50 filename strings in ARGBLK to ASCII strings in the format name.typ; converts octal version numbers, if present, to ASCII and stores the results in OUTBLK; inserts a tab between strings.

## Documentation Corrections

**Table 4–1 (Cont.) Table 6–1 \$EDMSG Routine Editing Directives**

Directive	Form	Operation
X	%VX	Uses the value in the next word in ARGBLK as a repeat count, converts the specified number of Radix-50 filename strings to ASCII strings in the format name.typ; converts octal version numbers, if present, to ASCII and stores the results in OUTBLK; inserts a tab between strings.

The documentation must be corrected as follows:

**Table 4–2 Table 6–1 \$EDMSG Routine Editing Directives**

Directive	Form	Operation
X	X	Converts Radix-50 filename string in ARGBLK to an ASCII string in the format name.typ; converts a version number, if non-zero, to an ASCII decimal string if decimal version support is selected in your system. Otherwise the version number is converted to an ASCII octal string. If the version number is zero, no version number is put into OUTBLK; stores the results in OUTBLK.
X	%nX	Converts the next n Radix-50 filename strings in ARGBLK to ASCII strings in format "name.typ"; converts the version numbers, if non-zero, to ASCII decimal strings if decimal version support is selected in your system; otherwise version numbers are converted to ASCII octal strings. If a version number is zero, no version is put into OUTBLK for that filename string. Stores the results in OUTBLK and inserts a tab between strings.
X	%VX	Uses the value in the next word in ARGBLK as a repeat count, converts the specified number of Radix-50 filename strings to ASCII strings in the format "name.typ"; converts version numbers, if non-zero, to ASCII decimal strings if the decimal version support is selected in your system. Otherwise version numbers are converted to ASCII octal strings. If a version number is zero, no version is put into OUTBLK for that filename string. Stores the results in OUTBLK and inserts a tab between strings.

### Key

ARGBLK = The argument block containing the binary data to be converted, the addresses of ASCII and extended ASCII characters or the address of a double precision value.

OUTBLK = The output block in which \$EDMSG is to store output.

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

- In Section 8.5.2, page 8–24, entitled “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.

---

#### 4.1.1 Additional System Library Routines

The following routines have been included as dummy entry points in SYSLIB for RSX–11M/RSX–11S, which have also been included into FCSRES for compatability with RSX–11M–PLUS and Micro/RSX:

\$DAT1	This routine defaults to the standard \$DAT routine and is intended to output the date in ISO 8601 format.
\$DAT4	This routine defaults to the standard \$DAT routine and is intended to output the date in four digit format.
\$CBDT4	This routine defaults to the standard \$CBDAT routine and is intended to output the year in four digit format if the value is greater than 1900.
\$DATS	This routine defaults to the standard \$DAT routine and is intended to output the date in the sysgen selected manner.

---

## 4.2 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.

---

### 4.2.1 Changes to System Data Structures

The system data structures (control blocks) changed in 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, was not 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*.

---

### 4.2.2 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.

---

### 4.2.3 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.”

## Documentation Corrections

---

### 4.2.4 Text for Driver Initiator Section

Please add the following text to the end of Section 2.4.2, entitled “Post-Driver Initiation Services,” on pages 2–11 to 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
```

---

### 4.2.5 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
```

---

### 4.2.6 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=$USRFB:0
>;      If you are not including a resident data base,
>;      this line should be left in the file.
```

---

#### 4.2.7 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.

---

#### 4.2.8 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.

---

#### 4.2.9 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.

---

### 4.3 RSX–11M System Generation and Installation Guide

Please make the following changes to the manual:

- The first sentence at the top of page 2–5 should read “The BRU64K System – Each tape distribution kit contains a BRU64K system.” The next two sentences should be deleted.
- Item 1 on page 2–6 should begin with “Load the distribution tape on the appropriate tape drive” instead of “Load the BRU64K tape on the appropriate tape drive.” The next sentence, which is enclosed in parentheses, should be deleted.
- Item 2 on page 2–7 should state “Hardware bootstrap the distribution tape” instead of “Hardware bootstrap the BRU64K or BRUSYS tape.”

## Documentation Corrections

- Item 6 on page 2–8 should be deleted.

Note that the instructions for performing an RSX–11M system generation on a VMS host system running in VAX–11 RSX compatibility mode have been added to Chapter 2 of the *RSX–11M System Generation and Installation Guide*.

Also, the reference to RMS in Question 3 of the Executive Options section of SYSGEN Phase I has been removed. The Files–11 Ancillary Control Processor (F11ACP) supports file sharing and placement control, so SYSGEN asks this question if your system includes the F11ACP, regardless of whether your system also includes Record Management Services (RMS).

In the table on page 4–21, which shows the pseudo devices supported by RSX–11M, include the following entry:

VF Virtual Disk Device

In order to include support for virtual disks, specify VF as one of the devices selected in the target configuration.

---

### 4.4 RSX–11M–PLUS I/O Operations Reference Manual

Please add the following section after the first paragraph of Section G.5 of the *RSX–11M–PLUS I/O Operations Reference Manual*.

When a volume switch is requested, you may, by using the Magnetic Tape Control Task (MAG), 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 task also allows a magnetic tape to be initialized if a new tape is needed for output and no previously initialized tape is available.

---

### 4.5 RSX–11M/M–PLUS Batch and Queue Operations Manual

Please add the following changes to the manual:

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

```
DELETE/JOB queuefilename jobname[/FILE_POSITION:n]
```

- In Section 2.6.1, page 2–15, please add the following description of the `/ALL` qualifier to the SHOW QUEUE command:

Displays information on all entries in all queues.

- In Chapter 3, Section 3.8, note the following addition:

Any spooled output or maps are also appended to the print job that contains the log file. In addition, the print job also assumes the characteristics of the batch log.

---

## 4.6 RSX-11M/M-PLUS Command Language Manual

The following sections contain supplementary information and a restriction on the Digital Command Language (DCL) described in the *RSX-11M Command Language Manual*.

---

### 4.6.1 Description of DUMP command

Please add the following section immediately after Section 5.1.6 of the manual:

The DUMP command outputs files, and file headers in various formats specified on the command line. It can also be used to display specific blocks on a mass-storage device. The format and valid qualifiers are as follows:

**DUMP[/keyword[ . . . ]] file/device**

**Parameter**

**keyword**

Specifies the following qualifiers:

```

/ASCII
/BASE:n
/BLOCK:start[:end]
/BYTE
/DECIMAL
/DENSITY:value
/HEADER_FORMAT
/HEADER
/HEX
/IDENT
/LOGICAL_BLOCK
/LOWER_CASE
/LONGWORD
/MEMORY_DUMP:start
/OCTAL
/RECORD
/REWIND
/RAD50
/SPACE_BLOCKS:n
/SPACE_FILES:n
/[NO]PRINT
/OUTPUT:filespec

```

**file/device**

Specifies the input data file or device.

---

### 4.6.2 Corrections to /CREATED/BEFORE and /MODIFIED/BEFORE Qualifiers

On pages 5-73, 5-75, and 5-76, the /CREATED:BEFORE and /MODIFIED:BEFORE qualifiers to the BACKUP command are incorrect. The correct syntax is /CREATED/BEFORE and /MODIFIED/BEFORE.

---

### 4.6.3 BACKUP Command Qualifiers

Two new arguments have been added to the /COMPARE and /VERIFY qualifiers to the DCL command BACKUP in Section 5.10, page 5–81 of the *RSX-11M Command Language Manual*. The format for the arguments is as follows:

**BACKUP/COMPARE[:SINGLE\_BUFFER]**

**BACKUP/COMPARE[:DOUBLE\_BUFFER]**

**BACKUP/VERIFY[:SINGLE\_BUFFER]**

**BACKUP/VERIFY[:DOUBLE\_BUFFER]**

For a description of these arguments, see Section 4.16.1.3.

---

### 4.6.4 Underscore Character Permitted in BACKUP Command Qualifier

In Section 5.10, page 5–79 of the *RSX-11M Command Language Manual*, the /SAVE\_SET:name qualifier to the BACKUP command now permits the use of the underscore character (\_) in the parameter *name*.

---

### 4.6.5 ANALYZE/ERROR\_LOG Command

Please add the following section immediately after Section 5.1.6 of the manual:

The ANALYZE/ERROR\_LOG command analyzes and formats information about errors and events that occur on your system hardware. It also generates reports that contain information that can be used to repair your hardware. The format and valid qualifiers are as follows:

**ANALYZE/ERROR\_LOG[/keyword[ . . . ]] datafile**

#### Parameter

#### keyword

Specifies the following qualifiers:

/BRIEF

/COMMAND:n

/DEVICES[:(ddm:[, . . . ])]

/DEVICES[ALL]

/ENTRY

/FULL

/INCLUDE

/NODETAIL

/OUTPUT[:outfile]

/PREVIOUS\_DAYS=n

/REGISTERS

/SERIAL\_NUMBER:snum

/SINCE:(dd-mmm-yy[mm:ss]) or /SINCE:(dd-mmm-yyyy[mm:ss])

/THROUGH:(dd-mmm-yy[mm:ss]) or /THROUGH:(dd-mmm-yyyy[mm:ss])

/TODAY

/VOLUME\_LABEL:label

/[NO]WIDE

/YESTERDAY

**datafile**

Specifies the output data file.

#### 4.6.6 **/HEADERS:n and /MAXIMUM\_FILES:n Qualifiers in the DCL Command INITIALIZE**

The following listed changes should be made to the /HEADERS:n and /MAXIMUM\_FILES:n qualifiers in Section 5.9, which is the description of INITIALIZE command. Please make the following changes:

- In place of the text that explains the /HEADERS:n qualifier, please add the following:

Specifies the number of file headers to allocate initially in the index file. The five system files (INDEXF.SYS, BITMAP.SYS, BADBLK.SYS, CORIMG.SYS, and 000000.DIR) are not included in the value for /HEADERS.

The value used for /HEADERS:n is derived from the maximum number of file headers specified by /MAXIMUM\_FILES:n, with consideration for pre-extending the index file if the maximum number of file headers will require a multiheader index file (see the description of /MAXIMUM\_FILES:n for more information on multiheader index files). You can use Table 4–3 to determine an appropriate value to use for the /HEADERS:n parameter.

**Table 4–3 Number of Index File Headers**

Maximum Number of Files	Disk Size	Number of File Headers
Maximum files less than 25588	Disks less than 209 Mb	Headers=maximum/2
Maximum files greater than 25588 and less than 51176	Disks between 210Mb and 419Mb	Headers=25593
Maximum files greater than 51176 and less than 51693	Disks between 420Mb and 423Mb	Headers=25846
Maximum files greater than 51693 and less than 65500	Disks greater than 423Mb	Headers=51693

- Please replace the first two paragraphs after the /MAXIMUM\_FILES:n qualifier with the following paragraph and table:

The maximum number of files varies according to disk size. You may want to use the values in Table 4–4 as the default approximations:

**Table 4–4 Default Number of Files – Approximation**

Disk Size	Approximate Number of Files
Up to 64Mb	Calculate the maximum number of files using the formula following the table
From 64Mb to 532Mb	Specify the number of blocks divided by 16 as the maximum number of files

## Documentation Corrections

**Table 4-4 (Cont.) Default Number of Files – Approximation**

Disk Size	Approximate Number of Files
Greater than 532Mb	Specify 65500 as the maximum number of files

The default used for the maximum number of files is the theoretical maximum possible number of one-block files, divided by eight. The following formula calculates the theoretical maximum number of files:

$$\text{MAXIMUM FILES} = ((N - ((N + 4095.) / 4096.) + 9.) * 127.) / 258.$$

### 4.6.7 Unloading Magnetic Tape

In the *RSX-11M Command Language Manual*, please add the following section to the DISMOUNT command, Section 5.8, after the last paragraph in the description of the /[NO]UNLOAD qualifier.

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 causes a specific action other than the default.

## 4.7 RSX-11M/M-PLUS Error Logging Manual

Please make the following documentation changes:

- In Table 2-2, page 2-5, the following change must be made to the device entry for the control file module ETSV05:

TSV05 /TK25            ETSV05

- In Section 3.3.3.4, the /HISTORY qualifier does not always work as described in the following text:

“RPT generates a summary report sorted by device error history. It displays the hard and soft error count and QIO count for every volume on each device.”

The use of a date/time range may make the history summary more prone to error. The history summary information within the Report Generator (RPT) is valid only when there is a MOUNT (or RESET) followed by device activity, followed by a DISMOUNT (or RESET) with no activity outside that interval. It is likely that devices that are mounted before Error Logging is activated and that remain mounted for the duration, or are left mounted when Error Logging is turned off, will not be properly displayed in the history summary. No record will be created for those devices in the history summary database even if they reported errors during the selection range. This occurs because those devices were not followed by a RESET record within the specified date/time range to force updates of the counts. The QIO counts may also be wrong because they were not updated after the last MOUNT record.

- In Example A-1, page A-3, the following change must be made to the list of acceptable device names:

```
;      TSV05 or TK25
```

- In Section 3.5, please add the following error message:

ERLRPT-F-FORINVCHR, FORMAT error - Invalid character in string in !DP directive.

**Explanation:** A control file module executed a WRITE\_GROUP statement where the string in a !DP directive contained a nonprinting character.

**User Action:** Correct the user-written module or submit a Software Performance Report (SPR) for Digital-supplied modules.

- Please add the following information, which describes how to use the new error logging feature, to Section 4.5.3:

After you write the device level module or modules for your devices, compile the module with the DSP2P1.SYM file. Next, insert your module or modules in ERRLOG.ULB. Note that the name of a user-written module must be in the following format:

```
ExxUSR
```

The parameter xx represents the device mnemonic. Do not use a Digital-supplied device mnemonic as your device mnemonic.

Specify your module name in the MODULE statement in the following format:

```
MODULE ExxUSR
```

If there is a NOTES module, the NOTES module name must be in the following format:

```
NxxUSR
```

- 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$CCMD   ='B'    1 ; Error Log Control
E$SSSTA  ='B'    1 ; Error Log Status Change
E$SSWI   ='B'    2 ; Switch Logging Files
E$SSAPP  ='B'    3 ; Append File
E$SSBAC  ='B'    4 ; Declare Backup File
E$SSSHO  ='B'    5 ; Show
E$SSCHL  ='B'    6 ; Change Limits
E$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
```

## Documentation Corrections

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

---

### 4.8 RSX-11M/M-PLUS Guide to Program Development

In Chapter 6, Section 6.2.2, please make the following correction:

```
DCL>LINK/TA:SUPLIB/MAP:SUPLIB FILE, USROBJ/INC:(TTREAD,TTWRIT)
>
```

---

### 4.9 RSX-11M/M-PLUS I/O Drivers Reference Manual

Please make the following correction to the *RSX-11M/M-PLUS I/O Drivers Reference Manual*:

- In Section 2.4, the correct octal value for the terminal type T.V2xx is 36, not 35.
- Add the terminal type LA75 to Table 2-8 with the following values:

Octal Value	43
TC.SCP	
Symbol	T.LA75
Terminal Type	LA75
TC.LPP	66
TC.WID	80
TC.HFF	1
TC.HHT	1

---

### 4.10 RSX-11M/M-PLUS Indirect Command Processor Manual

The following sections describe a restriction and supplementary information for the Indirect Command Processor (Indirect) Library. Please add these sections to the manual at the end of Chapter 1:



### Indirect Restriction

If a module name referenced is greater than 6 characters, Indirect truncates the name to 6 characters. When a file name is truncated, Indirect returns the following error message:

```
AT. -- File not found
```

Indirect assumes that the module name you want to reference is only 6 characters long, because the module names are truncated to 6 characters by the Librarian Utility Program (LBR) when the files are included in the command library.

To avoid this problem, always specify a module name of 6 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.

### Indirect Command Processor Versions

RSX-11M Version 4.7 supports the following versions of the Indirect Command Processor:

ICX	Provides the full functionality of ICP using the overlay structure of ICQ built for a 12KB partition. This provides additional symbol space at the expense of possible additional overlay activity. ICX is the default for baseline systems. ICX is the only version shipped with baseline systems and is built but not installed automatically by Phase II of SYSGEN.
ICP	Contains the same functional parameters as the IND task released in Version 4.2. This version requires a 12Kb partition size and may be used for SYSGEN of configurations that do not require ICX. ICP is the default for production systems. ICP is the standard version of Indirect created during the Phase II privileged task build. Both ICX and ICP are included in the privileged task builds during Phase II of SYSGEN. ICP is automatically installed by SYSVMR as the default for production systems at the conclusion of SYSGEN. There is no File Control Services Resident Library Routines (FCSRES) version of this task.
ICQ	Specifies a version that is overlaid more heavily to fit in an 8Kb partition. ICQ cannot be used for SYSGEN under any circumstances. This version supports the minimum of functional parameters necessary to execute a command file that does not exceed the following parameters: <ul style="list-style-type: none"><li>• One concurrently open data file</li><li>• One parallel .XQT directive</li><li>• Two direct-access labels</li><li>• One GOSUB nesting level</li><li>• A 2-level depth of open command files</li><li>• A 108<sub>10</sub>-byte command file input buffer</li></ul>

## Documentation Corrections

It 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 4.3 do not apply to the ICQ version. ICQ has the same features that it had in Version 4.2 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

Specifies the File Control Services Resident Library Routines (FCSRES) version of ICQ. It 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
- A 4-level depth of open command files
- A 132<sub>10</sub>-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 by using the SYSGEN Phase III procedure.

Due to task size constraints on ICQRES, enhancements and corrections made to Indirect for Version 4.3 do not apply to the ICQRES version. Except for a new symbol, <DIRECT>, no new features have been added to ICQRES since Version 4.2. The <DIRECT> symbol is set to the null directory string ([ ]) for compatibility with RSX-11M-PLUS and Micro/RSX systems.

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.
- Change the final sentence in Section 2.4.2 to read as follows:  
See Section 2.4.6.1 for more information.
- Delete the following text in Section 2.6.22:  
Task not installed in system (.XQT, .WAIT)
- In Section 2.6, "ticks" are not allowed with the .ASK, .ASKN, and .ASKS directives.
- In Chapter 2, Section 2.4.5, add the following statement:  
The default radix will always be octal unless you specify the character "D" in the format control string. For example,  

```
 ; NUMBER = 'NUMBER%D'
```
- In Chapter 2, Section 2.6.2, please make the following correction:

The format for timeout is nnu, where nn is the decimal number of time units to wait and u is S (seconds), M (minutes), or H (hours).

- In Chapter 2, Section 2.6.3, please make the following correction:

The format for timeout is nnu, where nn is the decimal number of time units to wait and u is S (seconds), M (minutes), or H (hours).

- In Chapter 2, Section 2.6.4, please make the following correction:

The format for timeout is nnu, where nn is the decimal number of time units to wait and u is S (seconds), M (minutes), or H (hours).

- In Section 2.6.10, 24 hours is the maximum amount of time you can specify for the .DELAY directive.

- In Chapter 2, Section 2.6.12, add the following statement:

The initial setting of the .ENABLE directive for GLOBAL mode is disabled (not enabled).

- In Chapter 2, Section 2.6.19.3, please add the following information:

The directives .IFDF symb and .IFT symb should not be used on the same line. Because the .IFDF symb directive evaluates to false, Indirect processes the remainder of the command line looking for a .OR directive. Instead, it encounters .IFT symb, but because the symbol is undefined, an error message is generated.

The following example shows how to test whether a symbol is defined and how to then use that symbol:

```
.IFNDF symbol .GOTO 10$
.IFT symbol <action . . . >

.
.
.
.10$:

.IFNDF symbol .SETF symbol

.
.
.
```

- Replace the example in Section 2.6.26 with the following:

The following example is from an interactive terminal session:

```
>@ti: Return
AT.>.enable substitution Return
AT.>.sets a "1,2," Return
AT.>.parse a "," b c d Return
AT.>:'b' Return
>;1
AT.>:'c' Return
>;2
AT.>:'d' Return
>; (null substring)
```

## Documentation Corrections

```
AT.>.parse a "," b c Return
AT.>:'b' Return
>;1
AT.>:'c' Return
>;2,
AT.> Ctrl/Z
>@ <EOF>
>
```

- In Appendix A, Section A.2, add the following error message:

**AT. — File attributes not available**

*Explanation:* An attempt was made to obtain file-attribute information with the <FILATR> symbol before any files were opened.

*User Action:* A file must be opened with a .OPEN(x) directive before <FILATR> can contain any information.

- In Section A.1, the “AT. — Value not in range” error message can also indicate that the time specified for the .DELAY directive exceeded 24 hours.
- In Section A.2, add the following error message:

**AT. — .EXIT without .END**

*Explanation:* After executing a .EXIT directive from within a BEGIN/END block, Indirect encountered end-of-file (EOF) before finding a .END directive.

*User Action:* Edit the command file to ensure that every .BEGIN directive is paired with a .END directive. Then, execute the procedure again.

---

## 4.11 RSX-11M/M-PLUS MCR Operations

The following sections describe the changes to be made to Chapter 3 of the manual.

---

### 4.11.1 /CTRLC Option keyword in the MCR Command CLI

The /CTRLC option used with the CLI /INIT command should be shaded to indicate that this option is only valid on RSX-11M-PLUS and Micro/RSX systems.

---

### 4.11.2 /BAD Option Keyword in the MCR Command INI

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 the BADBLK.SYS file 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 called the Bad Block Descriptor File. INI then uses the Bad Block Descriptor File to create the BADBLK.SYS file. 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 the BADBLK.SYS file 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 the BADBLK.SYS file.

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 keyword /BAD and its options.

---

### 4.11.3 /TERM Qualifier in the MCR Command SET

Add LA75 to the list of terminal types for the SET /TERM command.

---

### 4.11.4 /TERM Qualifier in the MCR Command ASN

Add the following information to the ASSIGN (ASN) command qualifier /TERM:

You cannot use ASN/TERM to display information regarding a terminal that is not logged in to the system.

---

### 4.11.5 DEFER Option in the MCR MOUNT and SET Commands

Add the option [NO]DEFER to the MOUNT and SET commands. These are used only for RSX-11M-PLUS and Micro/RSX

---

### 4.11.6 /HSYNC Command Keyword in the MCR SET Command

Add the following sentence to the SET command keyword /HSYNC:

For more information on type-ahead buffers, see the *RSX-11M/M-PLUS I/O Drivers Reference Manual*.

**4.11.7 /INF and /MXF Keywords in the MCR Command INI**

The following listed changes should be made to the /INF and /MXF keywords in Section 3.9, which is the description of INITIALIZE VOLUME command (INI). Please make the following changes:

In place of the text that explains the /INF keyword, please add the following:

Specifies the number of file headers to allocate initially in the index file. The five system files (INDEXF.SYS, BITMAP.SYS, BADBLK.SYS, CORIMG.SYS, and 000000.DIR) are not included in the value for INF.

The value used for /INF is derived from the maximum number of file headers specified by /MXF, with consideration for pre-extending the index file if the maximum number of file headers will require a multiheader index file (see the description of /MXF for more information on multiheader index files). You can use Table 4-5 to determine an appropriate value to use for the /INF parameter.

**Table 4-5 Number of Index File Headers**

Maximum Number of Files	Disk Size	Number of File Headers
Maximum files fewer than 25588	Disks fewer than 209Mb	Headers=maximum/2
Maximum files greater than 25588 and fewer than 51176	Disks between 210Mb and 419Mb	Headers=25593
Maximum files greater than 51176 and fewer than 51693	Disks between 420Mb and 423Mb	Headers=25846
Maximum files greater than 51693 and fewer than 65500	Disks greater than 423Mb	Headers=51693

Please replace the first paragraph after the /MXF keyword with the following paragraph and table:

The maximum number of files varies according to disk size. You may want to use the values in Table 4-6 as the default approximations:

**Table 4-6 Default Number of Files – Approximation**

Disk Size	Approximate Number of Files
Up to 64Mb	Calculate the maximum number of files using the formula following the table
From 64Mb to 532Mb	Specify the number of blocks divided by 16 as the maximum number of files
Greater than 532Mb	Specify 65500 as the maximum number of files

The default used for the maximum number of files is the theoretical maximum possible number of one-block files, divided by eight. The following formula calculates the theoretical maximum number of files:

$$\text{MAXIMUM FILES} = ((N - ((N + 4095.) / 4096.) + 9.) * 127.) / 258.$$

---

#### 4.11.8 Additional switches for MCR TIME command

In Section 3.47, page 3–206, the format for the time command has been changed to include two new switches. Below is the correct format for the time command:

##### Formats

**TIM[E] [/SYNC]**

**TIM[E] [/FULL]**

**TIM[E] [hrs:mins[:secs]] [dd-mmm-yy[yy]] [/SETTOY]**

**TIM[E] [hrs:mins[:secs]] [m1/day/yy[yy]] [/SETTOY]**

**TIM[E] [hrs:mins[:secs]] [day.m2.yy[yy]] [/SETTOY]**

##### Switches

###### **/SYNC**

(Privileged keyword.) The option allows for the system time to be set based on the current time from the systems TOY clock. This option is only applicable for KDJ11–E systems, or MENTEC M–series processors which have the TOY clock option installed.

###### **/SETTOY**

(Privileged keyword.) The option allows for the system time to be set, and update the time kept on the TOY clock for KDJ11–E systems, or MENTEC M–series processors which have the TOY clock installed.

###### **/FULL**

The option displays both the current date and time, as well as the day of the week.

---

#### 4.12 RSX–11M/M–PLUS RMS–11 Macro Programmer’s Guide

Please make the following corrections to the *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 Section 6.2, Table 6–2, the 000002 value for XB\$DAT should be changed to 000003.
- 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.
- In Appendix A, Section A.1, add the following text to the description of the error ER\$MRS:  
 Or, the sum of the fixed length record size and the record overhead exceeds the bucket size. Or, No Span Blocks has been selected with an invalid total record size.

## Documentation Corrections

- In Appendix A, Section A.1, add the following text to the description of the error ER\$NOD:

Or, the remote node rejected the operation. (STV contains the Network Services Protocol (NSP) code and can be found in Appendix C of the *DECnet-RSX Programmer's Reference Manual*.)

- In Appendix A, Section A.1, add the following text to the description of the error ER\$FUL:

### **ER\$FUL, Device or File Allocation Failure**

Octal: 176360  
Decimal: -784

The specified device or directory does not have enough room for file creation or extension. In the case of a contiguous request, it is also possible that there is not enough contiguous space on the device.

---

## 4.13 RSX-11M/M-PLUS RMS-11 User's Guide

Please add the following corrections to the manual:

- According to the *RSX-11M/M-PLUS RMS-11 User's Guide*, RMS-11 cannot perform an UPDATE operation on an alternate key with the key characteristics CHANGES and NODUPLICATES. This description is misleading. To increase the clarity of the description, please add the following information to Chapter 6, Section 6.2.5.2:

Although RMS-11 does not support the CHANGES and NODUPLICATES combination, it does not prevent you from performing an UPDATE operation on an alternate key with these characteristics. When an update causes a duplicate of an alternate key, RMS-11 returns the completion code ER\$DUP. However, it does not terminate the UPDATE operation. Instead, RMS-11 updates the primary data level for the record without updating the alternate index. As a result, the file contains duplicates of the alternate key.

To prevent RMS-11 from creating duplicates when you make changes on alternate keys, modify your application as follows:

- 1 Create the file with the key characteristics DUPLICATES and CHANGES.
  - 2 To disallow duplicates, perform a FIND operation on each alternate key. Then, perform an UPDATE operation on the modified record.
- In Section 2.2.3.3, please add the following information to the discussion of deadlock:

An application should use multistream rather than multichannel 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 treat the alternate key as if it were not present in the record, making no entry in the alternate key index structure.

- 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

- Modify Section 8.1.2.1, page 8-8, paragraph 2, sentence 3, to read as follows:

To add remote access (DAP) support to a task that is built against the RMSRES in supervisor mode you must include the following modules:

LB:[1,1]RMSLIB/LB:R0EXSY:R0IMPA-LB:[1,1]RMSDAP/LB:R0AULS

and include DAPRES as a LIBR or CLSTR option in the Task Builder command sequence.

**Note: Unlike RMSRES the DAPRES cannot be used in supervisor mode.**

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

## 4.14 RSX-11M/M-PLUS RMS-11 Utilities

Please make the following corrections to the *RSX-11M/M-PLUS RMS-11 Utilities* manual:

- In Chapter 2, Table 2-1, add the following commands:

Command	Format and Function
EXIT_S[UPERSEDE]	EXIT_S[UPERSEDE] filename[.typ] Names the description file in which the file design is stored.
SAVE_S[UPERSEDE]	SAVE_S[UPERSEDE] filename[.typ] Names the description file in which the file design is saved.

- In Chapter 2, Section 2.2.5, add the new command EXIT\_S[UPERSEDE].

## Documentation Corrections

The `EXIT_S[UPERSEDE]` command stores the file design in the description file specified in the command string, superseding any existing file by the same name. `EXIT_S[UPERSEDE]` then terminates RMSDES and returns the system prompt.

The format for the `EXIT_S[UPERSEDE]` command is as follows:

```
EXIT_S[UPERSEDE] filename[.typ]
```

`EXIT_S[UPERSEDE]` names the description file in which the file design is stored. The default file type is DES. If you do not want to supersede an existing description file, use the `EXIT` command.

- In Chapter 2, Section 2.2.5, add the following statement to the description of the `EXIT` command:

To supersede an existing description file, use the `EXIT_S[UPERSEDE]` command.

- In Chapter 2, Section 2.2.9, add the new command `SAVE_S[UPERSEDE]`.

The `SAVE_S[UPERSEDE]` command stores the file design in the description file specified in the command string, superseding any existing file by the same name. If you do not define areas when you issue the `SAVE` command, RMSDES prompts you for the areas.

The format for the `SAVE_S[UPERSEDE]` command is as follows:

```
SAVE_S[UPERSEDE] filename[.typ]
```

`SAVE_S[UPERSEDE]` names the description file in which the file design is saved. The default file type is DES. If you do not want to supersede an existing description file, use the `SAVE` command.

If you want to design another file, issue a `CLEAR ALL` command to restore the attribute values in the design buffer to their defaults.

- In Chapter 2, Section 2.2.9, add the following statement to the discussion of the `SAVE` command:

To supersede an already existing description file, use the `SAVE_S[UPERSEDE]` command.

- In Chapter 2, Section 2.6.2, add the following corrections:

- Modify paragraph 3 of the `ALLOCATION` field discussion to read as follows:

If you intend to create a single-area indexed file and do not require RSX positioning, RMS-11 uses the allocation from the file section if no area section exists in your design buffer. If you are allowing RMSDES to define areas for an indexed file by default, RMSDES will automatically calculate an allocation value for each area it defines.

- Modify paragraph 4 of the `EXTENSION` field discussion to read as follows:

If you intend to create a single-area indexed file and do not require RSX positioning, RMS-11 uses the extension from the file section if no area section exists in your design buffer. If you are allowing RMSDES to define areas for an indexed file by default, RMSDES will automatically calculate an extension value for each area it defines.

- Modify paragraph 5 of the BUCKETSIZE field discussion to read as follows:

If you intend to create a single-area indexed file and do not require RSX positioning, RMS-11 will use the bucket size from the file section if no area section exists in your design buffer. If you are allowing RMSDES to define areas for an indexed file by default, RMSDES will assign a bucket size value for each area it defines. However, if you choose to define areas explicitly and specify a bucket size value for each area, you should accept the default for the file section and set the bucket size value in each area section.

- In Chapter 2, Section 2.8, add the following correction to the explanation of the error message ?DES-F-VOR:

You entered a value in response to an attribute prompt that was not in the valid range of values for that attribute, or the values you entered resulted in a calculation that caused an overflow for RMSDES. If the value was not within the valid range, the error message is followed by a display of the incorrect value.

- In Chapter 4, Table 4-1, add the following switch and description to the table of RMSCNV switches:

<code>/ER[:filespec]</code>	Continue processing after encountering an exception record. If a file specification is provided, then write the primary keys of exception records into the specified file. If no file specification is provided, then output the exception records to the terminal.
-----------------------------	---

Default: Stop processing and report RMS error code.

- In Section 4.3, add the following information to the description of RMSCNV switches:

**`/ER[:filespec]`**

Directs RMSCNV to continue processing when it encounters an exception record in the input file that cannot be written to the output file (see Section 3.4). If you specify a file specification, the exception records will be written to that file. If you do not specify a file specification, the primary key of each exception record will be issued to the terminal. RMSCNV also issues exception record codes (see RMSIFL exception codes, Section 3.3.2).

If you specify an exception file specification, RMSCNV will create the file as an RMS-11 Variable Fixed Control (VFC) sequential file upon encountering the first exception record. RMSCNV will then write the exception record with a 4-byte exception code to the fixed control area of the record.

By default, if you do not specify the `/ER` switch, RMSCNV will stop processing upon encountering the first exception record and will issue an error message indicating the type of exception record.

- In Table 5-1, add the following information to the description of RMSDSP switches:

<code>/BR</code>	Briefly displays attributes.
<code>/SU</code>	Supersedes existing output file.

## Documentation Corrections

- In Section 5.2, include the asterisk (\*) and percent sign (%) in the description of wildcard characters permitted in the input file specification.

- In Section 5.3, add the following information to the discussion of RMSDSP commands:

### **/BR**

Directs RMSDSP to issue basic displays for indexed files (see Section 5.4, Example 5-3) and container files (see Section 5.4, Example 5-6).

### **/SU**

Directs RMSDSP to supersede any existing output file with the same name and version number as the output file specification. If this switch is not supplied and the version numbers are the same, RMSDSP will issue the following error message:

```
?DSP-F_OPNINP, Error opening DDnn:file.dat as output  
-RMS-E-ER$FEX, File already exists
```

- In Chapter 6, Table 6-1, add the following information to the table of RMSBCK switches:

**/NV**            Creates a new version of the output file.

- In Section 6.3.2, add the following information to the description of RMSBCK output switches:

### **/NV**

Directs RMSBCK to create a new version of the disk output file if a file currently exists with the same version number as the input file. The current file is not deleted. If you do not specify this switch and a file currently exists with the same file name and version number as the input file specification, RMSBCK will issue the following fatal error message:

```
?BCK-F-CREOUT, Error opening ddnn:file.dat;n as output  
-RMS-E-ER$FEX, File already exists
```

- In Section 6.2, in the discussion of RMSBCK command line format, include the asterisk (\*) and percent sign (%) in the description of wildcard characters permitted in the input file specification.
- In Table 7-1, add the following information to the table of RMSRST switches:

**/NV**            Creates a new version of the output file.

- In Section 7.2, in the discussion of the RMSRST command line format, include the asterisk (\*) and percent sign (%) in the description of wildcard characters permitted in the input file specification.
- In Section 7.3.2, add the following information to the discussion of RMSRST commands:

### **/NV**

Directs RMSRST to create the next higher version number if the expanded input file has the same version number as an existing output file. If this switch is not used and the file name and version number are the same, RMSRST will issue the following error message:

```
?RST-F-CREOUT, Error opening ddn:file.dat;n as output
-RMS-E-ER$FEX, File already exists
```

---

## 4.15 RSX-11M/M-PLUS System Management Guide

Please make the following corrections to the *RSX-11M/M-PLUS System Management Guide*:

---

### 4.15.1 ACNT Utility

Add the following message to Chapter 2:

**ACNT—Workfile—open file**  
**ACNT—IO error**

*Explanation:* The disk that has the account file is full or write-locked.

*User Action:* Provide free space on the disk by deleting files.

---

### 4.15.2 RMDEMO

Change the following lines in Chapter 6:

- In Section 6.4, locate the line “FREE $x$ =ddn:, where  $x$  is a number from 0 to 3 and ddn: is a device name and number.” Change “0 to 3” to “1 to 4.”
- Include the following section at the end of 6.4:
  - - TOP=nnnn - where nnnn is the highest block of memory to display
- In Section 6.4, locate the line “RMD displays the number of free blocks on DM0: instead of the fourth Files-11 device in your configuration and replots the display every 3 seconds instead of every second.” Change “fourth” to “third.”
- In Section 6.4, locate the line “To change the second and third Files-11 devices to DB1: and DB2: respectively, use the following MCR command line.” Change “second and third” to “first and second.”
- In Section 6.7, locate the line “>RMD I, DEVICE0=DB1:,DEVICE1=DB2:.” Change to “RMD I, DEVICE1=DB1:,DEVICE2=DB2:.”
- In Section 6.7, locate the line “DEVICE1=ddn:—specifies the device to be displayed.” Change “DEVICE1” to “DEVICE” (no number).

---

### 4.15.3 DCL INITIALIZE/PROCESSOR

In Chapter 7, Section 7.2, add the following switch to the DCL command INITIALIZE/PROCESSOR (the MCR command QUE):

## Documentation Corrections

### **/NOWARNINGS (/NM)**

Reduces the amount of information that is displayed on the console terminal when the system is bootstrapped and the STARTUP.COMD file is invoked. For example, if you use the MCR command QUE LPO:/CR/NM, the message “Queue already exists” is not displayed by the Queue Manager (QMG). The switch /NOWARNINGS (/NM) suppresses this message.

---

### 4.15.4 SHUTUP Utility

In Chapter 8, Section 8.7.1, please make the following correction:

When the delay before system shutdown expires, SHUTUP performs the following functions:

- 1 Stops the Console Logger (if active)
- 2 Redirects the console terminal to the TI of SHUTUP
- 3 Logs out logged-in terminals (multiuser protection systems only)
- 4 Stops the Queue Manager (QMG) and holds all active batch and print jobs
- 5 Stops Resource Accounting (if active)
- 6 Checkpoints all read/write commons
- 7 Invokes the LB:[1,2]SHUTUP.COMD file (if present)
- 8 Stops the Error Logger task (ERRLOG) (if active)
- 9 Deallocates checkpoint space and dismounts devices
- 10 Halts the processor

---

### 4.15.5 Data Terminal Emulation

In Chapter 9, page 9–3, replace Section 9.2 with the following section:

#### **Establishing Terminal Emulation**

To establish terminal emulation between a local RSX system and a host system, you can use the DCL command SET HOST/DTE or the MCR command DTE.

```
$ SET HOST/DTE ttnn:[/option]
```

```
> DTE ttnn:[/option]
```

#### **Parameters**

##### **ttnn**

Specifies the RSX device and unit specification of the terminal port used for terminal emulation.

##### **option**

Specifies one of the following options:

`/DIAL=" . . . "` Allows the specification of a dial command string for the modem. The string may consist of any of the digits 0 to 9, and one of the following symbols:

- Equal sign (=)
- Asterisk (\*)
- Hyphen (-)
- Uppercase A, B, C, D, P, T, and W
- Lowercase a, b, c, d, p, t, and w
- A space
- Number sign (#)
- Left parenthesis
- Right parenthesis

The equal sign indicates that another dial tone is expected (for example, when you dial from an internal telephone system to an outside telephone number). The other symbols provide information for the modem being used. See the manual that accompanies your modem for more information.

Note that when you specify `/DIAL` for a DFA01 modem, the modem automatically changes the terminal speed, if necessary.

`/MUTE` Specifies whether DTE should alter certain device characteristics prior to exiting. The default is to return all of the device characteristics to their original states. However, if the device is set to NOSLAVE and ECHO status, it is possible that noise characters can create intersystem echo loops, which can severely affect performance. Therefore, it is recommended that either the device be set SLAVE and NOECHO when it is idle (DTE will change these characteristics) or that the `/MUTE` option be specified, which will set the device SLAVE and NOECHO when DTE exits.

`/VERSION` Displays the version of the DTE task for DCL only.

`/ID` Displays the version of the DTE task for MCR only.

- Please add the following message to Chapter 9, Section 9.4.1, of the manual:

? DTE-F-MODERR, Unable to determine modem type

**Explanation:** The system is unable to determine the type of modem (DF03, DF112, or DF224) in use.

**User Action:** This message may indicate faulty hardware. Check your equipment and repeat the operation.

---

#### 4.15.6 SET /TYPEAHEAD

In Chapter 10, the description of the switch `/TYPEAHEAD` is incorrect. The default for size is  $66_{10}$ , not  $86_{10}$ .

## Documentation Corrections

---

### 4.15.7 Replacement Control Task

In Chapter 13, Section 13.3.3, please add the following information at the end of the first paragraph:

RCT reads the user's disk data in a bad block four times. As a result, data is successfully recovered more often.

---

#### 4.15.7.1 Replacement Control Algorithms

On Chapter 13, Section 13.3.4, please add the following information at the end of the section:

The bad block replacement algorithm includes a test that ensures the replacement of bad blocks. When a disk is formatted, a forced error bit is placed in the header of each replacement block. To ensure that the block was revectoring correctly, RCT reads the block and checks for the forced error bit. If the block was revectoring correctly, the read operation is directed to the replacement block and the forced error bit is found. If the block was not revectoring correctly and the forced error bit is not found, RCT write-protects the volume and informs you that the disk is corrupted.

The Bad Block Replacement Control Task (RCT) supports the latest Mass Storage Control Protocol (MSCP) Disk Storage Architecture specification. RCT is used with MSCP controllers, such as the UDA-50 and the RC25, which do not perform automatic revectoring of bad blocks. Instead these controllers call the RCT task, which performs revectoring for them. Revectoring is the redirection of data from a dysfunctional block to a block that is functional.

A controller that performs its own revectoring creates a complete error log report on the I/O it handles and sends the report to the device driver. The device driver, in turn, sends a report to the Error Logger. In this way, all messages on bad blocks appear in the error log file generated when you enter an ANALYZE/ERROR\_LOG command.

When RCT performs revectoring, it creates the error log report and sends it to the Error Logger. The *Bad Block Replacement Attempt* message, which formerly appeared in the error log report in the Entry Type column in brief- and full-format reports, has been changed to *RCT Device Error*.

In addition, an error message is issued by the Task Termination Notification program (TKTN), whose function is to send a message to the console terminal whenever a nonrecoverable hardware error occurs. The message is as follows:

```
*** ddn: -- Replace command failure
```

---

### 4.15.8 The TDX Catchall Task

Please add the following section and subsections as new sections to the *RSX-11M/M-PLUS System Management Guide*:

The TDX facility has the following functions:

- Enables you to run uninstalled tasks



- Allows you to abbreviate command names

---

#### 4.15.8.1 Installing TDX

Any task installed with the task name . . . CA. is treated as a catchall 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 catchall task for your system, install it by using the following MCR command line:

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

---

#### 4.15.8.2 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. The TDX commands and their MCR translations are as follows:

TDX Command	MCR Translation	Function
ATS	ACT /ALL	Displays the names of all active tasks in the system.
ATS ttn:	ACT /TERM=ttn:	Displays the names of all active tasks of the specified terminal.
CHD	SET /UIC	Displays the current default User Identification Code (UIC) for terminal TI.
CHD g m	SET /UIC=[g,m]	Changes the default User File Directory (UFD) to the UFD specified.
CLR	None	Clears the issuing terminal's screen and sets cursor to 0,0. Returns an exit status of EX\$SUC if the terminal is a cathode-ray tube (CRT) and EX\$WAR if it is not a CRT.
CRE file	PIP file=TI:	Creates a new file without invoking an editor.
CVT val	None	Evaluates an arithmetic expression, converts that expression into different formats, and then 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 (\$nnn), Radix-50 (%ccc), or ASCII ('c or "cc) characters; or arithmetic expressions using +, -, /, *, and < >.
DEL file[. . . ]	PIP file[. . . ]/DE	Deletes the specified file or files.
DIR [file[. . . ]]	PIP [file[. . . ]]/LI	Displays a directory listing at the terminal.

## Documentation Corrections

TDX Command	MCR Translation	Function
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 the FRE command for a specified device.
PUR file[, . . . ]	PIP file[, . . . ]/PU	Deletes all but the latest version of a file.
SHQ	QUE/LI	Displays information about all entries in all print queues.
SYS	SET /SYSUIC	Displays the current system UIC.
TDX	None	Displays the current version of TDX.
TYP file[, . . . ]	PIP TI:=file[, . . . ]	Prints the specified file or files on your terminal.

### 4.15.8.3 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 directory [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 Kit	TDX.MAC	TDX.OBJ TDXBLD.BLD
RL01/RL02	HLPDCL	EXCPRV
All others	RSXM70	RSXM70

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

The option that TDX uses depends on whether the logical device ZZ1 or ZZ2 exists 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.

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

Installs, runs, and removes a task. In the example, “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:
```

```
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 Versions 4.6 and later contain 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
```

The variable 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
```

---

#### 4.15.8.4 Installing Tasks Permanently

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

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

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

- The command line's length exceeds 39 characters.

## Documentation Corrections

- TDX has no means of returning the exit status of called tasks to the Indirect Command Processor. 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 directive `.XQT`.

---

### 4.16 RSX-11M/M-PLUS Utilities Manual

The following sections describe changes and corrections to the *RSX-11M/M-PLUS Utilities Manual*.

---

#### 4.16.1 Backup and Restore Utility (BRU)

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

---

##### 4.16.1.1 Selective Backups

In Chapter 7, Section 7.1.2, add the following information:

During a selective backup, UFDs that do not contain selected files are not backed up and cannot be re-created during a full restore operation.

---

##### 4.16.1.2 Wildcards in Input Specifications

In Chapter 7, Section 7.2.2.1, 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 the following ways:

- If the version number is omitted, the system automatically inserts a wildcard in that field. 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]*.*;*`.

BRU has been enhanced to improve its method of verifying or comparing data backed up from a disk to an MU-type tape device, such as the TK50. MUDRV, the driver for the MU-type devices, has also been enhanced to direct the hardware to perform a compare-host function.

BRU uses both of its buffers to hold data from the disk, and a buffer created by the compare-host function in the hardware holds the data from the tape. BRU can load data into one buffer while the other is in use, thus requiring fewer starts and stops of the tape. These changes increase the efficiency of compare and verify operations.

The behavior is the default for MU-type devices only. You may override this default by using the new `SINGLEBUFFER` option added to the existing BRU qualifiers `/COMPARE` and `/VERIFY`, which ensures that compare and verify operations are done as they were previously.

---

#### 4.16.1.3 Options Added to /COMPARE and /VERIFY Qualifiers

In connection with BRU's enhancement for MU-type devices, two options have been added to BRU's existing /COMPARE and /VERIFY qualifiers. The format for the options is as follows:

##### MCR Format

BRU/COMPARE[:SINGLEBUFFER]

BRU/COMPARE[:DOUBLEBUFFER]

BRU/VERIFY[:SINGLEBUFFER]

BRU/VERIFY[:DOUBLEBUFFER]

##### DCL Format

BACKUP/COMPARE[:SINGLE\_BUFFER]

BACKUP/COMPARE[:DOUBLE\_BUFFER]

BACKUP/VERIFY[:SINGLE\_BUFFER]

BACKUP/VERIFY[:DOUBLE\_BUFFER]

**Note:** The Digital Command Language (DCL) format includes an underscore character ( `_` ) in the SINGLEBUFFER and DOUBLEBUFFER option names, but the MCR format does not. The MCR style is used in this manual for general references to the options.

The DOUBLEBUFFER option used with the /COMPARE qualifier to the BRU command can be used only when the input device is a disk and the output device is a single MU-type magnetic tape. If you want to compare more than one MU-type magnetic tape, you must specify SINGLEBUFFER.

If you want to verify one or more MU-type magnetic tapes, you can use the DOUBLEBUFFER option. If one magnetic tape is the MU-type and one is not, you must specify SINGLEBUFFER. Otherwise, BRU issues a fatal, device-conflict error message.

The default for devices other than the MU-type is SINGLEBUFFER. For examples, see Section 4.16.1.4. The options are defined as follows:

DOUBLEBUFFER	Uses the compare-host function in comparing data transferred from a disk to a single MU-type magnetic tape. Also uses the compare-host function in verifying data transferred from a disk to one or more MU-type magnetic tapes. The MU tape drive must include the compare-host function. This is the default for MU-type devices. Use of this option increases the efficiency of a verify or compare operation. The error messages that BRU returns are less explicit, however. For more information on error messages, see Section 4.16.1.15.
SINGLEBUFFER	Overrides the default for MU-type devices and ensures that BRU uses only a single buffer to hold information from the disk when performing compare and verify operations. Use of this option ensures that the error messages BRU returns are more explicit but that the operation will usually require more time to complete. SINGLEBUFFER is the default for devices other than the MU-type.

---

### 4.16.1.4 BRU /COMPARE and /VERIFY Examples

```
>BRU/VERIFY:SINGLEBUFFER DR5: MU2:
```

This example uses the MCR command BRU to back up the data on a DR-type disk and perform a verify operation between the disk and the MU-type magnetic tape without the use of the compare-host function. The SINGLEBUFFER option overrides BRU's default behavior of using the compare-host function.

```
> BRU/COMPARE:DOUBLEBUFFER DR7: MU1:
```

This example uses the MCR command BRU and the compare-host function to perform a compare operation between a DR-type disk and the MU-type magnetic tape device containing the backup set. The DOUBLEBUFFER option is the default for MU-type devices. Note that compare operations, unlike verify operations, are performed separately from backup operations; that is, no data is backed up in a compare operation.

```
$BACKUP/COMPARE:DOUBLE_BUFFER DR7: MU1:
```

This example uses the DCL command BACKUP and the compare-host function to perform a compare operation between a DR-type disk and the MU-type magnetic tape device containing the backup set. The DOUBLE\_BUFFER option is the default for MU-type devices.

```
$BRU/COMPARE:SINGLEBUFFER DR5: MU2:
```

This example uses the MCR command BRU to perform a compare operation between a DR-type disk and an MU-type magnetic tape without the use of the compare-host function. The SINGLEBUFFER option overrides BRU's default behavior of using the compare-host function on MU-type devices.

```
$BACKUP/COMPARE:SINGLE_BUFFER DR5: MU2:
```

This example uses the DCL command BACKUP to perform a compare operation between a DR-type disk and an MU-type magnetic tape without the use of the compare-host function. The SINGLE\_BUFFER option overrides the command's default behavior of using the compare-host function.

---

### 4.16.1.5 /ERROR\_LIMIT Qualifier

Prior to Version 4.5, the /ERROR\_LIMIT:n qualifier terminated a restore operation after the specified number of errors was reached. The default number of errors was 25. The qualifier could not be used on backup operations.

Since Version 4.6, the behavior with restore operations is unchanged. However, the qualifier can now be used with double-buffered compare and verify operations on data backed up from a disk to an MU-type device. The default number of errors is 25.

---

#### 4.16.1.6 /IDENTIFICATION Qualifier

In Chapter 7, Section 7.4, on page 7–17 of the manual, please add the following BRU qualifier:

<code>/IDENTIFICATION</code>	Directs BRU to identify itself by displaying its version number. The qualifier may be specified on a command line alone or in combination with other qualifiers.
------------------------------	--

---

#### 4.16.1.7 Removal of IMAGE Backup and Restore Code from BRU64K

Please add the following section to Chapter 7, immediately before Section 7.5.1, of the manual:

Because BRU64K (standalone BRU) had reached its maximum size, and no further corrections or enhancements could be made to it, the IMAGE backup and restore code was removed from the Backup and Restore Utility (BRU) contained in BRU64K. This means that the /IMAGE qualifier is no longer valid, and that BRU64K does not support backup operations with more than one output disk. However, BRU64K continues to support copy operations from a single disk to another single disk.

If you need to use the /IMAGE qualifier, you can use online BRU or you can create a hardware-bootable standalone BRUSYS system on magnetic tape. For information on creating a hardware-bootable standalone BRUSYS system, see Section 4.16.1.8.

---

#### 4.16.1.8 Locating and Booting Standalone BRUSYS

Please add the following section to replace the first paragraph and list of Chapter 7, Section 7.5.1, on page 7–23 and 7–24 of the manual:

The BRUSYS system image and symbol table are located in directory [1,51] in the distribution kit. This BRUSYS system requires 124K words of memory.

You can bootstrap the standalone BRUSYS in one of two ways, as follows:

- Software bootstrap standalone BRUSYS by using the privileged command `BOOT` as follows:
 

```
>INSTALL $BOO
>BOOT [1,51]BRUSYS
```
- Hardware bootstrap standalone BRUSYS by following the hardware bootstrap procedure for your processor.

To create a hardware-bootable, standalone BRUSYS tape from the distribution kit, use the Virtual Monitor Console Routine (VMR) command `SAVE` to write the system image to tape in bootable format, as follows:

```
!Comments not included in commands
>ASSIGN Dx: = SY: !Dx is the device on which directory [1,51] is located
>ASSIGN Dx: = LB:
>ALLOCATE Mx: !Mx is the magnetic tape unit on which BRUSYS is to be written
>SET /UIC=[1,51]
>RUN VMR
ENTER FILENAME: BRUSYS
```

## Documentation Corrections

```
VMR>SAVE Mx:BRUSYS
```

```
VMR> Ctrl/Z
```

The magnetic tape now contains a hardware-bootable image of the standalone BRUSYS system. (See the *RSX-11M/M-PLUS System Management Guide* for information on VMR.)

---

### 4.16.1.9 Skipping Over a Bootable System Image

Please add the following section to Chapter 7, page 7–24, immediately before Section 7.6:

BRU 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 need for a separate magnetic tape containing the bootable system image. In using this feature, you may notice a short delay, which is caused by rewinding the tape and skipping over the bootable system image.

---

### 4.16.1.10 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 the BADBLK.SYS file and continue processing.

---

### 4.16.1.11 Tape Write Error Message

In Section 7.10, page 7–54, the “User Action” is incorrectly documented for the following message:

```
BRU—*WARNING*—TAPE WRITE ERROR  
I/O ERROR CODE number
```

The correct user action should read as follows:

**User Action:** Replace the tape on which the error occurred 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.

---

### 4.16.1.12 Executing Command Files

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



---

#### 4.16.1.13 Changes in the CNF Table for Standalone BRU

The control and status register (CSR) and vector information has changed for device types MM, MS, and MT. 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
MU	174500	260	Present

---



---

#### 4.16.1.14 /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.

---

#### 4.16.1.15 BRU Error Messages

Please add the following messages to Section 7.10 of the manual:

BRU—BRU version xx.xx RSX-11M

**Explanation:** Identifies the version of BRU being used.

**User Action:** No user action is required. This is an informational message.

BRU—\*FATAL\* -Device conflict

**Explanation:** You specified a /COMPARE:DOUBLEBUFFER or a /VERIFY:DOUBLEBUFFER option and your output device is not of the MU-type. When verifying or comparing mixed types of output devices (MU and non-MU), SINGLEBUFFER must be specified as an option.

**User Action:** If you wish to mix types of output magnetic tapes (non-MU with MU), you must specify /COMPARE:SINGLEBUFFER or /VERIFY:SINGLEBUFFER.

BRU—\*WARNING\*—Potential data record verify error

## Documentation Corrections

File ID mmmmmm,nnnnnn LBN nnnnn

**Explanation:** A data block on the input device did not match a data block on the output device.

**User Action:** To obtain a list of actual errors listing the file IDs and LBNs, perform a compare operation using /COMPARE:SINGLEBUFFER. If you prefer, you can repeat the backup operation. If it fails again, repeat the backup operation with a different disk or tape.

BRU—\*WARNING\*—Potential file header record verify error [mmm,nnn]  
filename.filetype;version

**Explanation:** A header record on the input device did not match a header record on the output device.

**User Action:** To obtain a list of actual errors listing the filenames, perform a compare operation using /COMPARE:SINGLEBUFFER. If you prefer, you can repeat the backup operation. If it fails again, repeat the backup operation with a different disk or tape.

BRU—\*WARNING\*—Potential file ID area or data record verify error

File ID mmmmmm,nnnnnn LBN nnnnn

**Explanation:** An error occurred in the file ID area. Potential errors are listed under the message. BRU cannot verify whether errors occurred in the data area of the record. Therefore, BRU lists all file IDs and LBNs in that block.

**User Action:** To obtain a list of actual errors, perform a compare operation using /COMPARE:SINGLEBUFFER. If you prefer, you can repeat the backup operation. If it fails again, repeat the backup operation with a different disk or tape.

BRU—\*FATAL\*—Continuation volumes cannot be double buffered

**Explanation:** BRU does not support a double-buffered compare operation on a backup set that spans more than one tape.

**User Action:** If you must compare a backup set that spans more than one tape, specify /COMPARE:SINGLEBUFFER in the BRU command line.

BRU—\*WARNING\*—Double buffered compare or verify not supported

**Explanation:** BRU cannot perform a double-buffered compare or verify operation, because the tape driver does not support double-buffered compare or verify operations.

**User Action:** No user action is required. BRU continues the verify or compare operation using a single buffer.

---

### 4.16.2 Disk Save and Compress Utility

Version 4.6 of RSX-11M and RSX-11S was the last release to include the Disk Save and Compress utility on the kit. This utility was used to save data on media and then restore the data.

The Backup and Restore Utility (BRU) provides a similar function. Media saved with the DSC utility should be restored with DSC and then saved with BRU.

---

### 4.16.3 File Dump Utility (DMP)

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

---

#### 4.16.3.1 New /LIM Switch

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. The /OCT switch is still the default if no format switches are specified.

---

#### 4.16.3.2 Correction to /HF Switch 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.

---

### 4.16.4 File Transfer Program (FLX)

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

- At the end of Section 4.1, page 4-3, add the following:
 

If an error occurs during a copy operation to an RT-11 device, the partial file is not substituted for an existing file on the output disk. The partial file is no longer closed as a permanent entry, and the definition and contents of the existing file remain intact.
- After the table at the top of page 4-2 add the following:
 

When you use the File Transfer Utility Program (FLX), the following devices do not support DOS-11 format:

  - RC25
  - RA60, RA80, and RA81
  - RD32, RD51, RD52, RD53, and RD54
  - RX33, RX50
- 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

## Documentation Corrections

- /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.

- In Section 4.2.2, on page 4–6, the file type CDA should be added to the list of default file types for the Image Mode switch.
- In Table 4–2, on page 4–8, the last sentence of the first paragraph should read:

The /ZE switch does not allow a file specification.

- In Section 4.4.2, page 4–12, the file specification in the example at the top of the page, as well as the file specification in the following line, should be SYS1.MAC.
- In Section 4.4.3, page 4–13, the last line in the paragraph following the example should read:

This results in a total of 324<sub>10</sub> directory entries, each of which uses 9 words.

- In Section 4.8, page 4–21, the following error message should be added:

FLX—Device size exceeds 65K blocks

**Explanation:** The DU device selected as an RT–11 device is not an RC25, RCF25, RD51, RD52, RD53, RX33, or RX50. Devices greater than 65K blocks cannot be supported with FLX.

**User Action:** Reenter the command line, specifying a valid RT–11 device.

---

### 4.16.5 Disk Volume Formatter (FMT)

Please make the following correction to the *RSX-11M/M-PLUS Utilities Manual* for the Disk Volume Formatter (FMT):

After Table 5–2 on page 5–5 add the following:

FMT formats RX33 diskettes. You use the /DENSITY, /VERIFY, and /NOVERIFY switches to format an RX33. The RX33 must be mounted foreign before you can use FMT.

An RX33 diskette cannot be formatted to simulate an RX50 diskette, and an RX50 cannot be formatted to simulate an RX33. This is due to a difference in the magnetic properties on RX50 diskettes. Consequently, you may not be able to perform read or write operations on the diskette.

#### **FMT Unsupported Devices**

None of the DU-type devices except the RX33 are supported by FMT.

In Section 5.4, page 5–9, add DL to the list of devices supported by the /WLT and /VE switches.

---

### **4.16.6 Librarian Utility Program (LBR)**

The following sections describe documentation changes to be added to Chapter 10 of the *RSX-11M/M-PLUS Utilities Manual* for the Librarian Utility Program (LBR).

---

#### **4.16.6.1 User File Attributes**

In Figure 10–7, page 10–7, bytes 40<sub>8</sub> 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 File Descriptor Block (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 as follows:

- 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 /MH switch to modify the header.

For more information, please see Sections 10.5.9 and 10.5.11 of the *RSX-11M/M-PLUS Utilities Manual*, and Section 1.7.1.2 (page 1–10) and Appendix A of the *RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual*.

---

#### **4.16.6.2 Create Switch Error**

In Section 10.5.2, page 10–12, the Create switch (/CR) 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**

## Documentation Corrections

---

### 4.16.6.3 The /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 uppercase characters in macro directives.

---

### 4.16.7 Object Module Patch Utility (PAT)

Please make the following addition to the *RSX-11M/M-PLUS Utilities Manual* for the Object Module Patch Utility (PAT):

In Section 14.2.4, page 14–7, the following new error message should be added to the section entitled “PAT Messages”:

PAT—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.

---

### 4.16.8 Peripheral Interchange Program (PIP)

The following sections describe documentation errors that should be corrected in the *RSX-11M/M-PLUS Utilities Manual* for the Peripheral Interchange Program (PIP).

---

#### 4.16.8.1 The /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 shown next.

```
PIP>/DD:01-JAN-93:01-FEB-93&/LI
```

```
PIP>/DD:*:1-JAN-93&/LI
```

```
PIP>/DD:1-JAN-93:*&/LI
```

---

#### 4.16.8.2 The /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
```

---

### 4.16.9 Source Language Input Program (SLP)

The following sections describe documentation errors and omissions that should be corrected in the *RSX-11M/M-PLUS Utilities Manual* for the Source Language Input Program (SLP).

---

**4.16.9.1 Error Message Format**

In Section 13.5.2, page 13–20, the example of the error message format is incorrect. The correct format example is as follows:

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

---

**4.16.9.2 Maximum Number of Characters in File Names**

In Section 13.5.2, page 13–21, under the error message “Illegal file name,” the explanation indicates that file names can be a maximum of 30<sub>8</sub> characters long. This is incorrect. SLP file names can be a maximum of 19<sub>10</sub> characters long.

---

**4.16.9.3 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 valid SLP switch.
- A valid switch was used in an invalid manner.
- A file specification could not be parsed.

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

---

**4.17 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 ANALYZE/CRASH\_DUMP command. 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.

---

**4.18 RSX–11M/M–PLUS and Micro/RSX Debugging Reference Manual**

The *IAS/RSX–11 ODT Reference Manual* has been renamed to *RSX–11M/M–PLUS and Micro/RSX Debugging Reference Manual*. Information specific to IAS has been deleted. This manual also includes information about XDT.

---

### 4.19 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.

Please make the following corrections to the *RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual*:

- In Chapter 3, Section 3.7.1, make the following correction:  
If the length-to-map field is not specified, the window length is not changed.
- In Chapter 3, Section 3.7.2, add the following statement:  
The MACRO-11 interface to the fast-mapping facility uses general purpose register 3 (R3) as a “scratch” buffer. Consequently, all data stored by the fast-mapping facility is destroyed.
- In Chapter 3, Section 3.7.4, add the following status messages:

---

Status Code	Meaning
IE.ITS	Inconsistent task state
SU\$SUC	Success

---

---

### 4.20 RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual

Please add the following information to the *RSX-11M/M-PLUS and Micro/RSX I/O Operations Reference Manual*:

- In Chapter 4, Section 4.2.1, please make the following correction:  
R1      Contains the size (in bytes) of the default directory string in program section \$\$FSR2. If no default directory string descriptor words have been written, R1 equals 0.  
R2      Contains the address of the default directory string in program section \$\$FSR2.
- Appendix C contains a summary of the I/O-related system directives in alphabetical order.
- Appendix I includes a new QIOMAC.MAC module description.

---

### 4.21 RSX-11M/M-PLUS and Micro/RSX Task Builder Manual

This section describes documentation changes that have not been incorporated into the manual.



---

#### 4.21.1 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
```

---

#### 4.21.2 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.

---

#### 4.21.3 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.

---

#### 4.21.4 /SHAREABLE:LIBRARY Switch Description

Section 5.1.1 incorrectly documents the effect of using the /SHAREABLE:LIBRARY switch. If you use this switch when building a library, the region program section name for the library is the same as that of the library root.

---

#### 4.21.5 Incorrect Device Specification

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

---

#### 4.21.6 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 to 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, entitled "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)
```

## Documentation Corrections

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)
```

Section 3.6.3, entitled “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 read as follows:

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

---

### 4.21.7 TKB Combinations of the /-PI and /LI Switches

In Section 10.25, page 10–31, the manual incorrectly documents the effect of using the /LI switch in the Task Builder (TKB). If you use this switch when building a library, the region program section name for the library is the same as that of the library root. The name of the library is not .ABS as documented.

---

### 4.21.8 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.

---

### 4.21.9 Offsets

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

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

---

### 4.21.10 New TKB Error Message

The Task Builder (TKB) has the following new error message:

Cluster library element element-name is not resident overlaid.

**Explanation:** 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.

The following sections contain restrictions and supplementary information on the Task Builder.

---

#### 4.21.11 TKB Option – RNDSEG

Please add the following RNDSEG option description to a location immediately preceding Section 12.1.26 in the manual:

The TKB option RNDSEG is a storage-sharing option that causes TKB to round the size of a named segment up to the nearest Active Page Register (APR) boundary while building a resident library.

When you install a resident library, INSTALL makes an entry for the resident library in the Common Block Directory (CBD). The system loads the resident library when a task that uses it runs.

The length parameter for the common block, as described in the label block for the task image, must match the corresponding parameter in the system CBD. If the task's label block data does not match the system data for that task, the task cannot be installed.

If you do not use RNDSEG and the common block length for the newly rebuilt library is not the same as the common block length previously recorded in the CBD, you have to relink the task with the new library before you can install it.

##### Syntax

RNDSEG=seg-name

##### Parameter

###### seg-name

Specifies the 1- to 6-character Radix-50 name of the segment.

##### Default

None

##### Notes

- The RNDSEG option operates only during a library build. Attempting to use the option while building any other form of task will result in the following diagnostic error message:

```
TKB -- *DIAG* - Library build not requested - ignoring option
RNDSEG=SEG1
```

- If you attempt to specify a nonexistent segment name, the following diagnostic error will be generated and the build will continue:

```
TKB -- *DIAG* - Segment not found to address round
RNDSEG=NOSEG
```

---

#### 4.21.12 Map Problem for Non-PIC Shared Region

Please add the following to Section 11.28, page 11–49 as a restriction:

A non-position-independent code (PIC) shared region's base address is displayed in the map as zero. The base address is not zero, but it has a true base address. This problem is a map-generation problem of TKB.

## Documentation Corrections

---

### 4.21.13 Cluster Libraries

Please add the following note after the fifth paragraph in Section 12.1.5, Page 12–9, of the manual:

**Note: Clustering read-only and read-write libraries is not supported on RSX-11M Version 4.6 or later software.**

---

### 4.21.14 Changing Values in an Installed Common

Please add the following section to Section 12.1.7 at the end of the note at the bottom of page 12–12 in the manual:

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

---

### 4.21.15 Using the /SS Switch with the RSX11M.STB File

Please add the following section to Section 10.35, Page 10–48, in the manual at the end of the text in the heading **Effect**:

When you use the RSX11M.STB file as an input file to TKB, the /SS switch should always be appended to the file specification. This allows only those symbols referenced to be included in the STB file. Otherwise, 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 you specify the Executive symbol definition file RSX11M.STB.

---

### 4.21.16 Slow Task Builder (STK) Restriction for Layered Products

Please add the following section to page F–11 in the manual:

Some RSX layered products require the Slow Task Builder (STK) for installation. STK is not supplied with the RSX-11M operating system as a separate task image; STK and the Task Builder (TKB) are included together in one task image on the distribution kit.

Please consult the release notes or installation guide for your layered product to determine if you need STK to install your layered product.

To create a default STK for RSX-11M, 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 volumes:

Tape kit            RSXM70

Before you invoke the command procedure MAKESTK.CMD, you must boot your new system. Ensure that there is enough space on the system, and then invoke SYSGEN3.CMD to build ZAP. After SYSGEN3.CMD has completed, you can invoke MAKESTK.CMD.

**STK Supplementary Information**

The Slow Task Builder (STK) and TKB are included together in one task image in the distribution kit. Use the /SB switch or the /SLOW qualifier to select STK.

Use the command line format shown next for the MCR switch /SB.

**file.TSK/SB,,=file.OBJ**

**Default**

/-SB

Use the command line format shown next for the DCL qualifier /SLOW.

**LINK/TAS/SLOW/MAP/SYM inputfile**

**Default**

/NOSLOW

**4.21.17 The /CL Switch and the /CODE:CLI Qualifier**

In the manual locations listed next, add the text following the list.

- Immediately after Section 11.6, page 11–14
- Immediately after Section 10.4, page 10–7

The MCR switch /CL and DCL qualifier /CODE:CLI indicate to TKB that the task is a command line interpreter (CLI). Use the /CL switch when you build the DCL task or any other CLI task.

**Note: The Fast Task Builder (FTB) supports neither the /CL switch nor the /CODE:CLI qualifier.**

Use the command line format shown next for the MCR switch /CL.

**file.TSK/CL,,=file.OBJ**

**Default**

/-CL

Use the command line format shown next for the DCL qualifier /CODE:CLI.

**LINK/TAS/CODE:CLI/MAP/SYM inputfile**

**Default**

/NOCODE:CLI.

**4.21.18 The /FM Switch and the /FAST\_MAP Qualifier**

Please add the following section to the manual in the following locations:

- Immediately after Section 10.12, Page 10–17
- Immediately after Section 11.20, Page 11–32

## Documentation Corrections

The MCR switch /FM and the DCL qualifier /FAST\_MAP inform TKB 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, FTB does not support the /FM switch or the /FAST\_MAP qualifier.**

Use the command line format shown next for the MCR switch /FM.

**file.TSK/FM,,=file.OBJ**

### Default

/-FM

Use the command line format shown next for the DCL qualifier /CODE:FAST\_MAP.

**LINK/TAS/CODE:FAST\_MAP/MAP/SYM inputfile**

### Default

/NOCODE:FAST\_MAP

---

## 4.22 RSX-11S System Generation and Installation Guide

Section 2.5 of this manual, entitled "The SETTIM Callable Subroutine," contains incorrect information on the FORTRAN callable routine SETTIM.

Please substitute the following information for Section 2.5:

SETTIM is a subroutine that can be called with FORTRAN to set the system's internal time. It is supplied to allow a running program to set the time in a configuration that does not include either a console terminal or basic MCR.

A new version of the FORTRAN callable subroutine SETTIM is available and is located in LB:[1,1]SYSLIB.OLB. Its module name is .STTIM. The interface to this routine is documented in the *RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual* under the STIMS directive.

The format of the FORTRAN call is shown next.

**CALL SETTIM** (*ibufn* [*ibufp* [*ids*]])

### Parameters

#### **ibufn**

Specifies an 8-word integer array; new time-specification buffer.

#### **ibufp**

Specifies an optional 8-word integer array; returns the previous time.

#### **ids**

Specifies an optional directive status.

Note that all the boundary checking is done within the directive itself and the status codes (documented under *STIMS* in the *RSX-11M/M-PLUS and Micro/RSX Executive Reference Manual*) are returned in the Directive Status Word (DSW) if specified.

Please make the following additional corrections to the manual:

- In Section 5.1.1, the documentation omits the commands for manually copying 11SGEN2.CMD from the distribution media to the target disk.

The command to copy 11SGEN2.CMD from a distribution disk is as follows:

```
> PIP ddnn:[200,200]=ddnn:[2,20]11SGEN2.CMD
```

The command to copy 11SGEN2.CMD from a distribution tape is as follows:

```
> FLX ddnn:[200,200]=mmnn:[2,20]11SGEN2.CMD
```

- In Chapter 6, Section 6.1.1, please make the following corrections:
  - The example that describes how to use the Peripheral Interchange Program (PIP) utility to copy files is incorrect. It should be as follows:

```
> PIP ddnn:[2,200]=ddnn[2,20]11SGEN.CMD
```

- If you are using a blank target disk with a tape kit, you need to perform the following steps before using the File Transfer Utility Program (FLX) to copy files:

- 1 The target disk must be initialized, as follows:

```
ALL ddnn:  
MOU/FOR ddnn:  
INI ddnn:11SKIT  
DMO ddnn:/LOCK=V
```

- 2 The tape containing the new kit must be mounted foreign, as follows:

```
MOU/FOR mmnn:
```

- 3 Before you copy the file 11SGEN.CMD, the directory [2,200] must be created on the target disk, as follows:

```
MOU ddnn:11SKIT  
SET /UIC=[1,1]  
UFD ddnn:[2,200]  
SET /UIC=[2,200]
```





# 5

---

## Virtual Device Subsystem Reference

This chapter describes the Virtual Device Subsystem which is included with RSX-11M Version 4.8. The subsystem allows the user to create a virtual disk from a file on a Files-11 volume, and to create a virtual disk device from a set of physical disks bound into a single volume, or from a dynamic common region in memory.

---

### 5.1 Introduction

The Virtual Device Subsystem comprises two parts: VFDRV (the Virtual Device Driver) and VCP (the Virtual device Control Program). VCP provides the user interface to create and manage virtual devices.

The Virtual Device Subsystem has the following features:

- Create a virtual disk from a container file on a physical or another virtual disk
- Create a bound volume set from two or more physical devices, accessed as a single virtual disk
- Create a virtual disk from a dynamic common memory region
- Create image copies of disks or physical tapes
- Hierarchical structure prevents inappropriate deletion or dismounting
- Permits dynamic expansion of the number of virtual units
- Provides diagnostic capabilities

**Note:** The virtual device subsystem included on RSX-11M does not include virtual tape support, unlike its RSX-11M-PLUS, and Micro/RSX counterparts. Any references to tapes in this section refers to physical tapes.

---

### 5.2 VCP Command Line

VCP (Virtual device Control Program) is invoked like standard installed utilities, either by direct command line, or input to the VCP> prompt. VCP accepts a task indirect command file as input.

**Format**

- >VCP **command**
- >VCP
- VCP>**command**
- >VCP **@commandfile**

## Virtual Device Subsystem Reference

VCP commands are all of the form *verb parameter /switches*. The standard VCP commands are shown below:

**CONnect**  $\left[ \begin{array}{l} \text{ddnn:}[\text{,ddnn:}[\text{,...ddnn:}]] \\ \text{file} \\ \text{main\_partition/MEM} \end{array} \right] \text{[/switches][=VFnnn:]}$

**DISConnect**  $\left[ \begin{array}{l} \text{virt\_dev:}[\text{/switches}] \\ \text{/ALL} \\ \text{/USER} \end{array} \right]$

**SHOw** [ddnn:][/switches]

**DUMp** [ddnn:][/switches]

**COPy** ddnn:[/switch] [TO] ddnn:[/switch]

**HELp** command [option]

**CREate** [dd:]/UNITS=ddd[/switches]

**TRAcE** virt\_dev:[/switches]

**STOP** virt\_dev:

**SET** ddnn:[/switches]

### Options

#### ddnn:

A valid RSX device or logical name.

#### file

A valid Files-11 filespecification.

#### /switch

Optional switch to control command effect.

**Note:** Switches must be specified with 3 characters or fewer.

#### dd:

A valid device, but must not contain a unit number.

#### virt\_dev:

Any virtual device handled by VF (may be a name other than VF)

---

## 5.3 Commands

The following section describes the commands. Note that some commands are privileged.

---

### 5.3.1 The CONnect command

The connect command is used to connect a file, a set of bound physical devices, or a memory region to a virtual device unit. The device attributes can be tailored, including the device size, type and the device name. Other attributes are described below.

### Formats

**CON file\_name[/switches][=device]**

**CON device\_1,[,device\_2,device\_n][[/switches][=device]**

**CON [main\_partition]/MEM[:size][[/switches][=device]**

The first form is to connect a Virtual Device to a file (file mode).

The second form is to bind physical devices as a bound volume.

The last form is to connect a Virtual Device to a memory region.

### file\_name

This field must contain a valid Files-11 filespec, and the device that the file resides on must be mounted. The user must have read, write, and extend access privileges to the file. The file must not be accessed by another user, or connected as another virtual device.

### file\_type

The file type for a virtual disk container is ".DSK".

### Notes:

1. When accessed in device mode, the target device must be mounted foreign and unallocated. If passthru mode (diagnostic) is selected, neither the virtual nor physical device should be mounted.
2. When accessed in file mode, the container file may be non-contiguous. For best performance, the files should have as few fragments as possible.
3. The connect operation checks access for the user. After connection, all access is covered by the RSX I/O mechanism, and if a volume is mounted, by the Files-11 volume access controls. The actual container is locked from file read-write activity, thus preventing deletion. Additionally, because of the hierarchical structure of nested virtual disks, a disk volume closer to the root of virtual disks cannot be dismounted.
4. On exit, VCP will put the VF unit number which was connected into the upper byte of the exit status word.

### Switches

#### **/CR—The CReate switch(File mode)**

The CReate switch instructs VCP to create the file specified. The switch takes an optional parameter specifying the size of the file in blocks. If the device is not mounted Files-11, or the user does not have the privileges required to create the file, the operation will fail.

The switch also allows a device type to be specified. For virtual disk devices, the file will be created with a size equivalent to the actual size of the physical device type specified. If the device type form of the create function is used, it will also establish defaults for the actions of the /TYPE switch, and whether the /BAD function should create a last track descriptor, or a standard bad block descriptor.

Disk file attributes will be defined as: fixed length, 512. byte records, best try contiguous, with the End-of-File marker set to the end of the highest block allocated.

## Virtual Device Subsystem Reference

### **/TYP—TYPE**

The /TYP (type) switch associates a specific device type with the file being connected, and will be available from the UCB Extension. The argument for this switch must be a string of valid RAD50 characters, which are meaningful to associate with the device.

When this switch is used in conjunction with the /CReate switch, the functionality of the "/SAVe" switch documented below will be included.

```
CONnect DU:[1,1]RP06/CR:RP06/TYP:XRP06
```

This command will create the file DU:[1,1]RP06.DSK, with 340,670 blocks, and will associate the device type of "XRP06" with the file. Once the file is created, the file will be connected to the next available VF: unit.

### **/SAV—SAVe device info (File mode)**

The /SAV (save) switch will associate a different "device type" with the "volume". It can only be used in conjunction with the /TYP switch, and will update the default volume "device\_type" stored in the file header of the "volume".

### **/BAD—BAD block handling (Disk File mode)**

The /BAD switch is used to write a "bad block" descriptor in the last block of the file. Since the "volumes" are stored on a previously initialized Files-11 volume, the use of the BAD utility is considered an overhead to the use of the volume.

This function will make the volume appear that the BAD utility had been run on the volume prior to initialization. The BAD utility can be used to update the empty descriptor created by utilizing the /UPD function of BAD.

If used in conjunction with the /LT switch the bad block descriptor will be created which conforms to the format for a last track device.

This function should only be used with a volume which has not yet been initialized, although this guideline is not enforced.

### **/LT—Last Track (File mode)**

The /LT (last track) switch causes the bad block descriptor created to use the format indicated for last-track devices.

The argument for the switch is the actual number of blocks associated with the device type. If the device type was given as an argument to the create command, or the /ATT switch is specified, VCP will automatically determine if the device type is a last-track device, and save the last-track information for use when a /BAD operation is specified. An example of the command is:

```
CONnect DU:[1,1]RL02/CR:20480/TYP:RL02/BAD/LT:20/DRV:DL:
```

This will set the device attributes for an RL02 device. By using either the /ATT switch, or a specific device type as the argument for the /CR switch, the last track information can automatically be determined.

```
CONnect DU:[1,1]RL02/CR:RL02/BAD
```

Both of the above commands perform an identical function.

### **/SN - Serial Number (File mode)**

The /SN (serial number) switch can be used in conjunction with the last track information obtained to write a specific volume serial number into the last track descriptor. The argument to the switch is a decimal number which will be placed into the first word of all last track descriptors created.

Using the example command above, the variation which would create a volume serial number of 400 would be:

```
CONnect DU:[1,1]RL02/CR:RL02/BAD/SN:400
```

### **/RON - Read Only**

The /RON (read-only) switch sets the device to read-only mode. Any attempts to write to the volume will be rejected with the status code of "Device write locked".

### **/DRV—Driver**

The /DRV (driver) switch will associate the connected volume with a specific device type other than VF. Prior to using this switch, the CREATE command must have been issued to create the data structures for the alternate device type.

```
CREATE DB:/UNIT=2  
CONNECT DU:[1,1]RP06/DRV:DB: or  
CONNECT DU:[1,1]RP06/ATT:RP06
```

These commands will create the data structures to be able to connect two virtual devices either through the device name VF:, or the device name DB:.

The second command will associate the RP06 file with the first available DB:, or alternate, device data structure associated with VF:.

### **/NM—No Message**

The /NM (no message) function will disable the display of informational messages.

### **/MOU—MOUnt**

The /MOU (mount) switch instructs VCP to mount the volume after it has been successfully connected. An argument list for the switch can be used to specify how the volume should be mounted. Each argument can be at most 3 characters long, and up to 5 arguments may be included.

The syntax for the command is:

```
CONNECT DU:[1,1]RP06/MOU:argument[:arg_2[:arg_3[,... ]]]
```

Valid arguments for this switch are any three character switches which are legal to the MCR MOUNT command. A few examples are:

```
OVR    - Mount the volume Files-11  
FOR    - Mount the volume as foreign  
PUB    - Mount the volume and set as public
```

### **/ATT—Attributes**

The /ATT (attributes) switch configures the virtual device to appear as the device type indicated. The device type information can be obtained from a number of sources, including the saved device type information in files, a /TYP switch included on the command line, or the device type specified in either /CR or /SIZ switches.

When used, VCP will attempt to connect the device to the device database entry which has the correct device name, indicate the device type in the UCB Extension, and determine what type of bad block information would be needed if the /BAD switch is specified.

## Virtual Device Subsystem Reference

### **/PAS—PASsthu (Device mode)**

Passthrough mode is a function of VFDRV where a virtual device is setup identically to the actual target device specified. In passthrough mode, only one device may be specified, and neither the virtual nor physical device should be mounted in any way, due to the implications of passthrough.

Passthrough mode will transfer all I/O requests, both data transfer and control QIOs to the specified device. The primary benefit of passthrough mode is to enable trace functions through the passthrough driver which would normally not be able to be observed. The unit data structures are set up to be exactly as the target device, and normal I/O directed to the device will be redirected through the VF: unit. The connected device must not be mounted, or have any attached tasks at the time the connect is issued.

### **/SIZ—SIZE (Device mode)**

The /SIZ function allows the user to specify the type of device to be emulated. This switch will allow multiple devices bound together to more accurately reflect the intended device type. If the /ATT function is used in conjunction with the /SIZ switch, the other device characteristics such as device type, and device name will also be applied to create the correct environment for the application.

For example, two RK07 disk drives, and one RL02 can be merged to create an equivalent number of blocks as provided on an RM02/3 disk drive. Using the /SIZ and /ATT switches together can create a suitable device to backup an RM02/3 disk drive; i.e.

```
CREATE DR:/UNIT=1
CONNECT DM0: ,DM1: ,DL2:/SIZ:RM02/ATT
```

This will create an environment suitable for backup of a physical RM02 with the merged devices DM0:,DM1:, and DL2:.

### **/MEM—Memory**

The /MEM (memory) switch defines that the device will utilize a portion of the system's main memory as a mass storage device. The size can be given as either a physical type of device, or as a physical block size which must be smaller than the largest available "hole" in memory.

```
CREATE DU:/UNIT=1
CONNECT /MEM:RX50/ATT/BAD
```

In this example, an alternate device structure is created, with a device type of "DU", and the second command allocates an 800. block segment of memory, and utilizes it as an RX50 type device.

---

### 5.3.2 The DISconnect command

The disconnect command will disconnect a file, unbind a set of bound physical devices, or disconnect a memory region from a virtual device unit. The file associated with the device will be closed and the virtual device marked as offline. If the device was connected by an alternate device name, the unit data structures will be restored. The format of the Disconnect command is shown below:

#### **Format**

**DIS [ddnn:][/switches]**

### Switches

#### **/DEV, Sub-devices**

The **/DEV** switch controls whether VCP will scan the other VF: data structures looking for a hierarchical device structure below the target device to be disconnected. If so, the devices below the target device will be dismantled and disconnected prior to the target device being dismantled and disconnected.

#### **/DMO**

The **/DMO** (Dismount) switch is used to request VCP to dismount the target device prior to disconnecting it. Once the device is dismantled, the disconnect operation will continue.

#### **/ALL**

The **/ALL** option is used to disconnect all VF: devices in a hierarchical manner. All devices connected to the top level virtual disk will be dismantled, and the the next device still connected will be done, until all devices are disconnected, or an error occurs.

---

### 5.3.3 The SHOW command

The show command will show the status of any virtual devices on the system.

#### **Format**

#### **SHO [device:][/switches]**

##### **device:**

is the virtual device (VFnn:) for which to show status. If omitted, the status of all devices will be displayed.

##### **switches**

are one or more of the switches described below.

#### **Status display for a connected disk drive**

```
VF1: 07226 Public,Mounted,Label=RSX11MPLBL82,Connected,Type=VRP06
(DB3:) File: DU2:[001001]RP06.DSK;1, Base_LBN: 3
FCB extension: 33670, Size: 340670
```

#### **/ALL**

The **/ALL** switch includes all the other SHOW switches.

#### **/FULL**

The **/FULL** switch is used to include the device information for the selected virtual devices from their respective Unit Control Block Extensions

#### **Binary Dumps**

The following switches produce binary dumps of the specified data structures:

- /DCP** - Device Control Block
- /UCB** - Unit Control Block
- /SCB** - Status Control Block
- /FCB** - File Control Block Extension and Window Block
- /MAP** - Noncontiguous file mapping pointers

## Virtual Device Subsystem Reference

A listing of all of the binary data structures which correspond to the display for VF1: shown above would be:

```
Device Control Block, VF: @ 052234
052234 / 065354 072226 043126 001001 000054 120052 177477 000070
052254 / 000000 177200 000377 000000 000000 000377 032224

Unit Control Block, VF1: @ 072226
072220 / 033670 000000 000000

072226 / 052234 072226 000721 002001 140110 000005 031276 001000
072246 / 072576 000000 006400 137154 001000 002241 070604 074054
072266 / 000000 000000 000000

FCB_Extension @ 033670
033670 / 115014 036134 000000 000003

File Window Descriptor @ 036134
036134 / 015402 000004 124774 000000 000000 000000 000000
```

---

### 5.3.4 The DUMp command

The dump command is similar to the SHOW command, except that the display output is sent to a specified file, and that all VF: devices are shown.

#### Format

**DUMP file\_name[/switches]**

file\_name is a valid Files-11 output file spec and switches are described under the SHOW command. If an output file name is not specified, output is to TI:

---

### 5.3.5 The COPY command

The copy command is used to copy disks or tapes to another device, providing it is as large, or larger than the input device. The format of the command is as follows:

#### Format

**COPY indevice:[/switches] [TO] outdevice:[/switches]**

**COPY outdevice:[/switches]=indevice:[/switches]**

Valid switches are:

/FILE = Copy device in Files-11 mode (copy only allocated blocks)

/DEVICE = Copy all logical blocks

/WRITE = Perform write checking on the output device

/BUFFER:size =(Tape\*) Use buffer of "size" bytes

/STATUS = Display copy status in 1000. block increments

#### Description

The COPY command can be used to duplicate disk/tape devices which performs a block by block copy operation. The command can be done in both Files-11 mode, or device mode, to perform the copy operation.



In Files-11 mode, the RSX-11M-Plus shadow catchup functionality is duplicated, which will utilize the input devices bitmap to determine which blocks should be copied.

In device mode, a block by block copy is performed, until the end of volume is reached, which will handle foreign device structures, tapes and non-Files-11 disks.

**Note: The COPY command can be used to copy physical tapes. Virtual tape support is not included.**

### 5.3.6 The CREate command (Privileged)

The CREATE command is used to dynamically add additional device structures. Each time the command is issued, an additional Device Control Block (DCB) data structure is created, however the original Status Control Block (SCB) is utilized by all units connected using the VF: driver.

Create is a privileged command, due to the potential impact it could have on primary pool, if a sufficiently large number of units are created. Each time the command is issued, one DCB (30. bytes), and "n" UCBs (46. bytes) are created. If a device name other than "VF:" is specified an additional DCB is also required.

Optionally, this command can be used to connect one of the virtual units to another type of device, as specified in the command line. In this case, two DCB data structures are created which both point to the same set of Unit Control Blocks (UCB). Until the device is connected to the alternate device name, the device will not appear in the system device list, and the logical unit range will not be determined until a device is connected using the alternate DCB. This provides the interlock which will allow the VF: driver to be unloaded while alternate device data structures have been allocated, and eliminate any possible race condition which could occur while loading or unloading a physical device driver.

#### Format

**CREate [dd:]/UNIts=ddd[/switches]**

#### dd:

The device name of the alternate device to connect. If omitted the command will only create additional VF: data structures.

#### ddd

The number of devices to create from 1 to 255 (decimal), inclusive. The total number of VF: units cannot exceed 256.

#### Switches

##### /DEVICE=VFnn:

The optional switch "/DEVICE" can be used to control whether an actual create function is performed. In the case of a startup command file, the units would only be created if the unit specified in the "/DEVICE" argument would be the first device created as a result of the CREATE command.

### 5.3.7 The SET command (Privileged)

The SET command allows the user to dynamically change the attributes of a connected device which would be done through another series of commands.

Its primary functionality is to allow the user an increased flexibility in controlling the functions and states of a connected device. The format of the command is:

#### **Format**

**SET device:/switch\_1[/switch\_n]**

For some options, the device specified may be a device other than a VF: unit, and for other options only a VF: device is allowed to be altered. If an option is available for all devices on the system, it will be indicated in the description.

- ONLINE - Set device as being ready
- OFFLine - Set device into not ready status
- RON - Set device as being readonly
- RW - Set device as being read/write
- ZERO - Clear all device counters
- REWind - Issue rewind command to tape device

#### **/ONLine**

The ONLINE function is used to "ready" a device. For virtual disks, it will set volume valid.

```
VCP>SET DR3:/ONLINE
```

#### **/OFFline**

The OFFLINE function is used to "unready" a virtual device. For disks, it will clear volume valid.

```
VCP>SET DR7:/OFF
```

#### **/RON**

The ReadOnly function sets a device into read-only mode, by setting the software write lock bit in the device's unit characteristics word.

```
VCP>SET DR7:/RON
```

#### **/RW**

The ReadWrite function sets a device into read/write mode, if it was disabled by software. This function cannot be used to enable a device which is hardware write protected.

```
VCP>SET DB4:/RW
```

#### **/ZEro**

The ZERO command is used to zero all counters associated with a device. These include both VF: specific counters, and RSX counters.

```
VCP>SET DR2:/ZE
```

### **/REwind**

The REWIND function will issue a rewind command to a specific magtape unit, return the device to <BOT>.

```
VCP>SET MS2:/REW
```

---

## 5.4 Technical Overview

This section describes the basic algorithms used to implement the virtual disk driver, and the protection mechanisms which allow the driver to insure data integrity of the system as a whole, and of the disk data structures.

---

### 5.4.1 General

In general, the driver uses the RSX-11M/M-Plus I/O hierarchy to allow a very flexible usage of devices in the system. Each virtual device accessed as a file on a previously mounted device uses the Files-11 File Control Block to preserve the data integrity of the device at each higher level. By removing the File window block from the task header at the time the file is accessed, this keeps the volumes transaction count at a non-zero level while the virtual device is accessed. Since the volume is considered to be an open file, the space on the disk cannot be deleted until the file is deaccessed, and effectively, the space is reserved for the driver.

For devices bound together as a volume set, each member of the set is redirected to the target device, and as such any I/O directed to the member volume will be handled by the virtual disk unit. If the volume is not mounted as passthru, the volume must be mounted foreign, since control I/O functions will be not passed on to each of the member volumes.

If this concept is followed down to multiple levels, each device which resides on a higher level device structure also has the space "reserved" at each level, and due to the transaction counts being maintained, none of the volumes in the hierarchy can be dismounted until each volume at a lower level is also released.

---

#### 5.4.1.1 Access rights, and privileges

In order to connect a volume to a virtual device, the user must have full access to the volume and file which is to be connected. If the user does not have the access, the file access will fail, and the connect request will be terminated. Once the user has connected the volume to a virtual device, the protection mechanism again returns to the normal device protection available from RSX-11M/M-Plus. If the volume is allocated, or mounted public, the user must be privileged to affect a system volume. Similarly, if a non-privileged user connects, and subsequently mounts the volume private, that user will have full access rights to the volume. In order to disconnect a volume from active use, it must be dismounted, and for a non-privileged user, this function will be reserved to volumes which were previously mounted by the user, and which are not public devices.

## Virtual Device Subsystem Reference

---

### 5.4.1.2 Create Function

Since the function has consequences on a system wide basis, and can affect system primary pool, this function is reserved to privileged users. The basic function of the create command is to allow the system to dynamically expand the device data structures used by VFDRV. The driver utilizes a common Status Control Block (SCB) for all units created on the system, so the data structures which are created by this function are the additional DCB which will be used by the added devices, and the Unit Control Blocks (UCBs) which are specified by the argument of the command. If an optional device name is included in the create command, an additional DCB will be added which will reference the same set of unit control blocks under a different device name.

Alternate device DCBs will not be linked into the system's device list until the unit is actually connected. This allows flexibility in the actual handling of physical device drivers. If an alternate DCB existed prior to the actual loading of the physical device driver, the actual device driver would attempt to utilize the data structures created by VCP, which would not contain real controller references. As such, the final result would be unpredictable, with a system crash being the most likely outcome.

All DCBs created by the utility will fall in ascending sequential order from the last DCB included in the system for the specific device type. In this case, the logical unit number of the alternate device name may not be the same as the logical unit number under which the unit is accessed as a VF: device.

---

## 5.4.2 Connect Function

The CONNECT function is the principal "work" function performed by the control program. Its purpose is to allow a virtual device to use a specific file as the target for the device operations. The connect function can also create the target file, and assign specific attributes to the virtual device in the process of the connect operation.

---

### 5.4.2.1 File access

The first step in connecting the virtual device is to ensure that the file can be accessed for use. The user must have read, write, and extend access to the file in order to connect it.

---

### 5.4.2.2 Device access

For merged devices, the target device must not be mounted Files-11, and not allocated to another user. If these conditions are not met, an error message will be generated. For RSX-11M-Plus, the volume must be mounted foreign.

When passthrough mode is selected, the device must not be mounted.

---

### 5.4.2.3 Virtual Unit selection

After the file is accessed, the program searches the volatile data base to determine if there are any virtual units which can be used to access the file. The user may specify a specific unit to be used, or add a condition that the device be connected using a specific device name.

If the device selected is to be accessed using a device name other than VF:, the UCB must have the DCB back pointer redirected such that the device will appear to be the correct device name.

---

### 5.4.2.4 File linkage to virtual device

At this point, the File Control Block Extension (FCBX) is allocated, and pointed to by the UCB pointer U.FCBX. Then the control word of the target device must be copied, such that if the device is an NPR device, the buffer words are set up correctly to allow the driver to transfer the data correctly. Finally, the Unit Control Block Extension is allocated, and the device type information is copied to the secondary pool extension.

Once the UCB data structures are set up, the UCB is set to an online state, and the driver is called at the power fail entry point, to ensure that it is ready to accept the subsequent I/O requests which will follow.

---

### 5.4.2.5 Multiple Device Transfers

The driver is capable of breaking an individual task I/O request into multiple individual requests. Each I/O packet is queued to the actual physical device which will then perform the actual I/O, and returned to VFDRV after the function is complete. The packet totals are updated in the original I/O packet to reflect the actual number of bytes transferred, and if the byte count has not been satisfied, the next device in the volume set is used, and the base logical block number is reset to zero.

---

## 5.4.3 Device Data Structures

This section describes the device data structures associated with the driver. Most entities are standard RSX-11M/M-Plus device structures, with a few additional data structures added. The UCB structure is extended backwards up to a maximum of 10. bytes. The data structures described are:

- Unit File Control Block Extension (U.FCBX)
- Unit I/O Outstanding Queue (U.IOPQ)
- Unit Device Control Block Pointers (U.DCBP,U.DCBS)

The definition which describes these offsets is:

```
.ASECT
= -12
U.DCBS: .BLKW 1 ; Secondary DCB pointer
U.DCBP: .BLKW 1 ; Primary DCB pointer
U.FCBX: .BLKW 1 ; File Control Block Extension
U.IOPQ: .BLKW 1 ; I/O Pending Queue
U.MUP: .BLKW 1 ; Multi-user Protection Word
U.DCB: .BLKW 1 ; Back pointer to DCB (=0)
```

Each of the structures pointed to by the UCB is described in the sections below. The offsets U.MUP, and U.DCB are standard offsets within the RSX device data structures. The offsets U.DCBS, and U.DCBP can only exist on

## Virtual Device Subsystem Reference

the first UCB of the associated data structure, and all other units will have at most three negative offsets.

### U.FCBX

The Unit File Control Block Extension is used to describe the relationship of the device to the next higher level data structure, namely the target device on which the device lives. The File Control Block Extension (FCBX) is a 6 word structure, with the following structure:

```
.ASECT
=0
FX.UCB: .BLKW 1 ; Destination UCB
FX.WDB: .BLKW 1 ; File Window Block (@I.LN2)
FX.LBN: .BLKW 2 ; Starting LBN on device
FX.TCB: .BLKW 1 ; TCB address of trace task
FX.REL: .BLKW 1 ; Trace buffer logging bias
FX.SIZ: .BLKW 0 ; Size of this data structure
```

for merged devices, the list format is slightly different;

```
.ASECT
=0
FX.UCB: .BLKW 1 ; Destination UCB
FX.LNK: .BLKW 1 ; Link word to next device FCBX
        .BLKB 1 ; Unused
FX.FLG: .BLKB 1 ; .GT. 0 if merged device list
        .BLKW 1 ; Unused
FX.SZ0: .BLKW 0 ; Size of subsequent device FCBX's
FX.TCB: .BLKW 1 ; TCB address of trace task
FX.REL: .BLKW 1 ; Trace buffer logging bias
FX.SIZ: .BLKW 0 ; Size of this data structure
```

and for memory regions, the following offsets describe access to the dynamic region:

```
.ASECT
=0
FX.UCB: .BLKW 1 ; Destination UCB (=0 for memory)
FX.PCB: .BLKW 1 ; PCB address of memory partition
FX.PTY: .BLKW 1 ; Address of ICB parity block
FX.FRK: .BLKW 1 ; Address of possible fork block
FX.TCB: .BLKW 1 ; TCB address of trace task
FX.REL: .BLKW 1 ; Trace buffer logging bias
FX.SIZ: .BLKW 0 ; Size of this data structure
```

### FX.UCB (Destination UCB)

The UCB field of this structure describes the target unit on which the virtual device actually lives. This device may be a physical device or another virtual device. The I/O packet will be forwarded to this device, after adjusting the destination LBN to be in line with the starting LBN of this virtual unit mapped to the target UCB.

For memory regions, this field is set to zero.

### **FX.WDB (Window Block)**

The window block is the mechanism whereby the driver locks the virtual device to the next level device structure. This is the window block which is created when VCP accesses the file during the connect operation. The format of the data structure is that of a Files-11 Window Block, described in the system macro F11DFS.

### **FX.PCB (Region PCB address)**

The PCB address is utilized for memory regions to describe the partition which is being utilized as the disk region. This PCB is then linked into the appropriate main partition to reserve the memory for use as a memory disk.

### **FX.LNK (FCBX Link word)**

For bound volume sets, the link word serves to point to the next FCBX data structure associated with the device. The end of the list is terminated with a zero link word.

### **FX.LBN (Starting LBN)**

The starting LBN is that value which is the address of virtual block 1 of the file accessed when the unit was connected. This 24-bit base LBN is added to the logical block values stored in parameters four and five of the QIOS directive parameter block passed to the driver when the QIOS directive is issued.

### **FX.FLG (Flags byte)**

The flags byte overlaps the high order byte of the starting logical block number. Since the logical block cannot exceed 24 bits, this flags byte will be zero for a volume which is actually a file.

### **FX.SZ0 (Secondary FCBX size)**

FX.SZ0 represents the number of bytes which will be used for all subsequent FCBX's associated with a merged volume set. Only the primary FCBX will maintain the data structures associated with trace operations.

---

## 5.4.4 U.DCBP,U.DCBS

The offsets are defined only for the first unit of a multi-accessed unit, and point to the two Device Control Blocks (DCBs) possible for these units. In order for this data structure to exist, the status bit UU.MUN is set in the utility word (U.UTIL) of the UCB. These words allow VCP to determine if the DCB is in use, or that the DCB is available for that unit.

---

## 5.4.5 U.IOPQ

The Unit I/O pending Queue is used to be able to determine what I/O packets are currently queued to other drivers (including VFDRV). The queue is only used when one of the following conditions are in effect:

- The unit is being shadowed
- The unit has an I/O packet which has an internal I/O completion queued

## Virtual Device Subsystem Reference

- The packet crosses actual physical device boundaries

The internal I/O completion function is currently used to implement disk data caching, where the UCB field of the I/O packet is required to be correct for the I/O function. When an I/O packet is defined to be one of the above functions, the driver will either a) Duplicate the I/O packet to set up an internal I/O completion function itself, or b) attach a rider packet to a previously duplicated packet created by the driver. The "packet" is then attached to the newly created I/O packet through the I.AADA packet offset, and the current UCB address is placed into offset I.AADA+2. These packets allow for a normal "unwinding" of the I/O packet during the I/O Done processing.

The offsets defined for this use are:

```
.ASECT
      = I.AADA
I.ILNK: .BLKW  1           ; I/O Rider link
I.IUCB: .BLKW  1           ; Next level UCB to complete
      = 0
R.ILNK: .BLKW  1           ; Next rider link
R.IUCB: .BLKW  1           ; Next level UCB address
```

When the rider link word (R.ILNK) field becomes zero, then the rider packet is actually the original I/O packet queued to VFDRV at the first level.

At that point, the duplicated I/O packet is released back to primary pool, and the completion status is passed back through \$IODON, to return the final status to the caller.



# 6

## Year 2000 Certification for RSX-11M/S V4.8

---

RSX-11M/S V4.8 was released in November of 1998, and includes full testing for Year 2000 Readiness.

RSX-11M/S V4.8 is not compliant with either ISO 8601:1988, or ANSI X3.30 standards with regard to date presentation. All dates are presented as DD-MMM-YY, or in some cases dates will be displayed as DD-MMM-YYYY.

RSX-11M/S V4.8 is compliant with the BSI-DISC PD2000-1 standard with regard to date handling.

Since dates are displayed using only two digit years, and based on PD2000-1 the century inferencing rules will specify that years greater than seventy-seven (77) will be in the twentieth century (preceded by 19), and those less than twenty-seven (27) will be in the twenty-first century (preceded by 20).

---

### 6.1 Internal Date Storage

The date format utilized within the utilities conforms to the standard time format used by RSX-11M/M-PLUS.

Below is shown the date/time format which is used by RSX-11M/M-PLUS;

```
      15                               00
+-----+-----+
!           Year - 1900           !
+-----+-----+
!           Month                 !
+-----+-----+
!           Day                   !
+-----+-----+
!           Hour                  !
+-----+-----+
!           Minute                !
+-----+-----+
!           Second                !
+-----+-----+
```

All date related functions provided by the operating system have been extensively tested to insure compliance with the DISC PD2000-1 standard, through the year 2027.

## 6.2 Disk File System

The RSX Family uses Files-11 Structure level 1. This volume structure contains an index file, which contains file headers for all files on the volume. The file header contains all of the information relating to the file's creation date, revision date, and expiration date. RSX-11M does not utilize the file expiration date for any purpose.

### 6.2.1 Files-11 File Headers

The file header block is organized into four areas, of which the first three are variable in size.

- Header Area
- Identification Area
- Map Area
- Checksum

The Identification Area includes the applicable date fields.

#### 6.2.1.1 ODS-I File Header Identification Area Description

The ident area of the file header begins at the word indicated by H.IDOF. It contains identification and accounting data about the file.

**Table 6-1 Identification Area**

Offset	Size	Description
I.FNAM	6 Bytes	File Name, These three words contain the name of the file, packed three Radix-50 characters to the word. This name usually, but not necessarily, corresponds to the name of the file's primary directory entry.
I.FTYP	2 Bytes	File Type, This word contains the type of the file in the form of three Radix-50 characters.
I.FVER	2 Bytes	Version Number, This word contains the version number of the file in binary form.
I.RVNO	2 Bytes	Revision Number, This word contains the revision count of the file. The revision count is the number of times the file has been accessed for write.
I.RVDT	7 Bytes	Revision Date, The revision date is the date on which the file was last deaccessed after being accessed for write. It is stored in ASCII in the form "DDMMYY", where DD is two digits representing the day of the month, MMM is three characters representing the month, and YY is the last two digits of the year.

**Table 6–1 (Cont.) Identification Area**

Offset	Size	Description
I.RVTI	6 Bytes	Revision Time, The revision time is the time of day on which the file was last deaccessed after being accessed for write. It is stored in ASCII in the format "HHMMSS", where HH is the hour, MM is the minute, and SS is the second.
I.CRDT	7 Bytes	Creation Date, These seven bytes contain the date on which the file was created. The format is the same as that of the revision date above.
I.CRTI	6 Bytes	Creation Time, These six bytes contain the time of day at which the file was created. The format is the same as that of the revision time above.
I.EXDT	7 Bytes	Expiration Date, These seven bytes contain the date on which the file becomes eligible to be deleted. The format is the same as that of the revision and creation dates above.
	1 Byte	(unused) This unused byte is present to round up the size if the ident area to a word boundary.
S.IDHD	46 Bytes	Size of Ident Area This symbol represents the size of the ident area containing all of the above entries.

**6.2.1.1.1 Date format to support year 2000 and beyond**

Files–11 only allows for dates to be presented as "DDMMMYY", which presents a problem for files created or revised after the year 2000.

ODS–1 provides a 7-byte ASCII field for creation and other dates. In order to accommodate this restriction in a way that is consistent with RSX date handling, the 2-bytes of year in the date attribute will be used to represent the year since 1900.

The two bytes will be encoded as follows:

- Low byte—Low order decimal digit of year, in ASCII.
- High byte—Quotient of years since 1900 divided by 10, plus 60g. This represents the ASCII high digit of the year from 1900 – 1999. In 2000, however, this will result in ":" being stored for the high digit of the year. For years 2010 through 2019, ";" will be stored, and so forth. This change should result in another 200 years or more of file representations.

**Table 6–2 Storage of Date Fields after 1990**

Calendar Year	Year Field Representation
1990 – 1991	90 – 99
2000 – 2009	:0 – :9
2010 – 2019	;0 – ;9
2020 – 2029	<0 – <9
2030 – 2039	=0 – =9
2040 – 2049	>0 – >9

**Table 6-2 (Cont.) Storage of Date Fields after 1990**

Calendar Year	Year Field Representation
2050 – 2059	?0 – ?9
2060 – 2069	@0 – @9
2070 – 2079	A0 – A9
2080 – 2089	B0 – B9
2090 – 2099	C0 – C9
2100 – 2109	D0 – D9
2110 – 2119	E0 – E9
2120 – 2129	F0 – F9
2130 – 2139	G0 – G9
2140 – 2149	H0 – H9
2150 – 2159	I0 – I9

## 6.2.2 File system attributes

The following sections describe how application interface with the Files-11 Ancillary Control Processor (F11ACP). In most cases, the system provides date information in the format described in the previous section.

In some cases, the information returned is formatted in a format which is compatible with the OpenVMS operating system, and is a 64-bit quantity expressed in 100ns intervals since 17-November-1858. Within this document, this quantity is referred to as a VMS quadword.

The table below describes the various date related functions processed by F11ACP, and the type of date data which is returned:

**Table 6-3 F11ACP Date attributes**

Attribute code	Return Field(s)	Format
8.	File expiration date	DDMMYY
10.	Full file header	DDMMYY
13.	Creation/Revision date	DDMMYY
17.	Creation date	VMS quadword
18.	Revision date	VMS quadword
19.	Expiration date	VMS quadword

The ASCII date format will extend file dates well beyond 2100, while the algorithm used within RSX-11M for calculation for generating the VMS quadword format will overflow after 2036.

RMS-11 V2.0 is the primary use for the VMS quadword format. Most other utilities will be unaffected.

## 6.3 Magnetic Tape Standards

Date information is stored within the ANSI Header 1 label (HDR1), which specifies the creation date of a given file. This date is specified to be of the form `_yyddd`, where `_` represents a blank, and `yy` is the year within the 1900s, and `ddd` is the day within the year. Each digit is stored as a single ASCII digit `"0-9"`. This format conforms with a level 3 implementation of the ANSI standard (X3.27-1978). The level 4 standard replaces the `"_"` blank character with `"0"` for the year 2000, and the `yy` field represents the year within the century.

RSX-11M includes support for ANSI X3.27-1978 level 4 magnetic tape labels. This includes full support for the Year 2000, although the same ASCII attributes exist for accessing the date fields stored in the HDR1 label on tape.

MTAACP accepts the same date attributes as F11ACP, except for the revision date. It also uses the same algorithm, which limits the maximum allowable year for VMS quadword attributes to 2036.

For ASCII dates, MTAACP supports dates from 1900 through 2099.

RSX-11M implements ANSI compliant level 4 records, on all utilities tested. This insures that all media transfers will be compatible with other systems implementing the ANSI level 4 standard.

**Table 6-4 RSX-11M ANSI tape dates**

Date	ANSI
10-JAN-1998	_98010
10-JAN-2000	000010
10-JAN-2010	010010

## 6.4 Foreign System Interchange

The FLX utility is the only RSX component which deals with foreign system interchange.

The FLX utility will handle DOS, and RT-11 volumes. For DOS, the valid date range is 1970 through 2035, and for RT-11 volumes, the valid date range is 1972 through 2099.

For both file systems, the entire valid date range is supported via FLX, with no restrictions.

---

## 6.5 Backup Utilities

Three utilities are supplied with RSX-11M for the purpose of backup. These are RMSBCK, RMSRST, and BRU. Each of these utilities will properly handle the full supported date range, and include support for century inferencing. When a year is specified as two digits, the inferred date range will be from 1965 through 2064. Four digit years are also supported, and must be specified as a value greater than 1900.

RMSBCK, and RMSRST also properly handle the full supported date range, from 1900 through 2027 inclusive. Internally, both utilities are limited to 2155, although extensive testing has not been done beyond 2027 on RSX-11M.

---

## 6.6 Networking

The network architecture of DECnet, includes two specifications which limit the overall supported dates for various operating systems. These are Network Management Protocol (V4.2.0), and Data Access Protocol (V7.1).

---

### 6.6.1 Data Access Protocol V7.1

The Data Access Protocol (DAP) used for file transfers, includes a file date and time (DTM) message. The DTM message stores the date as "DDMMYY", and only includes two ASCII digits for the year. The date field is followed by a time field, in a similar ASCII format which does not have any limitations.

This message has three sub-groups, which, if present, are indicated in a menu byte. These are the creation date, revision date, and expiration date. Each of these date groups has the same "DDMMYY" formatted date.

Since only two digits are used, century inferencing must be applied to the dates provided. All two digit fields in the range 70 through 99 are treated as being in the twentieth century, while those in the range 00 through 69 are treated as being in the twenty-first century, resulting in a valid date range of 1970 through 2069.

---

### 6.6.2 Network Management Protocol V4.2.0

Network Management protocol used for logging DECnet events, includes a date and time stamp, which is calculated as Julian half-days since 1-Jan-1977. The formula for the conversion is:

$$\begin{aligned} \text{JULIAN} = & (3055 * (\text{MONTH} + 2) / 100 - (\text{MONTH} + 10) / 13 * 2 - 91 \\ & + (1 - (\text{YEAR} - \text{YEAR} / 4 * 4 + 3) / 4) * (\text{MONTH} + 10) / 13 + \text{DAY} - 1 \\ & + (\text{YEAR} - 1977) * 365 + (\text{YEAR} - 1977) / 4 * 2 \end{aligned}$$

If the resulting value is considered a signed 16-bit integer, the date range available is from 1-January-1977 through 9-November-2021, or 44 years.

If the resulting value is considered to be unsigned, the date range can be expanded to 2065.

The RSX-Family treats the resulting value as unsigned, and will support network event logging until 2065.

Once the limiting date is passed, events will continue to be logged, however the time stamp will rollback to 1977, and will be relative to that year.

---

## 6.7 File System Utilities

All file system utilities have been extensively tested for Year 2000 Readiness, and no issues have been identified over the supported range of dates, 1977 through 2027.

The PIP utility has been modified to include support for the "/Y4" switch which will display file creation/revision dates as four digits. In addition, century inferencing has been included, and all 2-digit dates will be inferred to be in the range from 1965 through 2064.

---

### 6.7.1 Utility Date Format

All utilities accept dates in one of the format(s) described below:

- DD-*MMM*-YY
- DD-*MMM*-YYYY

Field	Description
DD	Two-digit day of the month
MMM	Three character English abbreviation of the month of the year; i.e. JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
YY	Two-digit year inferred to span between 1965-2027
YYYY	Four-digit year in the range 1900-2027

---

## 6.8 Assemblers, Compilers, and Linkers

The Macro-11 assembler has been corrected with regard to date presentation. Affected are the output list, map, and cross reference files produced by the assembler and task builder. The MACRO assembler considers the year 1900 to indicate that there is no valid date in the system, and will not output a date if the current system date is set to 1900.

The task creation date which is stored in the task label block is stored in a binary format, and the year is stored relative to 1900, and is identical to the internal system time format used by RSX-11M/S.

---

## 6.9 Batch and Queue

The RSX-11M Queue Manager and Command Line Interface can correctly handle dates in the range from 1977 through 2155, although it considers the year 2100 to be a leap year.

---

### 6.9.1 Queue Manager Processing Options

In RSX-11M V4.7, the structure for the Queue Manager was changed, with regard to date processing. Below is a description of the changes which were incorporated, and how this may affect applications.

Prior to RSX-11M V4.7, the Queue Manager and spooling tasks (QMGCLI) provided 4 bits for storing the year specification in a PRINT/AFTER job. Also, the data structures passed between the Queue Manager and QMGCLI that were stored in queue file QUEUE.SYS provided 4 bits for storing year specification in PRINT/AFTER jobs. The information has been stored as an increment from 1977.

Now, the year specification is stored as an 8-bit value, as an increment from 1900. Along with this change, the storage of month, day, hour, and minute have been changed.

Prior to starting the new Queue Manager, the system manager should assure that the old QUEUE.SYS file is empty, that is, the results of a SHOW/QUE instruction shows all queues empty of held, pending, stopped, paused, etc. jobs. A new QUEUE.SYS file will be created by the Queue Manager when it starts.

Although the spooler tasks included with this version have been modified in accordance with the new formats, application programs may include spoolers that have not been updated. The former syntax for packets from a spooler task to the Queue Manager remains acceptable, although certain assumptions are made.

If a packet is received with function QM.OPJ (former Open Job function) or QM.MDJ (former Modify Job function), the Queue Manager modifies the packet to the new format before storing it in QUEUE.SYS. The former 4-bit Year increment value is assumed to be a modulo-16 delta from 1977, specifying a date subsequent to current system time. This is implemented by adding 16 to the increment until the year is greater than or equal to that of the current system time.

Any tasks that directly access the Job Entry structure in QUEUE.SYS will have to be modified accordingly. Symbolic offset names are maintained so, unless the task accesses the After Time or Job Time Stamp fields, they probably only require you to assemble and link them again. Tasks that do make use of the Time fields should be recoded for consistency with the new format.



---

## 6.10 System Management

RSX-11M/S V4.8 includes full support for century inferencing on dates entered. All utilities will accept either a 2 or 4 digit year. If the year is specified as two digits, it will be inferred to be in the range from 1965 through 2064. If the year is specified as four digits, the full date range is available from 1900 through 2099.

All of the RSX-11M/S System Management Utilities have been updated to include century inferencing, in particular, the error logging subsystem, and the system date and time utilities.

For volumes initialized after 2000, the volume creation date is stored and interpreted as described for other date fields used in ODS-I. This is also true for the volume revision date.

When using RSX-11M with the KDJ11-E processor, namely the PDP-11/93, or PDP-11/94 processors, users should be sure that the console firmware being used is at Version 2.01 or higher.

---

## 6.11 Year 2000 issues in RSX-11M/S V4.7

The following problems were addressed in RSX-11M/S V4.7 product, and should be considered when deciding to upgrade to RSX-11M/S V4.8.

---

### 6.11.1 Century inferencing

RSX-11M/S V4.8 includes full support for century inferencing on dates entered. All utilities will accept either a 2 or 4 digit year. If the year is specified as two digits, it will be inferred to be in the range from 1965 through 2064. If the year is specified as four digits, the full date range is available from 1900 through 2099.

---

### 6.11.2 MCR TIME

Three issues exist for RSX-11M/S with regard to the MCR/DCL TIME command:

- TIME /SYNC, TIME /SETTOY function incorrectly with the KDJ11-E processor.
- TIME fails to setup the days per month value in the executive correctly.
- TIME has no mechanism to determine which century the system believes it is running in.
- For RSX-11S, TIME cannot set the current year beyond 1999.

The TIM command incorrectly sets the year in the KDJ11-E toy clock to include invalid BCD digits. This caused the KDJ11-E firmware to reset the TOY clock to 1-Jan-1990.

## Year 2000 Certification for RSX-11M/S V4.8

Previously, the TIM command incorrectly set the number of days per month, which resulted in all months having thirty one days, unless the STIMS directive was issued. This issue has been corrected.

In BASMCR, there was a correction to allow the input of four digit dates, which was incomplete. The result was that BASMCR could not set the date beyond 1999. It should also be noted that BASMCR has never set the days per month value in the executive, and this will continue to be a restriction.

In addition, the display from time has been updated to display the year in four digit format.

---

### 6.11.2.1 RSX-11M V4.7 Correction for TIME

The following correction allows for RSX-11M V4.7 to correctly interface with the KDJ11-E TOY clock with regard to the use of the /SYNC switch. It will disable the /SETTOY switch, and is included here for those who cannot upgrade and are using the KDJ11-E processors.

The corrections given below will remove the use of the /SETTOY switch associated with the MCR TIME command, but will allow full functionality from the "TIM /SYNC" command. Users should adjust the TOY clock using the console firmware.

In addition to the problem with the KDJ11-E, an additional problem has been identified within RSX-11M and RSX-11S, which is also addressed in this correction. The problem is that when setting the system time, the number of days per month is not updated. The correction included will address this problem as well.

Below are corrections for the affected Operating Systems.

The following SLP patch is for RSX-11M and RSX-11S Version 4.7 only. It is not applicable for any other version of the operating system.

Below are step by step instructions for applying this patch to your RSX-11M, or RSX-11S V4.7 system:

1. Log into a privileged account.
2. Enter the following file as [1,2]TIMOV.COR

```
----start of file [1,2]TIMOV.COR----
[12,10]TIMOV.MAC;2=[12,10]TIMOV.MAC;1
\
-5,5,;/DC521/
; Copyright (c) 1998 by Mentec, Inc., U.S.A.
%
-495,;/DC521/
      MOV    TIMMO,R0          ;; get the current month
      MOVB   LIMTBL-1(R0),R0   ;; get the days/month value
      CMP    R0,#28.          ;; is this February?
      BNE    1$                ;; nope, don't worry

      BIT    #3,TIMBUF         ;; is this a leap year?
      BNE    1$                ;; if NE, not a leap year

      INC    R0                ;; adjust to 29. days
1$:    INC    R0                ;; adjust for use with TDSCHE
      MOV    R0,$DPM           ;; update the days/month
```

```

-616,616,;/DC521/
-876,876,;/DC521/
      CMP      -2(R1),#65.      ; should we infer 20xx
      BHIS     5$              ; if HIS, nope
      ADD      #100.,-2(R1)    ; bias into 20xx
5$:    CALL    10$            ; Convert the month
/
----end of file [1,2]TIMOV.COR----
3. Install the SLP utility
>INS $SLP
4. Apply the correction
>SLP @[1,2]TIMOV.COR
5. Assemble the module for your system
>MAC [11,24]TIMOV=[1,1]EXEMC/ML,[11,10]RSXMC/PA:1,[12,10]TIMOV
6. Set UIC to [1,24]
>SET /UIC=[1,24]
7. Replace the module in the library
>LBR [1,24]MCR/RP=[11,24]TIMOV
8. Re-build MCR, or MCRMU using SYSGEN3, and re-install the tasks
in VMR.
>@SYSGEN3
9. Install the tasks in VMR
>SET /UIC=[1,54]
>RUN $VMR
Enter filename:RSX11M
VMR>REM MCR...
VMR>INS MCR (single-user system)
VMR>INS MCRMU (multi-user system)
VMR>REM ...MCR (multi-user system)
VMR>INS SYS (multi-user system)
VMR>^Z
10. Reboot the system.

```

---

### 6.11.3 RMSBCK, RMSRST

The RMSBCK and RMSRST utilities have been updated to allow date specification for the "/CD", "/BD", and "/RD" dates to expand to four digits, as well as use century inferencing for two digit years.

---

### 6.11.4 CLQ

Previously, the MCR CLQ command would incorrectly display the year in which a clock queue element became due after the year 2000. This problem has been corrected.

---

### 6.11.5 EDT Date Command

Previously, the EDT DATE command would always display the year with a leading "19", and would not correctly interpret the full year. This has been updated to show the correct year beyond 1-JAN-2000.

---

### 6.11.6 RPT Date Range Switch

RPT would not allow a date of the form DD-MMM-YYYY to be greater than 1999. This has been updated to allow date ranges beyond the year 2000, and also to allow two-digit year inferencing to be used between the years 1965-2064.

---

### 6.11.7 PIP Date Range Comparison

Previously, PIP compared dates using signed branches, which could result in incorrect comparisons. This problem has been corrected.

PIP has also been modified to allow two-digit year inferencing to be used between the years 1965-2064.

---

### 6.11.8 DMP Header ID area display

Previously, DMP when displaying header information would fail to translate the encoded year when displaying file header information. This problem has been corrected.

---

### 6.11.9 FLX

FLX has been updated to display file date information correctly beyond the year 1999.

---

### 6.11.10 VMR TIM Command

Previously, the VMR TIM command would only accept the time using a 2 digit year format. This has been updated to allow for either a 2 or 4 digit year field.

VMR TIM has also been modified to allow two-digit year inferencing to be used between the years 1965-2064.

---

### 6.11.11 Macro-11 Listings

Previously, the MACRO-11 assembler would output the year in the listing file as a relative year from 1900. This would result in a year of 100 to be displayed for the year 2000. This problem has been corrected.

---

**6.11.12 HELP Files**

HELP files have been updated to include those areas where four digit dates are specified.

---

**6.11.13 SYSLIB.OLB**

SYSLIB has been update to include the following new routines;

**Table 6-5 Additional SYSLIB Entry Points**

Entry Point	Description
\$DAT	Not changed, output date as DD- <i>MMM</i> -YY
\$DAT4	Output date as DD- <i>MMM</i> -YYYY, for RSX-11M/S, uses \$DAT
\$DATI	Output date as YYYY-MM-DD, for RSX-11M/S, uses \$DAT
\$DATS	Output date as either DD- <i>MMM</i> -YY, DD- <i>MMM</i> -YYYY, or YYYY-MM-DD based on system setting. For RSX-11M/S, uses \$DAT.
\$CBDT4	Alternate for \$CBDAT, to output 4 digits if the value is greater than 1900. For RSX-11M/S uses \$CBDAT

---

**6.11.14 FCSRES**

FCSRES has been updated to include support for the additional entry points in SYSLIB.

---

**6.12 Certification**

RSX-11M/S V4.8 is compliant with the DISC PD2000-1 standard within the date range from 1-January-1977 through 31-December-2027. In those cases where inferencing rules are required for use within the warranted date range, those function which utilize two digits shall infer that years 77 or greater are in the twentieth century, while years which are less than or equal to 27 shall be inferred to be in the twenty-first century.

Below is listed a table of the functions which have been tested, and their tested date limitations;

## Year 2000 Certification for RSX-11M/S V4.8

**Table 6-6 RSX-11M/RSX-11S Utilities Tested**

Utility	Tests	Limiting Date
Directives	ABRT\$, ALTP\$, ALUN\$, ASTX\$, ATRG\$, CINT\$, CLEF\$, CLOG\$, CMKT\$, CNCT\$, CRAW\$, CRGF\$, CRRG\$, CSRQ\$, DECL\$, DLOG\$, DSAR\$, DSCP\$, DTRG\$, ELAW\$, ELGF\$, EMST\$, ENAR\$, ENCP\$, EXIF\$, EXIT\$, EXST\$, EXTK\$, GCII\$, GLUN\$, GMCR\$, GMCX\$, GPRT\$, GREG\$, GTIM\$, GTSK\$, MAP\$, MRKT\$, QIO\$, QIOW\$, RCST\$, RCVX\$, RDAF\$, RDEF\$, RDXF\$, RPOI\$, RQST\$, RREF\$, RSUM\$, RUN\$, SCAA\$, SDAT\$, SETF\$, SDRC\$, SDRP\$, SFPA\$, SMSG\$, SNXC\$, SPEA\$, SPND\$, SPRA\$, SPWN\$, SREF\$, SRDA\$, STIM\$, STLO\$, STOP\$, STSE\$, SVDB\$, SVTK\$, UMAP\$, USTP\$, WSIG\$, WTLO\$, WTSE\$	Dec-2027
SYSLIB—Date routines	\$DATx, \$EDMSG	Dec-2027
System—File System	Creation/Revision Date	Dec-2027
System—Drivers	No date dependencies	Dec-2027
System—Errorlogging	Date/time stamps	Dec-2027
ACS	No date dependencies	Dec-2027
ALL	No date dependencies	Dec-2027
ASN	No date dependencies	Dec-2027
BAD	No date dependencies	Dec-2027
BOO	No date dependencies	Dec-2027
BRO	Date/time stamp	Dec-2027
BYE	Date/time stamp	Dec-2027
BRU	/SINCE, /THROUGH, /CREATED, /MODIFIED	Dec-2027
CDA	Crash date	Dec-2027
CFL	Listing files	Dec-2027
CLQ	Date time due	Dec-2027
CMP	No date dependencies	Dec-2027
COT	Date/time stamp	Dec-2027
CRF	Listing files	Dec-2027
DCL	Date parsing	Dec-2027
DMO	No date dependencies	Dec-2027
DMP	Header ID area	Dec-2027
EDI	No date dependencies	Dec-2027

Table 6-6 (Cont.) RSX-11M/RSX-11S Utilities Tested

Utility	Tests	Limiting Date
EDT	DATE command	Dec-2027
ELI	Date/time stamp	Dec-2027
ERRLOG	Date/time stamp	Dec-2027
F11ACP	Header date information	Dec-2027
FLX	DOS volumes, RT-11 volumes	Dec-2027
FMT	No date dependencies	Dec-2027
FTB	Map files	Dec-2027
HEL	Date/time stamps	Dec-2027
HOM	Home block creation/revision dates	Dec-2027
ICP	Date/time stamps, date symbol	Dec-2027
INI	Home block creation dates	Dec-2027
INS	No date dependencies	Dec-2027
IOX	Date/time stamps	Dec-2027
LOA	No date dependencies	Dec-2027
LBR	library headers	Dec-2027
LPP	Date/time stamps	Dec-2027
MAG	No date dependencies	Dec-2027
MCRBAS	TIM	Dec-2027
MCR	CLQ,TIM	Dec-2027
MCRMU	CLQ,TIM	Dec-2027
MOU	No date dependencies	Dec-2027
MTAACP	Header date information	Dec-2027
MACRO-11	Assembly listing files	Dec-2027
PAT	No date dependencies	Dec-2027
PIP	DIR/THROUGH, DIR/FULL, DIR/SINCE, COPY/SINCE, COPY/THROUGH, COPY/PRESERVE_DATES, APPEND/SINCE, APPEND/THROUGH, DELETE/SINCE, DELETE/THROUGH	Dec-2027
PMD	Date/time stamps	Dec-2027
PMT	Date/time stamps	Dec-2027
QMGCLI	After date processing	Dec-2027
QMG	After date processing	Dec-2027
RCT	No date dependencies	Dec-2027
RMD	Date/time stamps	Dec-2027

## Year 2000 Certification for RSX-11M/S V4.8

**Table 6-6 (Cont.) RSX-11M/RSX-11S Utilities Tested**

<b>Utility</b>	<b>Tests</b>	<b>Limiting Date</b>
RMS-11	RMSDSP, RMSIFL, RMSCNV, RMSBCK, RMSRST, RMSDEF, RMSDES	Dec-2027
RPT	/DATE:TODAY, /DATE:YESTERDAY, /DATE:RANGE:	Dec-2027
SAV	No date dependencies	Dec-2027
SHF	No date dependencies	Dec-2027
SHUTUP	Date/time stamps	Dec-2027
SLP	No date dependencies	Dec-2027
TIME	TOY, system	Dec-2027
TKTN	Date/time stamps	Dec-2027
TKB	Map files	Dec-2027
UFD	No date dependencies	Dec-2027
UNL	No date dependencies	Dec-2027
VCP	Date/time stamps	Dec-2027
VFY	No date dependencies	Dec-2027
VMR	TIME command	Dec-2027
ZAP	No date dependencies	Dec-2027



# A

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## Reporting Problems

This appendix describes submitting problem reports.

**Note: If you have a software support contract with Digital Equipment Corporation, you should submit Software Performance Reports (SPRs) to Digital.**

**All other customers may submit Software Problem Reports (SPR) to Mentec, Inc.**

An SPR can be used for:

- Software errors
- Documentation errors
- Follow-up on a previous SPR
- Questions
- Suggestions

An SPR cannot be used for:

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

In general, when you complete an SPR, use the following guidelines:

- Describe only one problem per SPR.
- Define as accurately as possible the state of the system and circumstances when the problem occurred.
- Illustrate the problem with specific examples.
- If you report a documentation error, specify the title of the manual, and include the section and page number where the error occurred. Include a table or figure number if appropriate.

### **Categories of SPRs:**

- Problem/Error SPR

This type of SPR contains a software problem. It is assigned a priority of 1 to 5. You receive an answer to this report.

- Suggested Enhancements/Other SPR

This type of SPR contains a question or suggestion. It is assigned a priority of 5. You may or may not receive an answer.

## Reporting Problems

**Priorities** Assign a priority of 1 to 5 to your SPR, 1 being the highest using these guidelines:

- 1 Most production work cannot be run.
  - Major system functions are unusable.
  - You cannot boot the system.
  - Necessary peripherals cannot be used.
- 2 Some production work cannot be run.
  - Certain functions are unusable.
  - System performance has declined.
  - Installation does not have excess capacity.
- 3 All production work can be run with some user impact.
  - Significant manual intervention is required.
  - System performance has declined.
  - Installation has excess capacity.
- 4 All production work can be run with no significant impact on user.
  - Problem can be patched or easily bypassed.
- 5 No system modifications are needed to return to normal production.
  - Suggestions are supplied.
  - Errors in documentation are noted.

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

- **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, accurately describe the details and supply a hard copy or user source code when necessary.
- **DRIVERS**—Controller/device information, software options, error log output, a copy of device registers, and a sample program.
- **UTILITIES**—A copy of your terminal output, showing setup commands, before and after effects, and relevant file information.
- **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.
- **FILE SYSTEM**—For a corrupted volume: output from the File Structure Verification Utility (VFY) and dump of the volume; for improper results: the error code, a file header dump, and a sample program.
- **ERROR LOG REPORT GENERATOR (RPT)**—A copy of the report file generated by RPT, either a hardcopy listing or machine-readable media.

If a failure occurs when you are running privileged, add-on software (for example, the DECnet package), try to reproduce the failure without the additional software. Then, when you write the SPR, indicate how the system operated with and without the add-on software.

---

# Index

---

## A

---

ANALYZE (DCL) command  
  /CRASH\_DUMP • 4-43  
  /ERROR\_LOG • 4-8 to 4-9, 4-28  
ASN (MCR) command  
  /TERM • 4-17  
Asynchronous buffered I/O • 1-34

---

## B

---

BACKUP (DCL) command  
  /CREATED:BEFORE • 4-7  
  /MODIFIED:BEFORE • 4-7  
  /SAVE\_SET qualifier  
    support for underscore ( - ) character • 4-8  
  /SAVE\_SET:name • 4-8  
  /VERIFY[:DOUBLE\_BUFFER] • 4-8  
  /VERIFY[:SINGLE\_BUFFER] • 4-8  
Backup and Restore Utility  
  See BRU  
BAD (MCR) command  
  /OVERRIDE • 4-17  
Bad block replacement control task  
  See RCT  
Baseline system  
  copying • 1-15  
Batch and Queue Operations Manual  
  corrections • 4-6  
    DELETE • 4-6  
    log files • 4-6  
    /NOTTRANSFER • 4-6  
    SHOW QUEUE/ALL • 4-6  
BRU • 4-32 to 4-38, 4-39  
  corrections • 1-11  
    Error on dismount • 1-11  
    improperly terminated tape • 1-12  
    Invalid date or time error with /REVISED •  
      1-12  
    No Files Found • 1-11  
    to aborting with a TK50 • 1-11  
  detecting bootable system image • 4-36  
  examples • 4-34  
  executing command files • 4-36  
  identification message • 4-37

BRU (cont'd)  
  large disk support • 1-23  
  messages • 4-37 to 4-38  
    error • 4-36  
    identification • 4-37  
  qualifiers  
    /COMPARE • 4-33  
    /COMPARE[: SINGLEBUFFER] • 4-33 to  
      4-34  
    /COMPARE[:DOUBLEBUFFER] • 4-33 to  
      4-34  
    /ERROR\_LIMIT:n • 4-34  
    /FOREIGN  
      copying with a RSX-11M-PLUS or  
      VAX-11 RSX host • 1-20  
    /IDENTIFICATION • 4-35  
    /NOSUPERSEDE • 4-37  
    /VERIFY • 4-33  
  replacement for DSC • 1-39  
  replacement for DSC utility • 4-38  
  restrictions  
    /IMAGE qualifier • 4-35  
  wildcard support • 4-32  
  with a TK50 tape • 1-32  
BRU64K • 1-2  
  device support • 1-23  
  removal of IMAGE backup and restore code •  
    4-35  
  with a TK50 tape • 1-32  
BRUSYS • 1-2  
  standalone • 4-35  
  system requirements • 1-20  
  with a TK50 tape • 1-32

---

## C

---

Catchall task  
  See TDX  
CLI (MCR) command  
  /INIT/CTRLC • 4-16  
Copying  
  distribution tape • 1-17  
  tape kit • 1-2  
  tape to disk • 1-20  
CPU  
  supported processors  
    M100 • 1-4, 2-2  
    M11 • 1-4, 2-2

## Index

### CPU

supported processors (cont'd)

M70 • 1-4, 2-2

M80 • 1-4, 2-2

M90 • 1-4, 2-2

### Crash driver

modification • 1-35

### Crash Dump Analyzer Reference Manual

corrections • 4-43

CXA16 multiplexer support • 1-22

CXB16 multiplexer support • 1-22

CXF32/DHF11 Module Support • 1-22

CXY08 multiplexer support • 1-22

---

## D

---

### Data Terminal Emulator

See DTE

### DATATRIEVE-11/RSX correction file

for RSX-11M • 1-3

DB-based system boot • 1-25

### DCL • 4-7, 4-33

Command

SHOW DEVICE enhancements • 1-10

commands

ANALYZE

/CRASH\_DUMP • 4-43

/ERROR\_LOG • 4-8 to 4-9, 4-28

BACKUP

/COMPARE[:DOUBLE\_BUFFER] • 4-8

/COMPARE[:SINGLE\_BUFFER] • 4-8

/CREATED:BEFORE • 4-7

/MODIFIED:BEFORE • 4-7

/SAVE\_SET:name • 4-8

support for underscore ( - ) character • 4-8

DELETE • 4-6

DISMOUNT

/[NO]UNLOAD • 4-10

DUMP • 4-7

INITIALIZE

/HEADERS:n • 4-9

/PROCESSOR/NOWARNINGS • 4-25

MOUNT

/NOLABEL restriction • 1-36

PRINT

/[NO]TRANSFER qualifier • 4-6

SET

HOST • 1-24

HOST/DTE • 4-26 to 4-27

restriction on VT300,400,500-series terminals • 1-22

### DCL

commands

SET (cont'd)

TERMINAL/VTxxx • 1-22

SHOW QUEUE

/ALL qualifier • 4-6

DUMP

New Command • 1-8

### DCL manual

corrections • 4-7

BACKUP /CREATED:BEFORE • 4-7

BACKUP /MODIFIED:BEFORE • 4-7

### Debugging Reference Manual

corrections • 4-43

DELETE (DCL) command • 4-6

### DEV

/ERR switch. • 1-1

/FULL switch. • 1-1

/MASS switch. • 1-1

### Device

DU

Large disk support • 1-11, 2-4

KDJ11-E processor

TOY Clock • 1-4

list of supported devices • 1-5, 2-2

Mentec M-Series processors • 2-1

MENTEC M-series processors • 1-4, 2-2

M100 • 1-4, 2-2

M11 • 1-4, 2-2

M70 • 1-4, 2-2

M80 • 1-4, 2-2

M90 • 1-4, 2-2

TOY Clock • 1-4

Mentec M-Series processors. • 1-1

MSCP disk size • 1-1

RM06 disk drive • 1-1

RZ26L disk drive • 1-4, 1-5, 2-2

RZ26x disk • 2-1

RZ26x disk drive • 1-1

RZ29B disk • 2-1

RZ29B disk drive • 1-1, 1-4, 1-5, 2-2

Setasi RM06 Disk • 2-1

Setasi RM06 disk drive • 1-5, 2-2

support

supplementary • 2-1

TK25 cartridge tape • 4-10

TLZ07 tape drive • 1-1, 1-4, 1-5, 2-2

TZ87 tape drive • 1-1, 1-4, 1-5, 2-2

Virtual device subsystem • 1-10

Virtual disks. • 1-1

### Device driver

remote terminal restriction • 1-30

TK50 tape subsystem • 1-30 to 1-33

Device support  
 for LA75 • 4-12  
 for T.V2xx • 4-12  
 MU-type device • 1-16  
 RA70 • 1-22  
 RA90 • 1-22  
 see the Software Product Description (SPD) •  
 1-21

Dial command string  
 for modem • 4-27

/DIAL option  
 SET HOST/DTE command • 4-27

Digital Command Language  
 See DCL

Disk Save and Compress utility  
 See DSC

Disk support  
 large • 1-23

Disk Volume Formatter  
 See FMT

DISMOUNT (DCL) command  
 /[NO]UNLOAD • 4-10

Distribution kit  
 media • 1-1, 2-1

DJ11 support • 1-24

DJ11 terminal interface • 1-24

DM-based system boot • 1-25

DMO (MCR) command  
 with a TK50 tape • 1-31

DMP utility • 4-39

DR-based system boot • 1-25

DSC • 1-39, 4-38

DTE • 4-26  
 command  
 format • 4-26  
 /ID option • 4-27  
 parameters • 4-26  
 error messages • 4-27

DTE (MCR) command • 4-26 to 4-27

DU driver enhancement • 1-29

DUMP (DCL) command • 4-7

---

## E

---

Echo loops  
 intersystem • 4-27

ELI  
 Abort error corrected • 1-14  
 restrictions  
 /NOLIM switch • 1-15  
 /SH switch • 1-15

Entering data  
 inputting lower-case characters • 1-13

Error Logging  
 See also ELI  
 corrections • 1-13  
 Undefined Format Code 11 • 1-13  
 error messages • 4-11  
 format of packets • 4-11 to 4-12  
 restrictions • 1-14  
 creating error logging packets • 1-38  
 /HISTORY qualifier • 1-38, 4-10  
 to history summaries • 1-14, 4-10

support  
 for a non-Digital device • 1-38  
 for PDP-11/84 • 1-13  
 for RZ26L disk drive • 1-5, 2-2  
 for RZ29B disk drive • 1-5, 2-2  
 for Setasi RM06 disk drive • 1-5, 2-2  
 for TK25 cartridge tape • 4-10, 4-11  
 for TLZ07 tape drive • 1-5, 2-2  
 for TSV05 • 4-10, 4-11  
 for TZ87 tape drive • 1-5, 2-2

system • 1-37 to 1-38

Error Logging Manual  
 corrections • 4-10  
 device entry ETSV05 • 4-10  
 error log packet • 4-11  
 error logging • 4-11  
 error messages • 4-11  
 TK25 • 4-10  
 TSV05 • 4-10

Error messages  
 BRU • 4-36, 4-37 to 4-38  
 DTE • 4-27  
 Error Logging • 4-11  
 Indirect • 4-16  
 RMS-11 • 4-23  
 RMSRST • 4-24  
 system management • 4-25  
 TKB • 4-46

Executive  
 code changes • 1-26 to 1-27  
 data structure changes • 1-27  
 I/O data structure changes • 1-27

Executive Reference Manual  
 corrections • 4-44  
 MACRO-11 fast map • 4-44  
 RRST\$ directive • 4-44  
 TFEA\$ directive • 4-44

## Index

---

### F

---

- F11ACP
  - large disk support • 1–23
- FCS
  - code size • 1–39
  - support for queue files for printing • 1–37
  - VMS ACP function support • 1–39
- FCSRES
  - restriction • 1–15
  - system library routines • 1–29
- Features
  - summary of new
    - for 11M • 1–1
    - for 11S • 2–1
- File
  - saved answer • 1–20
- File attribute codes • 1–37
- File Control Services
  - See FCS
- File Dump utility
  - See DMP utility
- File Transfer Program
  - See FLX
- FLX • 4–39 to 4–40
  - copying RT–11 devices • 4–39
  - DOS–11 device support • 4–39
  - using with a TK50 tape • 1–32
- FMT • 4–40 to 4–41
  - device support • 4–41
  - RX33 diskette support • 4–40

---

### G

---

- GBLDEF enhancement • 1–20
- Guide to Program Development Manual
  - corrections
    - LINK • 4–12
- Guide to Writing an I/O Driver
  - corrections • 4–3
    - building user-written drivers • 4–4
    - data structures • 4–3
    - driver initiator • 4–4
    - I.RPM • 4–5
    - I/O packet • 4–3
    - I/O queue • 4–3
    - MACRO-11 command line • 4–4
    - S.VCT • 4–5
    - U.BUF • 4–5

---

### I

---

- I/O
  - asynchronous buffered • 1–34
  - overlapped completion • 1–35
  - restrictions
    - big buffering in random mode • 1–36
    - multibuffering • 1–36
- I/O Drivers Reference Manual
  - corrections • 4–12
    - LA75 terminal type value • 4–12
    - T.V2xx terminal type value • 4–12
- I/O Operations Reference Manual
  - corrections • 4–44
    - \$\$FSR2 • 4–44
- /ID option
  - DTE command • 4–27
- Indirect • 4–12
  - command processors • 4–13
    - ICP version • 4–13
    - ICQ version • 4–13
    - ICQRES version • 4–14
    - ICX version • 4–13
  - default radix • 4–14
  - .ENABLE directive settings • 4–15
  - error messages • 4–16
  - format for timeout • 4–15
  - restriction • 4–13
  - restrictions
    - .DELAY directive • 4–15
    - .IFDF directive • 4–15
    - .IFT directive • 4–15
      - on .ASK directive • 4–14
      - on .ASKN directive • 4–14
      - on .ASKS directive • 4–14
      - on ticks • 4–14
- Indirect Command Processor
  - See Indirect
  - corrections • 4–12 to 4–16
  - new ICX.TSK • 1–3
  - restrictions
    - in SYSGEN • 1–21
- Indirect Command Processor Manual
  - corrections • 4–12
    - AT. error message • 4–16
    - .ENABLE GLOBAL • 4–15
    - error messages • 4–16
    - .IFDF and .IFT • 4–15
    - SYSTEM symbol • 4–14
    - ticks in .ASK type directives • 4–14
    - timeout • 4–14

INI (MCR) command  
 /BAD=[AUTO] • 4-17  
 /BAD=[option] • 4-16 to 4-17  
 /BAD=[OVR] • 4-17  
 large disk support • 1-23  
 /MXF • 4-18

INITIALIZE (DCL) command  
 /MAXIMUM\_FILES:n • 4-9 to 4-10  
 /PROCESSOR/NOWARNINGS • 4-25

INITL module  
 correction • 2-5

Inputting lower-case characters • 1-13

Intersystem echo loops • 4-27

IP11 layered product  
 for RSX-11M • 1-24

---

## J

---

J11-series processor support • 1-23

---

## K

---

KDJ11-E  
 TOY clock restrictions • 1-5, 1-26

Kit  
 changes • 1-15  
 copying with \$\$n logical name • 1-16  
 media • 2-1  
 tape • 1-2

---

## L

---

LA75 printer support • 4-12

Layered product  
 correction files • 1-3

Layered products  
 correction files  
   for RSX-11M • 1-3  
     DATATRIEVE-11/RSX • 1-3  
     PDP-11 BASIC-PLUS-2 • 1-3  
     PDP-11 FORTRAN-77 • 1-3  
   for RSX-11M  
     IP11 software • 1-24

LBR • 4-41 to 4-42

Librarian Utility Program  
 See LBR

Load error correction • 2-5  
 LPA-11K device restriction • 1-20  
 LSI-11/73 processor restriction • 1-25

---

## M

---

Magnetic Tape Ancillary Control Processor  
 See MTAACP

MAKESTK.CMD command file • 1-28

Mass Storage Control Protocol  
 See MSCP

MCR • 4-33

Command  
 DEVICE enhancements • 1-10

commands

ASN  
 /TERM • 4-17

BAD  
 /OVERRIDE • 4-17

CLI  
 /INIT/CTRLC • 4-16

DMO  
 with a TK50 tape • 1-31

DTE • 4-26 to 4-27

INI  
 /BAD=[AUTO] • 4-17  
 /BAD=[option] • 4-16 to 4-17  
 /BAD=[OVR] • 4-17  
 /INF • 4-18  
 large disk support • 1-23

MOU  
 /[NO]DEFER • 4-17  
 with a TK50 tape • 1-31

QUE  
 /CR/NM • 4-25

SET  
 /HOST • 1-24  
 /HSYNC • 4-17  
 /[NO]DEFER • 4-17  
 restriction on VT300,400,500-series  
   terminals • 1-22  
 /TERM • 4-17  
 /VTxxx=TI: • 1-22

TIM  
 FULL switch • 4-19  
 SETTOY switch • 4-19  
 SYNC switch • 4-19

MCR Operations Manual  
 corrections • 4-16 to 4-19  
 ASN • 4-17  
 /BAD • 4-16

## Index

MCR Operations Manual  
  corrections (cont'd)  
    /CTRLC • 4-16  
    INI • 4-17  
    MOUNT [NO]DEFER • 4-17  
    SET [NO]DEFER • 4-17  
    SET/HSYNC • 4-17  
Media for kit • 2-1  
Memory clearing • 2-5  
Memory-resident system • 2-2  
MENTEC M-Series  
  support • 1-4, 2-2  
Modem  
  dial command string • 4-27  
MOU (MCR) command  
  /[NO]DEFER • 4-17  
  with a TK50 tape • 1-31  
MOUNT (DCL) command  
  /NOLABEL  
    block size restriction • 1-36  
MOUNT command • 1-31  
MSCP • 1-37, 4-28  
  restriction in SYSGEN • 1-21  
  restrictions on support in RSX-11S • 2-2  
MTAACP  
  support for new file attribute codes • 1-37  
MU-type device support • 1-23  
/MUTE option  
  SET HOST/DTE command • 4-27

---

## N

\$\$n logical name • 1-16  
NCT • 1-24  
  DECnet package • 1-24  
Network Command Terminal  
  See NCT  
New hardware support  
  See Device and CPU  
NL: device • 1-20

---

## O

Object Module Patch Utility  
  See PAT  
Online Task Loader  
  corrections  
    to loading DECnet-11S tasks • 2-4

OTL  
  See Online Task Loader  
OTL system error correction • 2-5  
Overlapped I/O completion • 1-35

---

## P

PAT • 4-42  
PDP-11 BASIC-PLUS-2 correction file • 1-3  
PDP-11 FORTRAN-77 correction file  
  for RSX-11M • 1-3  
Peripheral Interchange Program  
  See PIP  
PIP  
  allocation failure  
    delete on error • 1-12  
  correction  
    on creating contiguous files • 1-13  
  corrections • 1-12, 4-42  
    allocation failure • 1-12  
    date comparison • 1-13  
  large disk support • 1-23  
  /PAGE switch • 1-9  
  /PAGE switch. • 1-1  
  switches  
    /DD • 4-42  
    /TD • 4-42  
    using with a TK50 tape • 1-33  
PRINT (DCL) command  
  /[NO]TRANSFER qualifier • 4-6  
PRINT\$ macro call • 1-37  
Printer support  
  form types • 1-18, 1-19  
  modifying • 1-19  
  selecting • 1-18  
Problem reporting • A-1  
  information to be supplied • A-2  
Problems  
  corrected since V4.5 • 2-5  
PUCOM partition • 1-21

---

## Q

QUE (MCR) command  
  /CR/NM • 4-25



---

# R

---

- RA70 support • 1–22
- RA90 support • 1–22
- RC25 disk kit • 1–16
- RCT • 4–27
  - enhancements • 4–28
- Record Management Services
  - See RMS–11
- Report Generator Task
  - /HISTORY qualifier • 4–10
- Reporting problems • A–1
  - information to be supplied • A–2
  - RMS–11 • 3–10
- REWIND command • 1–31
- RMD
  - MDPAGE TOP Option. • 1–1, 1–9
- RMS–11 • 3–1
  - access methods • 3–1
  - areas • 4–21
  - combining supervisor mode and remote access
    - RMS programs • 3–5
  - commands
    - EXIT • 4–22
    - EXIT\_SUPERSEDE • 4–21 to 4–22
    - SAVE • 4–22
    - SAVE\_SUPERSEDE • 4–21 to 4–22
  - contiguity • 4–21
  - deadlocks • 4–20
  - distribution kit files • 3–8 to 3–10
  - error messages • 4–23
    - ER\$FUL • 4–20
    - ER\$KEY • 4–19
    - ER\$MRS • 4–19
    - ER\$NOD • 4–20
    - RMSRST • 4–24
  - extended logical names support • 3–5
  - fields
    - ALLOCATION • 4–22
    - BUCKETSIZE • 4–23
    - EXTENSION • 4–22
  - installation • 3–6
  - Macro Programmer's Guide corrections • 4–19 to 4–20
  - remote access methods • 3–2
    - dates • 3–2
  - remote access support • 4–21
    - for indexed files • 4–21
  - reporting problems • 3–10
  - resident libraries • 4–21
  - resident library partition • 3–7
  - restrictions • 3–5
- RMS–11 (cont'd)
  - RK06 in • 3–6
  - RL01 in • 3–6
  - RL02 in • 3–6
  - RMSBCK
    - correction • 3–4, 3–5
    - /NV switch • 4–24
    - wildcard support • 4–24
  - RMSCNV
    - configuration • 3–8
    - /ER switch • 4–23
    - restriction • 3–6
  - RMSDES
    - correction • 3–4
    - enhancements • 3–5
  - RMSDSP
    - /BR switch • 4–23, 4–24
    - correction • 3–5
    - restriction • 3–6
    - /SU switch • 4–23, 4–24
  - RMSIFL
    - correction • 3–3
    - restriction • 3–6
  - RMSRST
    - correction • 3–4, 3–5
    - /NV switch • 4–24
    - wildcard support • 4–24
  - startup procedure • 3–6 to 3–7
  - startup SET commands • 3–7
  - supplementary information • 3–5
  - task building • 4–21
  - UPDATE operations • 4–20
  - User's Guide corrections • 4–20 to 4–21
  - using RMSDAP • 3–2
  - utilities • 3–3
    - command and ODL files • 3–7
    - configuration • 3–7
    - corrections • 4–21 to 4–25
    - rebuilding • 3–8
    - restrictions • 3–6
    - RMSCNV • 3–6
    - RMSDSP • 3–6
    - RMSIFL • 3–6
  - Utilities Manual • 4–21 to 4–25
  - wildcard support • 4–24
  - writing a record • 4–21
- RMS–11 Macro Programmer's Guide
  - corrections • 4–19
    - ALLOCATION field • 4–22
    - BUCKETSIZE field • 4–23
    - ?DES-F-VOR • 4–23
    - ER\$FUL error • 4–20
    - ER\$KEY error • 4–19

## Index

### RMS-11 Macro Programmer's Guide

#### corrections (cont'd)

- ER\$MRS error • 4-19
- ER\$NOD error • 4-20
- EXIT command • 4-22
- EXIT\_S command • 4-21, 4-22
- EXTENSION field • 4-22
- FID field • 4-19
- P\$BUF • 4-19
- record too small for primary key field • 4-19
- RMSBCK switches • 4-24
- RMSBCK wildcards • 4-24
- RMSCNV switches • 4-23
- RMSDSP commands • 4-24
- RMSDSP switches • 4-23
- RMSRST switches • 4-24
- RMSRST wildcards • 4-24
- SAVE command • 4-22
- SAVE\_S command • 4-21, 4-22
- wildcards • 4-23, 4-24
- XB\$DAT value • 4-19

### RMS-11 User's Guide

- corrections • 4-20 to 4-21
- adding DAP support • 4-21
- CHANGES • 4-20
- contiguity and areas • 4-21
- indexed file • 4-20
- NODUPPLICATES • 4-20
- record writing • 4-21
- remote access • 4-21
- task building resident libraries • 4-21
- UPDATE • 4-20

### Routines

- \$CAT5B • 4-1
- Convert Virtual to Real Address (\$CVRL) routine • 4-3
- \$CVRL • 4-3
- \$EDMSG
  - editing directives
    - corrections • 4-2
    - errors • 4-1
- \$EDTMG • 4-1
- SETTIM • 4-50 to 4-51
- \$TIM • 4-1
- \$WRKPT • 4-2

### RP07 disk • 1-16

### RPT

- Date specifications • 1-14
- Undefined Format Code 11 • 1-13

### RRST\$ directive

- restriction • 4-44

### RSX-11M SYSGEN manual

- corrections • 4-5

### RSX-11M-PLUS I/O Operations Reference Manual

- corrections • 4-6

### RSX-11S

- restrictions • 2-2

### RSX-11S SYSGEN manual

- corrections • 4-50 to 4-51
  - copying 11SGEN.CMD • 4-51
  - copying 11SGEN2.CMD • 4-51
  - FLX with blank disk • 4-51
  - PIP example • 4-51
  - SETTIM • 4-50

### RX33 restriction • 1-24

### RX50 restriction • 1-24

### RZ26L disk drive • 1-4, 1-5, 2-2

### RZ29B disk drive • 1-4, 1-5, 2-2

---

## S

---

### Saved answer file • 1-20

### SET (DCL) command

#### HOST

- /DTE • 4-26 to 4-27
- /DIAL option • 4-27
- /MUTE option • 4-27
- parameters • 4-26
- /VERSION option • 4-27
- selecting NCT during SYSGEN requirement • 1-24

#### /TERMINAL/VTxxx

- restriction on VT300,400,500-series terminals • 1-22

### SET (MCR) command

#### /HOST

- selecting NCT during SYSGEN requirement • 1-24

#### /HSYNC • 4-17

#### /[NO]DEFER • 4-17

#### /TERM • 4-17

#### /VTxxx=TI:

- restriction on VT300,400,500-series terminals • 1-22

### Setasi RM06 disk drive • 1-5, 2-2

### SHOW QUEUE (DCL) command

- /ALL qualifier • 4-6

### Slow Task Builder

- See TKB

### SLP • 4-42 to 4-43

Software Performance Report  
 See SPR

Source Language Input Program  
 See SLP

SPR  
 category • A-1  
 completing • A-1  
 priority • A-2

SYSGEN  
 corrections • 4-5  
 distribution kit • 1-1  
 for RSX-11S  
   corrections • 4-50 to 4-51  
   FLX correction • 4-51  
   PIP correction • 4-51  
 invoking VMR when using a VAX-11 RSX host •  
 1-20  
 minimum system requirements • 1-20  
 \$\$n logical name • 1-16  
 on a VAX-11 RSX host • 1-16  
 requirements  
   selecting NCT • 1-24  
 restrictions • 1-19  
   LPA-11K devices • 1-20  
   on Indirect Command Processor • 1-21  
   on MSCP devices • 1-21  
   online generation • 1-2  
   selecting printer support • 1-18  
   standalone • 1-16  
   using logical names • 1-16

SYSGEN manual changes • 1-2

SYSLIB  
 See System library routines • 1-29

System corruption correction • 2-5

System generation  
 See SYSGEN

System library routines • 1-29  
 FCSRES • 1-15, 1-29  
 RX50/RX33 devices • 1-24

System Library Routines Reference Manual  
 corrections • 4-1  
   added program sections • 4-1  
   added SYSLIB routines • 4-1  
   \$TIM routine • 4-1  
   \$WRKPT • 4-2

System Management Guide  
 corrections • 4-25 to 4-32  
 ACNT message • 4-25  
 DTE error message • 4-27  
 establishing terminal emulation • 4-26  
 INITIALIZE/PROCESSOR/NOWARNINGS •  
 4-25

System Management Guide  
 corrections (cont'd)  
 RCT • 4-27, 4-28  
 RMD • 4-25  
 SHUTUP • 4-26  
 /TYPEAHEAD • 4-27

System transportability • 1-24

SYSVMR.COMD file • 1-21

---

## T

---

Tape  
 copying distribution tape • 1-17  
 copying distribution to disk • 1-20  
 distribution • 1-20  
 kit • 1-2

Task  
 .AT task image • 1-3  
 hanging when attaching to a terminal • 1-14, 2-4  
 ICP.TSK • 4-13  
 ICQ.TSK • 4-13  
 ICQRES.TSK • 4-14  
 ICX.TSK • 1-3, 4-13

Task Builder  
 See TKB

Task Builder Manual  
 corrections • 4-44 to 4-50  
 /-CO switch • 4-46  
 /-LI switch • 4-46  
 /-PI switch • 4-46  
 double brackets • 4-45  
 double\_quote character • 4-45  
 error messages • 4-46  
 label block offsets • 4-46  
 LB; specification • 4-45  
 /LI switch • 4-46  
 manual references • 4-45  
 .ROOT statement • 4-45  
 /SHAREABLE:LIBRARY switch • 4-45

Task load error correction • 2-5

TC11 support • 1-24

TC11-TU56 tape subsystem • 1-24

TDX  
 commands • 4-29 to 4-30  
 functions • 4-29 to 4-30  
 installing • 4-29, 4-31  
 MCR translations • 4-29 to 4-30  
 modifying source file • 4-30 to 4-31  
 task • 4-28 to 4-32

## Index

Technical Overview • 5–11  
Telephone  
    dial command string • 4–27  
Terminal driver support • 1–23  
Terminal interface support • 1–23  
Terminals  
    unused ports • 1–15, 2–5  
Terminals VT300,VT400,VT500 • 1–14  
TFEA\$ directive  
    restriction • 4–44  
TIM (MCR) command • 4–19  
TK25 tape • 4–10  
TK50  
    with BRU • 1–32  
    with BRU64K • 1–32  
    with BRUSYS • 1–32  
    with PIP • 1–33  
    with the FLX utility • 1–32  
TK50 tape • 1–20  
    restriction • 1–25  
    subsystem • 1–30 to 1–33  
        dismounting the tape • 1–31  
        mounting the tape • 1–31  
        performance using RSX utilities • 1–31  
    tape indicators • 1–33  
TKB  
    /–SH restriction • 1–15  
    cluster libraries • 4–48  
    corrections • 4–44 to 4–50  
    creating the Slow Task Builder • 1–28  
    error messages • 4–46  
    Fast Task Builder • 4–49  
    FCSFSL • 1–28  
    FCSRES • 1–28  
    non-PIC shared region • 4–47  
    offsets • 4–46  
    qualifiers  
        /CODE:CLI • 4–49  
        /FAST\_MAP • 4–49  
        /SLOW • 4–49  
    RNDSEG Option • 4–47  
    Slow Task Builder • 4–48 to 4–49  
    switches  
        /–CO • 4–46  
        /–LI • 4–46  
        /–PI • 4–46  
        /CL • 4–49  
        /CO • 4–46  
        /FM • 4–49  
        /LI • 4–46  
        /MP • 4–45  
        /SB • 4–49  
        /SHAREABLE:LIBRARY • 4–45

TKB  
    switches (cont'd)  
        /SS • 4–48  
TLZ07 tape  
    restriction • 1–25  
TLZ07 tape drive • 1–4, 1–5, 2–2  
TOY Clock  
    KDJ11–E processor • 1–4  
    MENTEC M–series processor • 1–4  
TZ30 tape  
    restriction • 1–25  
TZ87 tape  
    restriction • 1–25  
TZ87 tape drive • 1–4, 1–5, 2–2

---

## U

---

UETP support • 1–24  
User Environment Test Package  
    See UETP  
Utilities Manual  
    corrections • 4–32 to 4–43  
    BRU • 4–32  
    BRU command files • 4–36  
    CNF table • 4–37  
    DMP • 4–39  
    DMP/HF • 4–39  
    DMP/LIM • 4–39  
    FLX • 4–39  
    FMT • 4–40  
    LBR • 4–41  
    LBR/CR • 4–41  
    LBR/IN • 4–42  
    MANUAL option • 4–36  
    /NOSUPERSEDE • 4–37  
    PAT • 4–42  
    PIP • 4–42  
    PIP/DD • 4–42  
    PIP/TD • 4–42  
    selective backups • 4–32  
    SLP • 4–42  
    SLP error messages • 4–43  
    SLP file name length • 4–43  
    SLP illegal switch • 4–43  
    tape write error message • 4–36  
    wildcards • 4–32

---

## V

---

VCP  
 See also Virtual device  
 Create Virtual Device • 5–9

/VERSION option  
 SET HOST/DTE command • 4–27

VFDRV  
 See also Virtual device

VFY  
 Correction<EOF on BIT.TMP> • 1–12  
 large disk support • 1–23

Virtual Device  
 Connect  
 /ATT • 5–3  
 /BAD • 5–3  
 /CREATE • 5–3  
 /DR • 5–3  
 /EXT • 5–3  
 /LT • 5–3  
 /MEM • 5–3  
 /MOU • 5–3  
 /NM • 5–3  
 /PASS • 5–3  
 /RO • 5–3  
 /SAVE • 5–3  
 /SIZE • 5–3  
 /SN • 5–3  
 /TYPE • 5–3

Create • 5–9  
 /DEVICE • 5–9

Disconnect  
 /ALL • 5–6  
 /DEV • 5–6  
 /DMO • 5–6

Set • 5–10  
 /OFF • 5–10  
 /ONL • 5–10  
 /RE • 5–11  
 /RON • 5–10  
 /RW • 5–10  
 /ZE • 5–10

VMR and VAX–11 • 1–20

VMS ACP function support  
 FCS • 1–39

VT300,400,500-series terminal restriction • 1–22

---

## Y

---

Year 2000  
 Additional changes • 1–6, 2–3

Year 2000 Certification • 1–1  
 Year 2000 support • 1–1, 2–1  
 date format • 1–7, 2–3

---

## Z

---

ZAP  
 used with the MAKESTK.CMD command file •  
 1–28

