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This manual summarizes the RT-11 V4.0 operating system features that differentiate it from RT-11 Version V03B. Read this document carefully.

RT-11 System Release Notes

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CONTENTS

	Page
PREFACE	vi
CHAPTER 1 NEW FEATURES	1-1
1.1 NEW PROCESSORS	1-1
1.1.1 The PDT-11/130 System	1-1
1.1.2 The PDT-11/150 System	1-1
1.1.3 The PDP-11/23 Processor	1-2
1.1.4 The PDP-11/44 Processor	1-2
1.2 NEW HARDWARE DEVICES	1-2
1.2.1 RL02 Disk	1-2
1.2.2 TS11 Magtape	1-2
1.2.3 TU58 DEctape II Data Cartridge	1-2
1.2.4 Hard Copy Printing	1-3
1.2.5 LA34, LA38 and LA120 Terminals	1-3
1.2.6 DZ11/DZV11 Support	1-3
1.3 NEW SOFTWARE COMPONENTS	1-3
1.3.1 Keypad Editor	1-3
1.3.2 System Jobs	1-3
1.3.2.1 Error Logger	1-4
1.3.2.2 Queue Package	1-4
1.3.3 Save Image Patch Program (SIPP)	1-4
1.3.4 Source Language Patch Program (SLP)	1-4
1.3.5 Binary Compare Program (BINCOM)	1-4
1.3.6 File Protection Feature	1-5
1.3.7 New Programmed Requests	1-5
1.3.8 New Device Handler Macros	1-5
1.3.9 New Error Messages	1-5
1.3.10 The System Generation Process	1-6
1.3.11 New Documentation	1-7
1.3.11.1 RT-11 Software Support Manual	1-7
1.3.11.2 RT-11 Installation Summary Cards	1-7
1.3.11.3 RT-11 Master Index	1-7
1.3.11.4 RT-11 Programmer's Reference Manual	1-7
CHAPTER 2 CHANGES AND ADDITIONS TO EXISTING COMPONENTS	2-1
2.1 MONITORS	2-1
2.2 KMON	2-2
2.2.1 Keyboard Monitor Changes	2-2
2.2.2 New Keyboard Monitor Commands	2-3
2.2.3 New Keyboard Monitor Command Options	2-3
2.3 HANDLERS	2-7
2.4 DUMP	2-8
2.5 DUP	2-8
2.6 FILEX	2-8
2.7 HELP	2-8
2.8 LIBR	2-8
2.9 LINK	2-9

CONTENTS

	Page
2.10	MACRO-11 2-9
2.11	MEMORY PARITY SUPPORT 2-9
2.12	MULTI-TERMINAL SUPPORT 2-10
2.13	ODT 2-10
2.14	PIP 2-10
2.15	RESORC 2-10
2.16	SRCCOM 2-11
2.17	USR 2-11
2.18	SYSGEN 2-11
2.19	SYSTEM SUBROUTINE LIBRARY (SYSLIB) 2-11
2.20	SYSTEM MACRO LIBRARY (SYSMAC) 2-12
CHAPTER 3	CORRECTED PROBLEMS AND CURRENT RESTRICTIONS 3-1
3.1	CURRENT RESTRICTIONS 3-1
3.1.1	Monitors 3-1
3.1.2	Terminals 3-1
3.1.3	KMON 3-2
3.1.4	Handlers 3-2
3.1.4.1	Line Printer Handlers 3-2
3.1.4.2	Magtape Handlers 3-2
3.1.4.3	DECTape II (DD) Handler 3-2
3.1.5	BATCH 3-2
3.1.5.1	\$DATA Compatibility with Card Reader 3-2
3.1.5.2	Multiple Backslashes in Card Reader Input 3-3
3.1.6	DUP 3-3
3.1.7	LINK 3-3
3.1.8	MDUP 3-4
3.1.9	PAT 3-4
3.1.10	PIP 3-4
3.1.11	RESORC 3-5
3.1.12	SRCCOM 3-5
3.1.13	System Macro Library (SYSMAC) 3-5
3.1.14	Wild Cards 3-5
3.1.15	FORTTRAN IV/RT-11 3-5
3.2	CORRECTED PROGRAMS 3-6
3.2.1	Monitors 3-6
3.2.1.1	SJ Monitors 3-6
3.2.1.2	FB and XM Monitors 3-6
3.2.2	USR 3-7
3.2.3	Magtape Handlers 3-7
3.2.3.1	DX (RX01) Handler 3-7
3.2.3.2	DY (RX02) Handler 3-8
3.2.3.3	RK (RK05) Handler 3-8
3.2.3.4	DM (RK06/RK07) Handler 3-8
3.2.3.5	DL (RL01/RL02) Handler 3-8
3.2.4	DIR 3-8
3.2.5	DUMP 3-8
3.2.6	EDIT 3-9
3.2.7	FILEX 3-9
3.2.8	LIBR 3-9
3.2.9	LINK 3-9
3.2.10	MDUP 3-10
3.2.11	ODT 3-10
3.2.12	PAT 3-10
3.2.13	PATCH 3-10
3.2.14	SYSGEN.CND 3-10

CONTENTS

	Page
3.2.15 SYSLIB	3-11
3.2.16 SYSMAC	3-11
3.3 DOCUMENTATION CORRECTIONS AND ADDITIONS	3-11
3.3.1 RT-11 Software Support Manual	3-11
3.3.2 RT-11 System Message Manual	3-11
3.3.3 RT-11 System User's Guide	3-12
3.3.4 RT-11 Pocket Guide	3-14
3.3.5 RT-11 Installation and System Generation Guide	3-14
3.3.6 PDP-11 TECO User's Guide	3-15
3.3.7 RT-11 Programmer's Reference Guide	3-15
CHAPTER 4 PROCEDURES AND PATCHES	4-1
4.1 PROCEDURES	4-1
4.1.1 Directory Segments	4-1
4.1.2 Line Printer Handlers	4-1
4.1.3 Recommended Terminal/Line Printer SET Command Options	4-2
4.1.4 Recommended VT100, VT105, and LA120 Setup Mode Options	4-3
4.1.5 File Protection Feature	4-3
4.1.6 Single- and Double-Density Diskette Usage	4-3
4.1.7 PDT-11 I/O Port Utility (SPEED.SAV)	4-4
4.1.8 .GTJB and .CHCOPY Programmed Requests	4-5
4.1.8.1 .GTJB Programmed Request	4-5
4.1.8.2 .CHCOPY Programmed Request	4-5
4.1.9 Device Ownership	4-5
4.2 PATCHES	4-5
4.2.1 DUP	4-5
4.2.1.1 Multi-Size Volume Patch	4-5
4.2.1.2 Bad Block Replacement Patch	4-6
4.2.1.3 Magtape Patch	4-7
4.2.2 FMS-11 Source Patch	4-7
4.2.3 Magtape Bootstrap (1600 BPI)	4-8
4.2.4 Changing Queue Device	4-8

PREFACE

This manual defines the RT-11 Version 4 (V04) release. New features, corrected problems, and a comparison between this release and the previous release (V03B) are presented in the following chapters.

The system manager and system programmers should be thoroughly familiar with the contents of this manual before generating a system as described in the RT-11 Installation and System Generation Guide.

This manual is divided into four chapters:

- Chapter 1 - NEW FEATURES

This chapter describes the new features of Version 4.

- Chapter 2 - CHANGES AND ADDITIONS TO EXISTING COMPONENTS

This chapter describes existing components that have been improved through changed or added capabilities.

- Chapter 3 - CURRENT RESTRICTIONS AND CORRECTED PROBLEMS

This chapter lists the problems that have been corrected and the restrictions that are in effect. In addition, this chapter includes the corrections to the Version 4 manuals.

- Chapter 4 - PATCHES AND PROCEDURES

This chapter describes and includes patches and procedures to improve system performance.

CHAPTER 1

NEW FEATURES

The primary goals of RT-11 Version 4 are to provide support for additional hardware, implement new software features, correct existing software problems, and make the system easier to install and maintain.

This chapter describes the new features provided in RT-11, but you should refer to the individual manuals of the documentation set for detailed descriptions on how to implement and use the new features.

Although some of the hardware devices listed below were supported as part of a special RT-11 V3B release, they are listed as new features because RT-11 Version 4 is the first general RT-11 release to support these devices.

1.1 NEW PROCESSORS

RT-11 can run on the following new processors:

- The PDT-11/130 System
- The PDP-11/23 Processor
- The PDT-11/150 System
- The PDP-11/44 Processor

1.1.1 The PDT-11/130 System

RT-11 operates on the PDT-11/130 Intelligent Terminal. The PDT-11/130 includes a dual-drive DECTape II minicartridge unit. RT-11 supports DECTape II as the directory-structured system device. The permanent device name for the PDT-11 cartridge is PD. Each cartridge stores 512 blocks, each block containing 256 words. Directories and file data are interchangeable between DECTape II on the PDT-11/130 and DECTape II on PDP-11 processors running RT-11. However, bootable system volumes are not interchangeable.

1.1.2 The PDT-11/150 System

RT-11 operates on the PDT-11/150 Intelligent Terminal. The PDT-11/150 includes a random-access mass storage device that uses RX01 single-density flexible diskettes. RT-11 supports this device as the directory-structured system device. The permanent device name for the PDT-11 diskette is PD. Each diskette stores 494 blocks, each block containing 256 words. Directories and file data are interchangeable between RX01 flexible diskettes on the PDT-11/150 and RX01 flexible diskettes on PDP-11 processors running RT-11. However, bootable system volumes are not interchangeable.

NEW FEATURES

1.1.3 The PDP-11/23 Processor

RT-11 operates on the new PDP-11/23 processor. The PDP-11/23 is compatible with the entire PDP-11 family of processors. This processor, 2.5 times faster than the PDP-11/03, has memory addressing to 124K words and optional floating-point processing.

1.1.4 The PDP-11/44 Processor

RT-11 operates on the new PDP-11/44 processor. The PDP-11/44 comes equipped with dual TU58 DECTape II drives and memory management; floating-point processing is optional. A maximum of 124K words of memory is supported by RT-11.

1.2 NEW HARDWARE DEVICES

This section briefly describes the new hardware devices supported by RT-11, as well as new support in RT-11 for established devices.

1.2.1 RL02 Disk

The RL02 hard disk is physically similar to the RL01, except that the RL02 provides twice the data storage capacity of the RL01. The RL02 provides 20450 blocks of storage. The permanent device name for the RL02 disk is DL. RL01 and RL02 disk packs are not interchangeable; that is, RL02 packs may only be inserted in RL02 drives. Mixed configurations of RL01 and RL02 disk drives on a single controller are supported.

1.2.2 TS11 Magtape

The TS11 magtape is supported by RT-11. This mass storage device includes internal diagnostics for error detection and recovery. The permanent device name for TS11 magtape is MS. Storage capacity is 32 million bytes at 1600 BPI (phase encoded). Each controller supports only one drive. RT-11 supports up to eight controllers.

1.2.3 TU58 DECTape II Data Cartridge

RT-11 supports one or two controllers driving DECTape II data cartridges. Each TU58 cartridge subsystem supports two drives. If your system contains four drives, a second controller governs the third and fourth units, and you must perform a system generation to obtain RT-11 support for it. RT-11 supports DECTape II as a file-structured random-access device and as a system device. The permanent device name for DECTape II is DD. Each cartridge stores 512 blocks, each block containing 256 words. Each DECTape II controller must be interfaced through a separate DL11, DLV11, or compatible single-line local interface.

NEW FEATURES

1.2.4 Hard Copy Printing

Version 4 of RT-11 provides a serial line printer handler (physical device name LS) for the following terminals: LA34, LA35, LA36, LA38, LA120, LS120, and LA180. The terminal must be interfaced through a DL11, DLV11, or compatible single-line local interface. This handler can also be used with non-DIGITAL terminals that use the XON/XOFF protocol. The printer must be interfaced through a local DL single-line interface.

1.2.5 LA34, LA38, and LA120 Terminals

RT-11 supports the microprocessor-driven LA34, LA38, or LA120 terminals as system console, additional terminals, or hard copy printers.

1.2.6 DZ11/DZV11 Support

Up to four DZ11/DZV11 multiplexers can be supported to provide a total of 16 lines. A local terminal attached to a DZ11 or DZV11 multiplexer may now be assigned as the RT-11 console under multi-terminal monitors.

1.3 NEW SOFTWARE COMPONENTS

Version 4 of RT-11 includes many new components. This section names them and briefly describes their functions. You should refer to the manuals in the documentation set for detailed descriptions of components mentioned here.

1.3.1 Keypad Editor

The Keypad Editor (KED and K52) can be used with the VT100 and VT52 families of video terminals to edit text files. The Keypad Editor uses the video screen as a window into the file. As you use the Editor, it scrolls the file up or down to display different sections of the file. It immediately shows you the effect of each editing function by updating the text you see on the screen. Its most common functions require no more than two keystrokes, and its function names clearly indicate what the functions do.

1.3.2 System Jobs

The system jobs feature permits an FB or XM monitor created through system generation to run up to six jobs, in addition to the normal foreground and background jobs. DIGITAL provides two system jobs: the file queuing job, QUEUE, and the error logger, EL. If you generate a monitor with support for system jobs, you can run either or both of the supplied system jobs along with a foreground and background job (although this drastically reduces memory available for foreground and background operation). Under the distributed FB monitor, you can run a system job as the foreground job.

NEW FEATURES

1.3.2.1 Error Logger - The error logger (EL) monitors the hardware reliability of the system. It keeps a statistical record of all I/O operations on devices that call it. At intervals that you determine, the error logger produces individual or summary reports on some or all of the errors that have occurred. Support for the error logger must be obtained through system generation. The error logger runs with the FB or XM monitors, as either a foreground or system job. The error logger is not supported under the SJ monitor.

1.3.2.2 Queue Package - The file queuing package (QUEUE and QUEMAN) allows you to send files to any valid RT-11 output device. Although the QUEUE package is particularly useful for obtaining hard copy listings of files, queuing is not restricted to a line printer or to other serial devices. The QUEUE program runs with the FB or XM monitors, as either a foreground or system job. QUEMAN, the user interface to QUEUE, runs in the background.

1.3.3 Save Image Patch Program (SIPP)

The save image patch program (SIPP) lets you make modifications to any RT-11 file that exists on a random-access storage volume. It is especially useful for maintaining .SAV image files. You can use SIPP interactively from the console, in an indirect command file or in a BATCH stream to patch all files created with the Version 3B (except V3B overlaid) or 4 linker. Overlaid files created with the Version 4 linker can be patched by SIPP. Overlaid files created by previous versions of linker can be patched with the /A option; however, there is no automatic updating of internal system communication areas, overlay handlers, overlay tables, or window descriptor blocks in programs with extended memory overlays.

SIPP was designed to replace the PATCH utility. However, PATCH is included in the Version 4 release so that patches that have been published prior to this release can be installed, and PATCH can patch overlaid files created with the Version 3B linker.

1.3.4 Source Language Patch Program (SLP)

The source language patch program (SLP) is a patching tool you can use for maintaining source files that exist on any RT-11 device. Inputs to SLP are source files that you want to modify and a command file that consists of text lines and edit command lines that specify the patching operations to be performed.

1.3.5 Binary Compare Program (BINCOM)

The binary compare program (BINCOM) compares two binary files and lists the differences between them. You can direct BINCOM to print the results of the comparison at the terminal or line printer, or to store them in a file. BINCOM can also create an indirect command file for SIPP.

NEW FEATURES

1.3.6 File Protection Feature

The peripheral interchange program (PIP) allows you to protect files against accidental deletion. All files on the distribution kit are protected. File protection is indicated by the letter "P" next to the file size as listed in the file's directory. Files may only be protected and unprotected using the keyboard RENAME command or the PIP utility. There is no programmed request or SYSLIB call to carry out these operations from user programs.

1.3.7 New Programmed Requests

Three new programmed requests are available:

1. The .SPCPS (save/set mainline PC and PS) programmed request allows a program's completion routine to change the flow of control of the mainline code. This request can be used only in FB and XM systems if it is specified as a feature during the system generation process.
2. The .SDTTM (set date and time) programmed request allows your program to set the system date and time.
3. The .MTSTAT (multi-terminal status) programmed request provides status information in a multi-terminal environment.

1.3.8 New Device Handler Macros

Four new device handler macros are available:

1. The .DRDEF macro is used in the preamble section of the handler to issue .MCALL directives and provide symbol definitions required by the handler.
2. The .DRSET macro is used in the code of the handler to create or extend the list of SET options for a device.
3. The .DRVTB macro places a table in the code of the handler. The table contains the vector address, interrupt entry point, and processor status word for each device vector. This table is used for RT-11 devices that have more than one interrupt vector associated with them.
4. The .DRBOT macro is used in setting up the primary bootstrap driver. Handlers that are used as system device handlers must contain the code for the primary device driver the bootstrap uses.

1.3.9 New Error Messages

Several error messages were changed or added to the following system components:

BATCH	FILEX	PAT
CREF	FORMAT	PATCH
CSI	KMON	PIP
DUP	LIBR	RMON
EDIT	LINK	SRCCOM

NEW FEATURES

In addition, error messages were provided for the following new system components:

BINCOM	SIPP
EL	SLP
QUEUE	

1.3.10 The System Generation Process

Several new features were incorporated into the system generation process.

SYSGEN.CND

1. Monitor/driver separation allows users to generate a monitor that can be used with many system devices instead of a monitor that can only be used for a specific system device.
2. The system job feature was added as a system generation process.
3. .SPCPS (save/set mainline PC and PS) programmed request.
4. Terminal input and output buffer sizes can be changed for all monitors.
5. Multi-terminal support in SJ was added as a system generation process.
6. Month rollover.
7. Subsets of keyboard monitor commands can be selected. You can choose all commands or one or more of the following subsets: (1) utility, (2) language, or (3) minimal.
8. FPU support is now an option.
9. Escape sequence support was removed.
10. Different magtape handlers with different characteristics can be generated during the same system generation process.
11. New devices and processors supported:

- TS11 magtape
- TU58 DECTape II data cartridge
- 16 DZ11/DZV11 lines
- RL02 disk
- Serial line printer
- PDT-11/130 system
- PDT-11/150 system
- PDP-11/23 processor
- PDP-11/44 processor

SYSGEN.SAV

1. Additional script language commands.
2. Additional functions such as long form of dialogue and suppression of certain parts of text.

NEW FEATURES

1.3.11 New Documentation

The RT-11 documentation set includes four new manuals. Each is briefly described here.

1.3.11.1 RT-11 Software Support Manual - This manual provides detailed descriptions of the software components of the RT-11 operating system. It is intended for programmers with experience in MACRO-11 assembly language who are interested in system-level programming, and for application programmers who want to improve their understanding of the RT-11 operating system. Before you use this manual, you should be familiar with the topics covered in the RT-11 System User's Guide and with the programmed requests documented in the RT-11 Programmer's Reference Manual. The RT-11 Software Support Manual contains information that can help you use system resources and programmed requests more effectively.

1.3.11.2 RT-11 Installation Summary Cards - The cards condense the installation procedures in the RT-11 Installation and System Generation Guide into an easy-to-use format. They summarize the steps and commands you use to install RT-11 on various configurations. You can use the Summary Cards if you have thoroughly studied the RT-11 Installation and System Generation Guide and do not need the more detailed instructions contained in it.

1.3.11.3 RT-11 Master Index - The master index is a compilation of the indexed items in all other manuals in the RT-11 manual set. You should use it to locate topics described in the individual manuals.

1.3.11.4 RT-11 Programmer's Reference Manual - This manual provides detailed descriptions of the programmed requests, system macros, and system subroutines. In Version 3B, this information was located in the RT-11 Advanced Programmer's Guide, which no longer exists for Version 4. Other information previously in the RT-11 Advanced Programmer's Guide, such as I/O programming conventions and extended memory support description is now located in the RT-11 Software Support Manual.

CHAPTER 2

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

This chapter describes new capabilities that have been added and changes that have been made to existing components.

2.1 MONITORS

In Version 4, the system device handler is not part of the monitor file. The system device handler resides on the system volume like any other handler. The advantages of this separation are:

1. There are only three monitors distributed on the RT-11 kit rather than the 23 or more distributed in Version 3B. The three monitors are called RT11BL.SYS, RT11SJ.SYS, and RT11FB.SYS.
2. Device-specific code is located in the handler alone. There is no device-specific code in the monitor or in the bootstrap. This makes it easier to develop handlers for new system devices.
3. Any file can be booted regardless of its name. Monitor files are no longer restricted to xxMNyy for their file names; however, the .SYS file type is still required.
4. Patching is simpler since there are fewer monitor files. Patches to a device handler need to be installed only once, even if many monitors run on one disk.
5. The monitor does not have to be regenerated or relinked to change the system device. All that is required is to copy the monitor, system device handler, and boot blocks.
6. System device handlers can have SET options.

In all monitors, except for monitors that include multi-terminal support, the default input ring buffer size has been raised to 134 characters. This allows input of lines of up to 132 characters without requiring a system generation.

The baseline monitor no longer contains floating point support. If a floating point interrupt occurs due to a floating point error under a monitor without floating point support, the CPU will halt with the PC = 250.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

The following new physical device names are supported by all monitors except as noted:

- DD DECTape II Cartridge
- LS Serial Line Printer
- MQ Message Facility (FB/XM monitors only)
- MS TS-11 Magtape (not in baseline monitor)
- PD PDT-11 Cartridge or Diskette

The RT-11 monitor, when making CSI calls, checks to see if BATCH is running, and if so, does not print prompts.

An attempt to use extended memory by a program at load time without an XM monitor results in an error check. Code for creating regions and window initialization for extended memory overlays was added to KMON to provide load time size checks.

Code was added for the new extended memory .SETTOP feature. The virtual high limit was added to the job impure area in extended memory and to the GTJB return.

A virtual .SAV file can be run with the SRUN/FRUN keyboard monitor commands.

Logical names "FG" and "BG" assigned to the foreground and background jobs are now "F" and "B".

At system bootstrap time, the monitor will not install device handlers for devices that do not exist on the system.

2.2 KMON

2.2.1 Keyboard Monitor Changes

There has been a change in the LOAD command operation. Previous to Version 4, loading a non-file-structured device with a job assignment assigned all units of that device to a job. This has been changed in Version 4 to assign ownership of all units of special devices when a job assignment is made. This will preclude, for example, locking out the use of all magtape drives by a single job.

When selecting error logger support for an FB/XM monitor, and also requesting an SJ monitor during the system generation process, the SHOW CONFIGURATION command under the SJ monitor reports error logging support. This requirement is necessary so that handlers can be used for both SJ and FB monitors. However, there is no error logging support under the SJ monitor.

The RESUME keyboard command now supports the system job feature.

The SUSPEND keyboard command now supports the system job feature. It suspends the execution of a system job. Type the RESUME command to continue execution of a job.

Because of the new KMON commands and options, the minimal acceptable abbreviations for some of the commands and options have increased in length.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

2.2.2 New Keyboard Monitor Commands

The keyboard monitor command SRUN has been added to allow you to execute a system job. The SRUN command executes a system job under a monitor created through system generation with the system job special feature.

Also, FRUN and SRUN command options are now compatible with the syntax of other keyboard commands. FRUN options are the same as for SRUN except that the /LEVEL and /NAME options are invalid. The Version 3B and earlier FRUN options /N:n, /T:n, and /P are no longer valid and have been replaced by /BUFFER:n, /TERMINAL:n, and /PAUSE, respectively. Options for both the FRUN and SRUN commands are described in the next section.

The CREATE command has been added to allow you to create or extend a file with a specific name, location, and size on the block-replaceable volume that you specify. Options for this command are described in the next section. The FORMAT command has been added to allow you to format disks and diskettes, DECTape, or DECTape II. Options for this command are described in the next section.

2.2.3 New Keyboard Monitor Command Options

New options have been added to the keyboard monitor commands. Now, almost every utility program and option is accessible through the keyboard commands. During system generation, you can exclude support for some of the commands if you need to save space on disk.

BOOT

/FOREIGN Boots a system other than RT-11 Version 4.

/WAIT Initiates the boot procedure, although it does not begin until prompted.

COPY

/BOOT:val Copies bootstrap information from monitor and handler files to blocks 0 and 2 through 5 of a random-access volume, permitting you to use that volume as a system volume.

/END:n Copies data ending at block n.

/FILES Copies a volume to a file on another volume or vice versa. It must be used with the /DEVICE option.

/START:n Copies data starting at block n.

/VERIFY Verifies that the output matches the input after a copy operation. This option is available only when using the COPY/DEVICE command, and cannot be used for file copies.

/WAIT Initiates the copy procedure, although it does not begin until prompted. This allows you to replace the system volume with a data volume.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

CREATE Creates or updates a file directory entry with the specified name, location and size.

/ALLOCATE:n Allocates n blocks to the file being created.

/EXTENSION:n Extends the specified file by n blocks.

/START:n Creates a file starting at block n.

DELETE

/ENTRY Removes a job from the QUEUE package queue (valid only if QUEUE is running).

/WAIT Initiates the delete operation, although it does not begin until prompted.

DIRECTORY

/BEGIN Specifies the file at which the directory listing is to begin.

/END:n Used with the /BADBLOCKS option to specify the last block to be scanned.

/START:n Used with the /BADBLOCKS option to specify the first block to be scanned.

/VERIFY Used with the /BADBLOCKS option to read a bad block, write to it, and read it again.

/VOLUMEID:ONLY Allows listing of the volume id without the directory.

/WAIT Initiates the operation, but does not begin until prompted.

DIFFERENCES

/ALWAYS Creates an output file regardless of whether there are any differences between the two input files. Use with the /BINARY, /SIPP:filespec, and /OUTPUT:filespec options.

/AUDITTRAIL Includes an audit trail in the SLP output file to keep track of patches made to the modified file. Use with the /SLP option.

/BINARY Invokes the Binary Compare Program (BINCOM).

/BYTES Lists the differences between the two files byte by byte. Use with the /BINARY option.

/CHANGEBAR Creates an output file that contains the new file with a changebar character next to the lines in the new file that differ from those in the old file.

/END:n Specifies the ending block number of the file comparison, where n is an octal number. Use with the /BINARY option.

/QUIET Suppresses the printing of the differences between the two files at the terminal and prints the message "?BINCOM-W-Files are different" if applicable. Use with the /BINARY option.

/SIPP:filespec Generates a file that you can use as an input command file to the Save Image Patch Program (SIPP). Use with the /BINARY option.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

/SLP Produces an output file suitable for input to SLP.

/START:n Specifies the starting block number of the file comparison, where n represents the octal starting block number. Use with the /BINARY option.

/[NO]TRIM Used to compare tabs and spaces that appear at the end of source lines.

DUMP

/FOREIGN Indicates that the volume to be dumped is not a directory-structured volume, such as a magtape.

EDIT

/KED Invokes the Keypad Editor for use with the VT100 video terminal.

/K52 Invokes the Keypad Editor for use with the VT52 video terminal.

FORMAT

/NOQUERY Suppresses the confirmation message that otherwise appears before formatting/verifying begins.

/PATTERN Selects the patterns to be run during device pattern check verification.

/QUERY Allows the system to print a confirmation message before it performs formatting or verification. This is the default setting.

/SINGLEDENSITY Formats the diskette in single density.

/VERIFY Performs pattern check verification on the device after it has been formatted.

/WAIT Initiates the format operation, although it does not begin until prompted.

FRUN

/BUFFER:n Reserves more space in memory than the actual program size (formerly V3B /N:n option).

/NAME:name Assigns a logical name to the foreground job.

/PAUSE Used to help you debug a program (formerly V3B /P option). When you type the carriage return at the end of the command string, the system prints the load address of your program and waits. You can examine or modify the program by using ODT. You must type the RESUME command to start the foreground job.

/TERMINAL:n Assigns a terminal to interact with the foreground job in a multi-terminal environment (formerly V3B /T:n option).

INITIALIZE

/BADBLOCKS:RET Initializes without doing a bad block scan, retaining any .BAD files already on the volume.

/RESTORE Restores a disk to its original state if no files have been transferred to it since initialization.

/WAIT Initiates the initialization procedure, although it does not begin until prompted.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

LINK

/ALPHABETIZE Lists the global symbols in the program in alphabetical order.

/BITMAP Creates a memory usage bitmap.

/NOBITMAP Outputs the bitmap only if there is no code located below location 400.

/SYMBOLTABLE:file Creates a file containing symbol table definitions for all the global symbols in the executable image.

/TOP:n Specifies the highest address to be used by the relocatable code in the load module.

/XM Enables the extended memory SETTOP feature.

PRINT

/FLAGPAGE:n Prints header or banner pages as the first pages of a hard copy listing (valid only if QUEUE is running).

/NAME:jobnam Specifies a one- to six-character alphanumeric jobname for the file(s) to be printed (valid only if QUEUE is running).

/NOFLAGPAGE Inhibits printing of a header or banner page as the first page of a hard copy listing (valid only if QUEUE is running).

/PROMPT Allows continuation of a command string onto subsequent lines (valid only if QUEUE is running).

/WAIT Initiates the print operation, although it does not begin until prompted.

RENAME

/NOPROTECTION Disables the protection status of the renamed file.

/PROTECTION Assigns protected status to the renamed file. A protected file cannot be deleted until protected status is disabled.

/WAIT Initiates the rename operation, although it does not begin until prompted.

SET

EDIT KED Invokes the Keypad Editor for use with the VT100 video terminal.

EDIT K52 Invokes the Keypad Editor for use with the VT52 video terminal.

DD CSR=n Modifies the DECTape II handler to use n as the address of the CSR for the first DECTape II controller.

DD CSR2=n Modifies the DECTape II handler to use n as the address of the CSR for the second DECTape II controller.

DD VECTOR=n Modifies the DECTape II handler to use n as the vector address for the first DECTape II controller.

DD VEC2=n Modifies the DECTape II handler to use n as the vector address for the second DECTape II controller.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

LP/LS CSR=n Modifies the line printer handler to use n as the address of the CSR for the line printer controller.

LP/LS [NO] FORM Causes the line printer handler to optionally simulate hardware form feeds.

LP/LS LENGTH=n Causes the line printer handler to use n as the number of lines per page.

LP/LS SKIP=n Causes the line printer to skip n lines over perforations between pages.

LP/LS VECTOR=n Modifies the line printer handler to use n as the vector address for the line printer controller.

SHOW

ALL Combines the function of the CONFIGURATION, DEVICES, JOBS, and TERMINAL options. It also tests the device assignments.

ERRORS Invokes the error report utility ERROUT to provide an error report of the system and its devices.

JOBS Displays a list of loaded jobs and indicates the status of each job.

QUEUE Lists the current contents of the device queue.

TERMINALS Shows unit owner for systems that have multi-terminal support.

SQUEEZE

/WAIT Initiates the SQUEEZE operation, although it does not begin until prompted.

SRUN

/BUFFER:n Reserves more space in memory over the actual program size.

/LEVEL:n Assigns an execution priority level to the job.

/PAUSE Loads the program without starting it.

/TERMINAL:n Specifies terminal number n as the job's console terminal.

TYPE

/WAIT Initiates the typing operation, although it does not begin until prompted.

2.3 HANDLERS

A new TS11 magtape handler (MS.SYS) was written for Version 4. Magtape handlers can now distinguish between foreground ownership and individual system job ownership.

New SET options are now available for the LP handler. The LP handler no longer sends nulls to the line printer.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

2.4 DUMP

DUMP now handles operations involving magtape. You can dump specific blocks or entire tapes. Also, protection error messages were added.

2.5 DUP

Where appropriate, error messages now include a file specification. Protection error messages were added.

The following options have been added:

- /E:n The value n indicates the location at which a copy procedure must end.
- /F Copies a device to a file on another device, or vice versa.
- /G Indicates the location at which a copy procedure must begin.
- /Q Boots any system other than Version 4 RT-11 operating system. This option is used with the /U option.

2.6 FILEX

FILEX supports DY single-density floppies and PDT-11/150 floppies.

2.7 HELP

The HELP files are updated. The HELP program has had several new command arguments added and also executes faster.

2.8 LIBR

Where appropriate, error messages now include a file specification. When creating a new library, the default is not to insert absolute globals in the directory.

The following options have been added:

- /A Includes all global and absolute global symbols in the library file's directory.
- /X Creates libraries that can have more than one definition for a global entry point. These multiple definition libraries are processed differently from libraries that contain only one definition for each global entry.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

2.9 LINK

The overlay handler has been placed in SYSLIB.OBJ. Where appropriate, error messages now include a file specification. Additional information has been placed in block 0 for SIPP and the /V and /XM options. There is a new .LIMIT value when the /XM and /V options are used. A new .MAP output file format is generated and contains information for the /V and /XM options. The /O and /V options require the line to be reentered and will no longer include the file as part of the previous line.

The following options have been added:

- /G Increases the internal buffer to accommodate the largest entry point table of all the multiple definition libraries you are using.
- /Q Specifies the absolute base addresses of up to eight p-sects in your program. This option is particularly useful if you are preparing your program sections in absolute binary (.LDA) format for placement in ROM storage.
- /V:n:m Creates an extended memory overlay structure for your program. If the virtual overlay region and partition are not specified, the default is for each segment to occupy a unique area in extended memory; no mass storage I/O is necessary when each segment is called.

2.10 MACRO-11

MACRO-11 has been rewritten and is considerably faster. In addition, the permanent symbol table for MACRO-11 now includes the mnemonics for the Commercial Instruction Set.

MACRO-11 now indicates errors more severe than the warning state. Therefore to catch assembly errors, it is no longer necessary to set the error level to the warning state in indirect command files.

2.11 MEMORY PARITY SUPPORT

Memory parity is supported as a system generation feature, but is not included in the distributed monitors. If a memory parity error occurs under a monitor without memory parity support, the CPU will halt with the PC = 120. The presence of memory parity hardware can be checked with the SHOW CONFIGURATION command. If memory parity support has been included and a memory parity error occurs, the system prints an error message. Additionally, the system logs the error if error logging was also selected as a system generation feature, and the error logging program, EL, is running. The parity error routine distinguishes between recoverable cache memory errors and main memory errors. Only main memory errors abort a job, but the system logs both types of errors.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

2.12 MULTI-TERMINAL SUPPORT

Write pass-all and read pass-all modes are implemented. This causes the monitor to do no processing of the input or output characters; it prevents the terminal handler from interpreting the input characters and "bit stripping" the high-order bit of input and output characters.

A new programmed request (.MTSTAT) is added to provide multi-terminal system status information. Also, one to four DZVlls can be supported. Full modem support for DZll/DZVll multiplexers is provided. Local terminals attached to DZll/DZVll multiplexers may now be assigned to be the RT-ll console under multi-terminal monitors. DZ lines have program-settable character length, stop bits, and parity.

The TT: handler can now be used to obtain input from a job's console terminal under a multi-terminal monitor.

2.13 ODT

Virtual Debugging Technique (VDT.OBJ) is a conditional assembly of ODT. It is used for XM and multi-terminal debugging.

2.14 PIP

The PIP system utility program was completely rewritten for Version 4. Where appropriate, error messages now include a file specification.

The following options have been added:

- /E Initiates the copy operation, although it does not begin until prompted.
- /F Assigns protected status to a file. A protected file cannot be deleted until that status is disabled.
- /Z Disables the protected status of a file.

2.15 RESORC

A new command option (/J) was added that shows information on jobs currently in the system. Ownership of terminals is also shown. Display of logical and physical devices (SHOW command with no option) was removed from KMON and implemented in RESORC. RESORC now supports the PDT 11/130 and PDT 11/150 processors.

The following options have been added:

- /J Displays information about the currently loaded jobs (the job number and name, the console the job is running on, the priority level of the job, the job's running state, the low and high memory limits of the job, the start address of the job's impure area).
- /L Displays the current system's device assignments and ownership status.
- /T Now shows unit owner for systems that have multi-terminal support.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

2.16 SRCCOM

The following options have been added:

- /A Includes an audit trail (0 - 11 characters entered by the user) that keeps track of patches made to the modified file. This option is used with the /P option.
- /P Produces an output file that is acceptable to the SLP utility as command file input.
- /D Causes the file specified in the command line to show differences from the old file with vertical bars to indicate insertions and bullets (lower-case o) to indicate deletions.
- /T Causes SRCCOM to compare trailing blanks and tabs. Default is to ignore trailing blanks and tabs.
- /V:i:d Allows the user to change the characters that are used to flag insertions and deletions. The "i" represents the insertion character code and the "d" represents the character deletion code.

2.17 USR

File protection error codes were added to the .CLOSE, .DELETE, .ENTER, and .RENAME programmed requests.

2.18 SYSGEN

Two script language commands were added:

1. #ABBR provide abbreviated form of script commands
2. #ROPRT reset CTRL/O (^O) and print

Additional functions were added:

1. Get long form of dialogue.
2. CTRL/O to suppress certain parts of text. CTRL/O is reset for the next question.

2.19 SYSTEM SUBROUTINE LIBRARY (SYSLIB)

The following changes have been made to the System Subroutine Library (SYSLIB.OBJ).

The overlay handler and virtual overlay handler now reside in the system library.

The ICLOSE subroutine was changed to provide for an error return on file protection violations. The ICLOSE and CLOSEC subroutines terminate activity on the specified channel and free it for use for another operation. In addition, the IDELET, IENTER, and IRENAM functions now return an additional error code specifying a file protection violation.

CHANGES AND ADDITIONS TO EXISTING COMPONENTS

The IGTJB function and GTJB subroutine were changed to return information about any job in the system. The jobname parameter was added to support the system job feature.

The ICHCPY subroutine was changed to allow a job to copy any other job's channels. The ICHCPY subroutine opens a channel for input, logically connecting it to a file that another job opened for input or output. This subroutine can be used with the FB and XM monitors only.

The MTGET subroutine now provides for the return of the job number of the job that owns a specific terminal. The MTGET subroutine also furnishes you with information about a specific terminal in a multi-terminal system even if the terminal is unassigned.

The MTATCH subroutine now provides for the return of the job number of the job to which the terminal is attached if the request fails.

The IQSET subroutine has an additional parameter (addr) that provides an extension area for a job's queue elements.

The MTIN and MTOU subroutines now return an optional fourth argument, which is the number of characters actually transferred in a multiple character request.

2.20 SYSTEM MACRO LIBRARY (SYSMAC)

The following changes have been made to the System Macro Library (SYSMAC.SML).

Three programmed requests have been added. They are .SPCPS (save/set mainline PC and PS), .SDTTM (set date and time), and .MTSTAT (multi-terminal status).

Four macros have been added to aid the user in writing device handlers. They are .DRDEF, .DRSET, .DRBOT, and .DRVTB.

The jobname parameter has been added to the .CHCOPY programmed request to support the system job feature. The .CHCOPY programmed request opens a channel for input, logically connecting it to a file that another job opened for input or output. This request can be used by the FB or XM monitors or system jobs only.

The .GTJB programmed request can accommodate 8- or 12-word status parameter blocks to provide information on system jobs. The .GTJB programmed request returns information about a job in the system. The jobname parameter was added to support the system job feature.

CHAPTER 3

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

This chapter describes restrictions that apply to Version 4 system components and lists previous problems that are corrected in the Version 4 release. Corrections to the Version 4 manuals are also included.

3.1 CURRENT RESTRICTIONS

3.1.1 Monitors

Monitors, in certain cases, do not work on RL01 disks that have a serial number below 77,000. Such disks should be returned to DIGITAL for replacement.

3.1.2 Terminals

When you type a double CTRL/C on an SJ system, the monitor issues a hardware RESET instruction. This causes the DZ multiplexer to reset its status; it drops Data Terminal Ready on all lines, effectively hanging them up. This is part of the general clean-up the system performs after a program aborts.

The guaranteed maximum input baud rate to the console terminal on non-multi-terminal systems is 300 baud. The maximum output baud rate on non-multi-terminal systems is 9600 baud. The RT-11 Software Support Manual lists the maximum input and output baud rates for multi-terminal systems. Under certain circumstances, based on CPU type and system load, your system may be able to obtain higher input and output rates. However, terminals running at rates higher than those recommended may occasionally lose input characters. This will usually be noticed when typing keyboard characters that generate multiple character sequences, such as the cursor movement key or keys on the alternate keypad. If this occurs, you should set the terminals to a lower speed and/or include high-speed ring buffer support.

High-speed ring buffer support, a system generation feature, is described in Chapter 3 of the RT-11 Software Support Manual.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

3.1.3 KMON

If you use the SAVE command to create a program that will run under the XM monitor, use SIPP to deposit a zero in locations 64 and 66 of the file.

3.1.4 Handlers

Under monitors generated with the system job feature, handlers must now be specified with a colon in their name when unloading them. For example,

UNLOAD RK:

3.1.4.1 Line Printer Handlers - If using escape sequences or special control characters with LP or LS handlers, specify SET LP/LS CTRL and SET LP/LS WIDTH 255 to be sure that the handler sends all characters to the printer.

3.1.4.2 Magtape Handlers - If you attempt to assemble earlier RT-11 magtape handlers on an RT-11 V4.0 system, you will encounter an assembly error. This is due to incompatibility in the system macro library (SYSMAC.SML). If you cannot use Version 3B to assemble the V3B handlers, you will have to replace the V4.0 system macro library with the V3B system macro library, assemble the handlers and the file structure module, and then restore the V4.0 system macro library. All other handlers from V3.0 and V3B should assemble and link properly under an unmodified V4.0 system.

If a magtape handler is loaded with the LOAD command under the SJ monitor, and a CTRL/C is done from any program that accesses that magtape, any further access to the magtape will generate an error. To gain access to the magtape, the handler must be first unloaded and then loaded again.

3.1.4.3 DECTape II (DD) Handler - The DECTape II (DD) handler has been modified to support two controllers. The conditional parameter, DDT\$0, indicates whether dual controller support is desired.

3.1.5 BATCH

3.1.5.1 \$DATA Compatibility with Card Reader - If you use a READ statement in a loop to input a stream of data in FORTRAN, control transfers to the statement label given in the END=condition when data read is

CTRL/Z<RET><LF>

For card input, the CTRL/Z is Hollerith punch 7,8,9. In addition, for card input you must SET CR: CRLF before loading CR handler. This command causes a <RET><LF> to be appended to each card read. You must also SET CR: TRIM before you load the handler. This converts a card containing only a CTRL/Z in the first column in the BATCH stream to

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

CTRL/Z<RET><LF>, which FORTRAN recognizes as an end-of-file. If this is not done, an input conversion error message is generated.

3.1.5.2 Multiple Backslashes in Card Reader Input - Backslash is used to create multiple statement lines in BASIC. Since backslash is a special character to the BA handler, two backslashes must be used in the BATCH source file whenever a single backslash is desired. The BA handler reduces the two backslashes to a single backslash when the source is read.

When input to the BATCH compiler is from the card reader and consists of a single job, the method of doubling backslashes works correctly. It also works if input is a card deck containing multiple jobs where only the first job contains the extra backslashes. If the second job contains the extra backslashes, BATCH generates a BC error since the whole multi-job deck is stored on disk and is re-read by the BA handler for each subsequent job. This second reading of the source input by the BA handler causes the BC error because the double backslash was reduced to a single backslash on the first reading, and the single backslash now looks like a run-time directive to the BA handler. This is a restriction on the use of multiple backslashes in card reader input to BATCH.

3.1.6 DUP

The DUP system utility program was completely rewritten for Version 4.

Restrictions that apply to the Version 4 DUP utility program are as follows:

1. To boot any system other than a RT-11 V04 operating system, including previous versions of RT-11, use the /Q or /FOREIGN option. If the /Q or /FOREIGN options are used, date and time are not preserved across bootstraps.
2. The version 4 DUP utility program will not run under previous versions of RT-11.
3. Do not use COPY/DEVICE to or from an input or output volume initialized with bad block replacement; For these cases, use the commands INIT, SQUEEZE/OUTPUT, and-- for bootable volumes-- COPY/BOOT. Note that the DL and DM handlers support bad block replacement. In addition, COPY/DEVICE should not be used between volumes with different numbers of physical blocks. For example, when copying diskettes on an RX02 drive, do not attempt to copy a single-density diskette to or from a double-density diskette with the COPY/DEVICE command. Such an operation may generate an invalid directory on the output device.

3.1.7 LINK

When linking privileged jobs with extended memory overlays (/V), the value of the "Next Available Address" printed on the .MAP listing must not overlap the lowest used area in low memory (0 to 28K). This is because that area could be occupied by the USR, loaded handlers, and foreground and/or system jobs.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

If the map or the symbol definition files are directed to the same device as the image file (.REL or .SAV,) the message "?LINK-F-SAV device full" may be generated because of space requirements. A possible remedy for this situation is to specify a size restriction for the map or symbol table file, for example, using the /ALLOCATE:size option when producing a map file.

3.1.8 MDUP

MDUP requires that files be in specific order on the tape. When a file is found, the search for the next file begins at the next tape file. If a file is not found (end-of-tape encountered), that file is discarded. MDUP then rewinds the tape and begins searching for the next file. The files searched for must be on the tape in the following order:

```
SWAP.SYS
RT11SJ.SYS
TT.SYS
LP.SYS
MT.SYS
MM.SYS
MS.SYS
PIP.SAV
DUP.SAV
DIR.SAV
```

3.1.9 PAT

Patches utilizing the /C: option that were originally intended to be used with V3B PAT will produce the message "?PAT-W-Input /correction file checksum error". Either install these patches with V3B PAT, or ignore the warning message and check the patch carefully for correctness.

A correction file may now reference a global defined in the input module.

3.1.10 PIP

If you specify an off-line device when using the COPY command, the first few characters of a message are displayed before the generation of the correct monitor error message. For example, if the magtape device is offline:

```
.COPY *.* MT:
?FI
?MON-F-Directors I/O error 007220
```

If the copy of PIP on the system volume is replaced by another copy of PIP, a system crash may occur. This can be prevented by using the /NOREPLACE option or running PIP from another volume.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

3.1.11 RESORC

The SHOW DEVICES command will not display a vector for physical device name PD.

3.1.12 SRCCOM

The maximum line length accepted by the SRCCOM system utility program is 250(decimal) characters.

3.1.13 System Macro Library (SYSMAC)

Programs that issue a .SCCA programmed request will be aborted with a CTRL/C if the input device is TT:.

3.1.14 Wild Cards

When using embedded wild cards in the first input specification to QUEMAN or PRINT, without a jobname being specified in the output specification, QUEMAN will use the first input specification as the jobname.

FOR EXAMPLE (assuming QUEUE is running),

```
PRINT RT11*.MAP
```

will designate the job name as "RT11*" rather than the first file name.

3.1.15 FORTRAN IV/RT-11

The following information applies only to FORTRAN IV/RT-11 V2.1 running under Version 4 of RT-11. For any subsequent releases of FORTRAN, the release notes corresponding to that version should be consulted.

There are a number of patches required for correct operation of FORTRAN. The RT-11 V04 Software Dispatch Review and subsequent issues of the RT-11 Software Dispatch contain these patches.

FORTTRAN programs cannot be run as virtual jobs. Foreground FORTTRAN programs cannot use extended memory overlays.

If the background job area under the XM monitor becomes too small (approximately 8K words), background FORTTRAN programs fail and the error message "?MON-F-ill addr" is generated. To prevent this error, increase the background job area.

The use of virtual arrays under the SJ and FB monitors on PDP-11/23-based systems requires that the monitors be patched to run in 28K words. This is a customization patch in the RT-11 Installation and System Generation Manual entitled "Running RT in less memory than is available".

The DISP='PRINT' option of the OPEN statement is not supported. Using this option results in an error at compile time and run time.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

If you are using the LS handler with FORTRAN IV/RT-11 V2.1 programs and have not renamed the handler to LP.SYS as suggested in the RT-11 Installation and System Generation Guide, you must explicitly state that carriage control is desired in an OPEN or CALL ASSIGN statement for the line printer to operate properly.

If you FRUN a foreground program before you run a background program, considerable foreground output is buffered before the background program begins. By using CALL PRINT instead of WRITE, the foreground program is blocked long enough for complete background output to be printed.

3.2 CORRECTED PROGRAMS

3.2.1 Monitors

3.2.1.1 SJ Monitors - The following problems were corrected:

1. A branch could go out of range if large buffers were specified during the system generation process.
2. Timer support degraded system performance.
3. Double CTRL/C termination caused system crash.
4. Typing CTRL/O to console terminal caused system crash.
5. Halt on READ occurred in DX SJ bootstrap.
6. Typing CTRL/C with a loaded TT handler could cause unpredictable results.

3.2.1.2 FB and XM Monitors - The following problems were corrected:

1. Issuing keyboard commands while a foreground job is using the USR could cause a system crash.
2. Unpredictable results could occur if the background and foreground jobs required the CSI at the same time.
3. A trap or incorrect action could occur when a job was FRUN under the FB monitor.
4. A race condition sometimes allowed the background job to be scheduled ahead of the foreground job.
5. Typing CTRL/O to the console terminal sometimes crashed RT-11.
6. A directory segment could be corrupted if a CSI error occurred and volumes having one-segment directories were exchanged without exiting from a program.
7. The .UNPROTECT programmed request did not work properly.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

8. The monitor incorrectly handled the clock bit (bit 5) of the system configuration word (monitor fixed offset 300(octal)).
9. In the XM monitor, the SET USR NOSWAP option gave an error file/device error message.
10. In the XM monitor, the .ELRG programmed request always caused an exit.
11. In the XM monitor, region 0 could be eliminated by the user if an address was used that was not 0.
12. In the XM monitor, floating point status was incorrectly passed to a user exception routine.
13. In the XM monitor, after a RUN or a GET, the portion of the program above the nearest 1000(octal) word boundary below KMON was not correctly loaded.
14. Under multi-terminal monitors, the breakpoint PSW (location 16) would be corrupted after console terminals were switched.
15. Attempts to load the system unit of the system device resulted in an error message.
16. In multi-terminal monitors, VT100/VT105 CTRL/Q characters sent on power-up were incorrectly entered into the user's buffer, typically causing the first command entered to fail and generate the error message "?KMON-F-Illegal command".
17. In multi-terminal monitors, CTRL/S characters were incorrectly handled when SET TT NOPAGE was in effect.
18. The .GTLIN programmed request would ignore the status of the JSW lower-case bit and always map all lower case to upper case.

3.2.2 USR

A problem was corrected concerning the CSIGEN closing of output files on an error instead of purging them.

3.2.3 Magtape Handlers

A problem was corrected concerning error recovery and reading valid blocks after an .ENTER programmed request.

Several error recovery and file search problems were corrected in file-structured handlers.

3.2.3.1 DX (RX01) Handler - A program was corrected relative to a seek in extended memory.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

3.2.3.2 DY (RX02) Handler - The following problems were corrected:

1. A seek caused a system crash.
2. SPFUN 373.
3. Double-density-only support did not work correctly under an SJ monitor without timer support.
4. Retry operations locked out interrupts.

3.2.3.3 RK (RK05) Handler - A problem was corrected concerning a seek in extended memory.

3.2.3.4 DM (RK06/RK07) Handler - The following problems were corrected:

1. Queue element link pointer crash.
2. Error handling.
3. Resetting of controller error bit after processing error.
4. .SPFUN read.

3.2.3.5 DL (RL01/RL02) Handler - The following problems were corrected:

1. Vector at 160
2. Zero fill and .READx word count 0.
3. Attempting to access beyond physical device.
4. Seek not working correctly.
5. Wandering off track produced erroneous reporting of bad blocks.

3.2.4 DIR

Several problems involving handler release, output files on magtape, and sorted directories were corrected.

3.2.5 DUMP

The following problems were corrected:

1. The "TAPE MARK" message was incorrectly output after the last block was dumped if an MT, CT, or MM handler was loaded, no matter what device was being dumped.
2. A non-file-structured lookup was always done if the version number was obtained.
3. Command line errors were not always handled correctly.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

3.2.6 EDIT

The following problems were corrected:

1. The "\$" echo on nonstandard escape codes.
2. Purge channel after hard error while entering a file.

3.2.7 FILEX

The following problems have been corrected:

1. Null characters were transferred instead of ignored.
2. Record length (/U:n) was interpreted as the record length of RT-11.
3. Interchange format did not fill sectors with nulls when writing fewer than 128 characters per record.

3.2.8 LIBR

The following problems were corrected:

1. Location 0 was cleared at run time if only a .LST output file was created and the library directory was one block long.
2. The default file types for .OBJ files were lost when the version number was obtained.
3. A MACRO library did not operate properly when it contained a line with a "." only.

3.2.9 LINK

The following problems were corrected:

1. The /Y and /H options were incorrectly allowed to occur together.
2. The /S option with STB output caused an incorrect buffer size.
3. Retyping an erroneous continuation line could cause a system halt.
4. An illegal memory reference occurred when an image larger than the current memory size (16K image on an 8K machine) was linked.
5. LDA text blocks of odd length were not handled properly
6. P-sects in overlays were not always properly moved to the root.
7. The /X option was not implemented properly.
8. Module names were not ignored on input to the linker.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

9. The /H option did not work properly with overlaid files.
10. The /C or // options were reinitialized on the retyped line.
11. SYSLIB.OBJ was not searched if the first overlay line was retyped.
12. The value in location 50 was one word larger than required.
13. P-sects moved to the root during the library pass caused p-sects and/or globals to be lost.
14. The LINK-W-byte relocation error an NNNNNN did not give the correct number.

3.2.10 MDUP

The problem concerning the incorrect specification of the RL01 controller vector was corrected.

3.2.11 ODT

The following problems have been corrected:

1. A return was made to a previous sequence function.
2. ODT's blank PSECT name was changed to \$ODT\$.

3.2.12 PAT

The following problems were corrected:

1. An incorrect error was returned in byte 53.
2. RLD record information could cause the file to link improperly as a foreground job.

3.2.13 PATCH

A trap to 4 occurred when an attempt was made to access a nonexistent relocation register; this problem was corrected.

3.2.14 SYSGEN.CND

The question regarding device timeout support was not always asked during the system generation process; this problem was corrected.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

3.2.15 SYSLIB

The following problems were corrected:

1. The MTATCH call and the asynchronous status word did not operate properly.
2. The MTIN and MTOUT calls did not handle the absence of a character count argument correctly.

3.2.16 SYSMAC

The macro expansions for the .MTDTCH, .MTRCTO, and .QSET programmed requests were corrected.

3.3 DOCUMENTATION CORRECTIONS AND ADDITIONS

3.3.1 RT-11 Software Support Manual

Section 2.3.3 of the RT-11 Software Support Manual describes a procedure that determines the size of RMON. Note that the resulting value represents the size of RMON plus the size of the system device handler.

Section 7.2.4.1 describes the abort entry point for device handlers and states that the setting of HNDLR\$ in the device status word is ignored in an SJ environment. In addition, handlers are never entered when a job aborts in the SJ environment; the SJ monitor simply performs a RESET instruction.

3.3.2 RT-11 System Message Manual

The following messages were omitted:

?PIP-F-Channel in use

A serious PIP internal error occurred.

Reboot the system and retry the operation. If the error occurs again, obtain a new copy of PIP.SAV and retry the operation. If the error still occurs, submit an SPR to DIGITAL; include with the SPR a program listing and a machine-readable source program, if possible.

?PIP-F-Channel not open DEV:FILNAM.TYP

A serious PIP internal error occurred.

Reboot the system and retry the operation. If the error occurs again, obtain a new copy of PIP.SAV and retry the operation. If the error still occurs, submit an SPR to DIGITAL; include with the SPR a program listing and a machine-readable source program, if possible.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

?DUP-F-No V4 boot on volume

1. An attempt was made to boot a volume that does not contain a bootstrap. Use the COPY/BOOT command to copy a bootstrap to the volume.
2. An attempt was made to boot a volume containing a bootstrap that is not compatible with RT-11 Version 4. Retry the operation, using the BOOT/FOREIGN command.

The explanatory text for the message, "?LINK-F-Storing text beyond high limit" is incorrect. It should read as follows:

?LINK-F-Storing text beyond high limit

1. An input object module may have caused the linker to store information in the image file beyond the high limit of the program; there is an error condition in object module. Reassemble or recompile the program.
2. An output file size specified with /ALLOCATE, or an LDA file was being produced. The message indicates that there was not enough room on the output device for the output file. Specify a larger output file size, or refer to Section 3.0 of this manual for information on how to increase storage space.

The message "?DUP-F-Size function failed" also occurs if a nonexistent unit number is specified.

Some of the messages that begin with ?MON- have two forms, an abbreviated form and a long form. The text under the abbreviated form of the message begins with the phrase "For FB and XM only", meaning that this form of the message appears only when running under the FB or XM monitor. The text then refers you to the long form of the message for an explanation of why the error occurred and appropriate corrective actions. Although the text under the long form begins with the phrase "For SJ only", the information about the error also applies under FB and XM.

3.3.3 RT-11 System User's Guide

Source Language Patch Program (SLP)

The second input file, designated as comfil, in the SLP command line has a default file type of .MAC and not .COM. Therefore, you must explicitly enter the file type .COM.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

Interactive Commands

In the SET MT command description, the DEFAULT, DENSE, and DUMP option descriptions should read as follows:

MT: DEFAULT=[7 or 9]
 Returns to the default settings for 7- or 9-track tape.
 The 7- and 9-track defaults are equivalent:

 DENSE=800
 ODDPAR

MT: DENSE=[200 or 556 or 800 or 807 or 809]
 Sets density for 7- or 9-track tape. Specifying 200, 556, or 807 for 7-track tape sets 6-bit mode. Density settings 800 and 809 are equivalent. Specifying either 800 or 809 for 7-track tape sets core dump mode. Settings 800 and 809 are only valid settings for 9-track tape. Thus, the valid density settings are as follows:

 7-track: 200 = 200 bpi six-bit mode
 556 = 556 bpi six-bit mode
 807 = 800 bpi six-bit mode
 800 or 809 = 800 bpi core dump mode

 9-track: 800 or 809 = 800 bpi

MT: DUMP
 Sets core dump mode for 7-track tape. This is equivalent to setting DENSE = 800 or 809.

NOTE

These SET command options apply to all units of the magtape controller. Six-bit mode and core dump mode are described in Chapter 10 of the RT-11 Software Support Manual.

The LS handler default is SET LS LC, not SET LS NOLC as stated on page 4-166.

On page 4-38, under the COPY command description in Chapter 4, the /PACKED option description should include the sentence "This option transfers DECsystem-10 files created by MACY11, MACX11, or LNKX11 with the /P option."

On page 4-120, in the LIBRARY command syntax illustration, add square brackets around "library".

On page 4-126, in the LINK command syntax illustration, add "[/ALLOCATE:size]" following "[NO]EXECUTE[:filespec]".

The following information clarifies the EDIT command syntax illustration.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

The full forms of command lines (brackets enclose optional terms) to edit files with automatic backup and explicit output file names are:

```
EDIT input-filespec[/ALLOCATE:size]
```

```
EDIT/OUTPUT:output-filespec[/ALLOCATE:size] input-filespec
```

The full forms of command lines to create and inspect files are:

```
EDIT/CREATE input-filespec[/ALLOCATE:size]
```

```
EDIT/INSPECT input-filespec
```

You can use the /KED, /K52, or /TECO option with any of the command lines above.

Calculating Workspace for a FORTRAN Foreground Program

The following information clarifies the formula on page 4-104 to calculate the value required with the /BUFFER option of the FRUN keyboard command:

A = the maximum number of files open at any one time. Each file opened as double buffered should be counted as two files.

N = the maximum number of simultaneously open channels (logical unit numbers). This value is specified when the compiler is built, and can be overridden with the /UNITS option during main program compilation; the default value is 6.

R = the maximum formatted sequential record length. This value is specified when the compiler is built and can be overridden with the /RECORD option during main program compilation; the default value is 136.

The value n computed by the formula is decimal words, and should be specified with a decimal point after the value.

3.3.4 RT-11 Pocket Guide

On page 7, the line that reads "RL01 disk (n = 0-3)" should read "RL01, RL02 disk (n = 0-3)".

On page 28:

Under the ;Ax command to SIPP, change "...accepts further input in ASCII." to "...and accepts further input in octal."

Under the ;Ryyy command to SIPP, change "...accepts further input in Radix-50." to "...accepts further input in octal."

3.3.5 RT-11 Installation and System Generation Guide

The standard base-line SJ monitor does not include floating point support, but the standard SJ and FB monitors do include this support. Table 1-3 does not list this difference.

The file BATCH.MAC is not included in the software kit. Table 2-1 lists this file as one of the software components in the kit. The unsupported component SPEED.SAV is included in the kit but is not listed in Table 2-1.

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

Support for RF11 is initialized for one platter, not two as indicated in Table 2-1. In addition, the SYSGEN answers that duplicate the standard SJ and FB monitors (Section A.2) list the wrong answer to question 53 (the number of RF platters). The answer to question 53 should be 1.

In Table 2-1, the line that reads "RL11/RL01 Handler" should read "RL11/RL01/RL02 handler".

The SYSGEN dialogue, which is duplicated in Section 8.3, has been changed. The first sentence of the explanation that precedes questions 65, 68, and 71 should read: "The magtape handler requires table space for each magtape unit."

Add the following note on page 9-4 at the end of Section 9.4:

NOTE

To complete the monitor build procedure as rapidly as possible, execute the SYSBLD or MONBLD file under the SJ monitor with the USR SET SWAP (default) and no unnecessary loaded handlers.

The patch that appears in Section 2.8.7 is no longer correct. Substitute the following patch.

```
.RUN SIPP
*LINK.SAV
Segment? 0
Base? 2172
Offset? 0

Segment      Base      Offset      Old      New?
000000      002172      000000      000010      nnn
000000      002172      000002      001742      ^Y
*^C
```

The patch that appears in Section 2.8.8 is no longer correct. Substitute the following patch.

```
.RUN SIPP
*LINK.SAV
Segment? 1
Base? 4542
Offset? 114

Segment      Base      Offset      Old      New?
000001      004542      000114      000252      nnnnnn
000001      004542      000116      175616      ^Y
*^C
```

3.3.6 PDP-11 TECO User's Guide

The PDP-11 TECO User's Guide (Order No. DEC-11-UTECA-B-D) supersedes the PDP-11 TECO User's Guide and PDP-11 TECO User's Guide, Update 1, referenced in the RT-11 Documentation Directory.

This updated manual reflects the current version of TECO (Version 36).

3.3.7 RT-11 Programmer's Reference Manual

Under the .GTIM programmed request, the sentence "In the SJ monitor, the time of day is not reset." should read "The SJ monitor resets the time only if you select timer support during the system generation process."

CORRECTED PROBLEMS AND CURRENT RESTRICTIONS

If an asynchronous operation on a channel results in end-of-file, the following .WAIT programmed request or IWAIT subroutine will not detect it. The .WAIT or IWAIT detects only hard error conditions. A subsequent operation on that channel will detect end-of-file and will return to the user immediately with the carry bit set and the end-of-file code in byte 52. The subsequent operation, under these conditions is not initiated.

The .SCCA programmed request or ISCCA system subroutine will not intercept CTRL/Cs coming from an indirect command file.

The following information clarifies the operation of completion routines under the SJ monitor:

Unlike completion routines run under FB and XM monitors, which are serialized and run at priority 0, completion routines run under an SJ monitor are nested and can interrupt each other. In addition, they execute not at priority 0, but at the same priority as the device whose interrupt scheduled them. For example, the completion routine resulting from a .WRITC programmed request to device TT: runs at priority 4. Completion routines from timer requests run at the same priority as the system clock. This is particularly important on LSI-11 and PDP 11/03 systems that have only two interrupt levels, ON and OFF, so that clock interrupts may be lost while lengthy completion routines execute.

CHAPTER 4

PROCEDURES AND PATCHES

4.1 PROCEDURES

4.1.1 Directory Segments

Each directory segment can have 72 entries except the last segment, which is limited to 70 files. For example, on a volume with five segments, the first four segments can have 72 files and the last segment can have only 70 files. If a volume has only one segment, 70 files can be stored on it. Procedural information is given in the RT-11 Software Support Manual.

4.1.2 Line Printer Handlers

If output to some models of line printers is terminated prematurely, the print head may not be at the left margin. Thus, when output to the printer is resumed, printing may begin in the middle of the line. To prevent this, the printer should be manually reset by the procedure appropriate for the printer in use.

There are several conditions in which data sent to a printer using the LS handler will be lost without warning. For all terminals, if the printer is powered down or off line, all information sent to the printer during that time will be lost. For all terminals except the LA34, LA38, LA120, LS120, or serial LA180, if the printer encounters an error condition during operation, all information will be lost.

The LP and LS handlers are distributed with SET LP/LS FORMO as the default mode. This causes a form feed to be printed before each file, which is required for correct pagination when printing consecutive files without removing them from the printer. For example, commands such as PRINT/COPIES and COMPILE/LIST/CROSS/MAP require FORMO mode for correct pagination. However, when files are printed and removed separately, as is normally the case, FORMO mode wastes paper. Therefore, SET LP/LS NOFORMO is recommended for normal use.

The LS handler cannot be used to communicate with a terminal being used as a console terminal; the TT: handler must be used instead.

The SET LS NOHANG option is inoperative; it will operate in the same manner as the default SET LS HANG.

If the LP/LS handler NOFORM or SKIP options are used, load the handler by including a LOAD LP/LS command in the appropriate STARTx.COM files. After this is done, you should manually set the printer paper to the

PROCEDURES AND PATCHES

top of page each time the system is booted (top of page is normally set so that printing begins on the fourth print line down from the page perforation). All paper movement from then on should be accomplished through the handler and not manually. For example, to remove the last printed file from the printer, two form feeds should be sent to the printer. To do this, create a file called FF.LST with an editor consisting of only two form feed characters (<CTRL/L>s). Issuing the command PRINT FF will then cause the last file printed to be spaced to where it can be removed from the printer, and the top of page will then be correctly set for the printing of the next file.

The LS handler has a default CSR address of 176500 and a default vector address of 300. If your serial line printer is connected to a DL11/DLV11 interface with different addresses, use the SET LS CSR/VECTOR commands to modify the default values. For example, to modify the LS handler to utilize the MINC-11 printer port, SLU2, issue the following commands:

```
SET LS CSR=176520, SET LS VECTOR=320
```

4.1.3 Recommended Terminal/Line Printer SET Command Options

This section describes the non-default SET options recommended for use with the terminals and line printers that are listed below. The SET TT command settings are not permanent and must be issued each time a monitor is booted. Therefore, it is recommended that the command be included in the appropriate STARTx.COM file or files. When operating under a multi-terminal monitor, the characteristics of local terminals other than the boot-time console may also be set by using the SET TT command. To do this, include a SET TT CONSOLE=n command for each local terminal whose characteristics you want to set in the appropriate STARTx.COM file, followed by the appropriate SET TT command. After all the terminal characteristics have been set, a SET TT CONSOLE=0 command in the STARTx.COM file will return control to the boot-time console.

Of the SET TT command options that are listed, the SET TT SCOPE command is the only one that is relevant and valid under a non-multi-terminal SJ monitor. Since the SET LP/LS commands modify the permanent copy of the handler, they need only be issued once.

The recommended non-default SET options for use with the following terminals and line printers are:

LA30, LA35, LA36, LS120:

```
SET TT WIDTH n
SET LP/LS CR,CTRL,NOFORM,NOFORMO,LC,WIDTH n
```

LA34, LA38:

```
SET TT TAB,WIDTH n
SET LP/LS CR,CTRL,NOFORM,NOFORMO,LC,TAB,WIDTH n
```

LA120:

```
SET TT FORM,TAB,WIDTH n
SET LP/LS CR,CTRL,NOFORMO,LC,TAB,WIDTH n
```

LA180:

```
SET LP/LS CR,CTRL,NOFORMO,LC,WIDTH n
```

PROCEDURES AND PATCHES

```
VT05:
    SET TT SCOPE,TAB,WIDTH 72

VT50, VT52, VT55, VT100, VT105:
    SET TT NOCRLF,SCOPE,TAB
```

4.1.4 Recommended VT100, VT105, and LA120 Setup Mode Options

The following setup mode options are recommended for normal use on VT100 and VT105 terminals: on line, autorepeat on, margin bell off, auto XON/XOFF on, wrap around on, new line off, interlace off, parity off, bits per character 8, tabs set every 8 columns. The margin bell on may be useful when preparing FORTRAN programs to notify the operator when column 72 has been reached.

The LA120 terminal should be initialized to its factory settings, and then buffer control changed to small. The following LA120 factory setup options should not normally be changed: line/local status, local echo, auto newline, parity and data bits, auto repeat, auto linefeed, XON/XOFF, and printer new line character. Use the LA120 local form feed key to ensure that the paper is correctly positioned at top of form, for example, before printing a program listing.

The terminal baud rate should be set to correspond to the computer interface. The setup options should be set for operator preference or forms requirements. The setup options should then be permanently saved. To do this, while in setup mode, type <SHIFT/S> on a VT100 or VT105, and type <SHIFT/9> on an LA120.

4.1.5 File Protection Feature

The protected status of files created under Version 4 is ignored in Version 3B.

If an executing FORTRAN IV/RT-11 V2.1 program attempts to replace an existing protected file, the "?Err 28 Open failed for file" error message results; this can be intercepted through the ERR=option of the OPEN statement.

Under BASIC-11/RT-11 V2 or MU BASIC-11/RT-11 V2, an attempt to replace or delete a protected file with the REPLACE, COMPILE, or UNSAVE commands, or with the KILL, NAME TO, or OPEN FOR OUTPUT statements, results in the "?NOT ENOUGH ROOM" or "?FILE NOT FOUND" error messages. Under MU BASIC-11/RT-11, these errors can be intercepted in a BASIC program by the ON ERROR GO TO statement. The NAME TO statement can be used in either BASIC or MU BASIC to rename a protected file without changing its protected status.

Protecting or unprotecting files can only be done with the RT-11 RENAME command or the PIP /R option.

4.1.6 Single-and Double-Density Diskette Usage

Information recorded on a single-density diskette can be transferred between RX01, RX02, and PDT-11/150 systems. RX01 and PDT-11/150 systems cannot read or write double-density diskettes, nor can they reformat diskettes. The RX02 diskette drive is capable of formatting, reading, and writing either single- or double-density diskettes.

PROCEDURES AND PATCHES

RT-11 determines the density of the diskette when it is mounted in an RX02 drive, and further operations occur transparently with regard to the density in which the diskette is recorded. Blank diskettes received from DIGITAL are single density. You must reformat them by using the FORMAT command, and then initialize them by using the INITIALIZE command to obtain their maximum storage capacity.

4.1.7 PDT-11 I/O Port Utility (SPEED.SAV)

SPEED is an unsupported utility program that allows you to set the baud rate and other parameters for the PDT-11 I/O ports. The parameters are set with CSI options that are entered in the normal way. Therefore, you can include a command to RUN SPEED, followed by the required options, in your startup indirect command file. Only one speed setting may be made on a line and a device must be named. For example, the CSI line must contain one /T, /P, or /M option.

SPEED can be used only to change the parameters of PDT-11 processors.

The options you can use when you run SPEED are as follows:

Option	Purpose
/H	Display a summary of SPEED options
/T:n	Select terminal n (0, 1, 2, or 3)
/P	Select the printer port
/M	Select the communication port and set asynchronous mode
/S:dddd.	Set the baud rate to dddd decimal
/D	Disable parity checking
/E:n	Select even (0) or odd (1) parity
/C:n	Select character length (5, 6, 7, 8)

For example, the following lines, when added to a startup indirect command file, set the optional cluster port 1 to 2000 baud with parity disabled, set the optional cluster port 2 to 600 baud with odd parity, and set the printer port to 2400 baud with parity disabled:

```
R SPEED
/T:1/S:2000./D
/T:2/S:600./E:1
/P/S:2400./D
^C
```

You should not set the baud rate above 2400 for a cluster port or above 9600 for the console. Earlier models of PDT-11 processors are restricted further to baud rates of 2000 and 9600, respectively. See the PDT-11 hardware documentation for details on the use of I/O ports.

The power-up values for the PDT-11 ports are as follows:

Communications line:	Asynchronous, 1200 baud, eight bits per character, one stop bit, no parity
Console terminal:	Asynchronous, eight bits per character, one stop bit, no parity. Baud rate is determined by auto-bauding or can be fixed at 9600 baud
Line printer:	Asynchronous, 1200 baud, eight bits per character, one stop bit, no parity

PROCEDURES AND PATCHES

Optional cluster terminals:	Asynchronous, 300 baud, eight bits per character, one stop bit, no parity
-----------------------------	---

4.1.8 .GTJB and .CHCOPY Programmed Requests

The .GTJB and .CHCOPY programmed requests have been changed and may require changes in user programs if they are reassembled under Version 4 of RT-11.

4.1.8.1 .GTJB Programmed Request - The .GTJB programmed request area has been expanded from two words to three words. Your program must provide such a three-word area when it uses .GTJB. Also, the .GTJB returns a larger block of information in Version 4 than it did in Version 3B. If you reassemble your program using the V4 system macro library, you must first provide a 12-word block of memory at the address specified by the addr argument to the request. Programs assembled under Version 3B or earlier will not require changes if the .OBJ or .SAV image file is used under Version 4. You must change the sources only if you wish to reassemble your program under Version 4.

4.1.8.2 .CHCOPY Programmed Request - The .CHCOPY programmed request area has been expanded from two words to three words. Your program must provide such a three-word area when it uses .CHCOPY. Programs assembled under Version 3B or earlier will not require changes if the .OBJ or .SAV image is used under a Version 4 monitor that does not include system job support. If you intend to run a program that uses .CHCOPY under a system job monitor, you must change the sources to expand the request area, and then reassemble and relink your program. If you reassemble your program under Version 4, you must expand the request area to three words.

4.1.9 Device Ownership

Under monitors with system job support, you can assign ownership of a device with a LOAD command only if the owning job already exists. For example, to assign ownership of the LP handler to QUEUE, you must first SRUN QUEUE, then LOAD LP=QUEUE; otherwise, an error will be reported.

4.2 PATCHES

4.2.1 DUP

4.2.1.1 Multi-Size Volume Patch - If a user-written device driver is used for a device that supports multi-size volumes (such as the RX02 or RK06/7), the following two patches must be made. Both patches assume that the device code for the device is 377 (octal).

PROCEDURES AND PATCHES

Patch 1

```
.R SIPP
*DUF.SAV
Segment? 1
Base? 0
Offset? 10223
```

Segment	Base	Offset	Old	New?
000001	000000	010223	000	377
000001	000000	010224	000	^Y

*^C

Patch 2

```
.R SIPP
*MDUF.SAV
Base? 0
Offset? 4450
```

Base	Offset	Old	New?
000000	004450	000000	\

Base	Offset	Old	New?
000000	004450	000	377
000000	004451	000	^Y

*^C

4.2.1.2 Bad Block Replacement Patch - If a user-written handler supports bad block replacement, one of the following patches must be applied.

If all bad blocks are replaceable (such as the RL01/2), apply Patch A. If only bad sector errors are replaceable (such as the RK06/7), Apply Patch B.

Patch A

```
.R SIPP
*DUF.SAV
Segment? 1
Base? 0
Offset? 10243
```

Segment	Base	Offset	Old	New?
000001	000000	010243	000	377
000001	000000	010244	000	^Y

*^C

Patch B

```
.R SIPP
*DUF.SAV
Segment? 1
Base? 0
Offset? 10252
```

Segment	Base	Offset	Old	New?
000001	000000	010252	000000	\

Segment	Base	Offset	Old	New?
000001	000000	010252	000	377
000001	000000	010253	000	^Y

*^C

PROCEDURES AND PATCHES

4.2.1.3 Magtape Patch - If a user-written magtape handler is used, the following three patches must be made. All three patches assume that the device code for the device is 377(octal).

Patch 1

```
.R SIPP
*DUF.SAV
Segment? 1
Base? 0
Offset? 10234
```

Segment	Base	Offset	Old	New?
000001	000000	010234	000000	\

Segment	Base	Offset	Old	New?
000001	000000	010234	000	377
000001	000000	010235	000	^Y

*^C

Patch 2

```
.R SIPP
*PIF.SAV
Segment? 1
Base? 0
Offset? 5665
```

Segment	Base	Offset	Old	New?
000001	000000	005665	000	377
000001	000000	005666	000	^Y

*^C

Patch 3

```
.R SIPP
*MDUF.SAV
Base? 0
Offset? 4461
```

Base	Offset	Old	New?
000000	004461	000	377
000000	004462	000	^Y

*^C

4.2.2 FMS-11 Source Patch

The FMS-11 Version 1.0 sysgen conditional file no longer runs correctly due to a correction in SYSGEN for RT-11 Version 4. The following patch will correct it for Version 4. Note that a patched file does not run under V03B SYSGEN.

PROCEDURES AND PATCHES

Correct the conditional file ARTGEN.CND by typing the following:

```
.R EDIT
*EBARTGEN.CND<ESC>R<ESC><ESC>
*FANQUE<ESC><ESC>
*OAI    #DECR    ANTSK<RET>
        #SUBS    '.NTSK'ANTSK<RET>
<ESC>-3L<ESC><ESC>
*GNTSK-1<ESC>=C,NTSK<ESC>V<ESC><ESC>
        #ASK      Number of queue elements [D] (.NTSK) ?ANQUE/D=NT$ASK-1,0,100
*GNT$ASK-1<ESC>=C,NTSK<ESC>V<ESC><ESC>
        #ASK      Number of queue elements [D] (.NTSK) ?ANQUE/D=.NTSK,0,100
*AI     #ENDS<RET>
        #INCR    ANTSK<RET>
<ESC>-6A7L<ESC><ESC>
        #PRINT
        #DECR    ANTSK
        #SUBS    '.NTSK'ANTSK
        #ASK      Number of queue elements [D] (.NTSK) ?ANQUE/D=.NTSK,0,100
        #ENDS
        #INCR    ANTSK
        #IF      EXPDLG
*EX<ESC><ESC>
```

4.2.3 Magtape Bootstrap (1600 BPI)

Module MBOT16.BOT is a primary bootstrap for producing a 1600 bpi, phase-encoded, bootable magtape. It is usable on either MS or MM drives. To use this bootstrap, edit DISMT1.COM by replacing MBOOT.BOT with MBOT16.BOT in the INITIALIZE command line. This line should now read INITIALIZE/NOQUERY/VOLUMEID/FILE:DIS:MBOT16.BOT TAP:

4.2.4 Changing Queue Device

The following patch for QUEUE.REL changes the device on which QUEUE opens the workfile, QUEFILE.TMP, from DK: to SY:.

```
.R SIPP<RET>
*QUEUE.REL<RET>
BASE?    1000<RET>
Offset?  214<RET>

Base      Offset    Old      New?
001000    000214    015270  #R<RET>
001000    000214    <DK>    #RSY<RET>
001000    000216    <QUF>    ^Y<RET>
```

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RT-11
System Release Notes
AA-5286C-TC

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