



**RSX-11M/RSX-11S**  
**Release Notes**  
Order No. AA-2573F-TC

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## **RSX-11M/RSX-11S**

### **Release Notes**

Order No. AA-2573F-TC

RSX-11M Version 3.2  
RSX-11S Version 2.2

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## RSX-11M V3.2 RELEASE NOTES

RSX-11M Version 3.2 provides enhancements to System Generation, the Executive, and the dynamic storage region (pool), as well as a full duplex terminal driver and a queue manager that handles system printing jobs. In addition RSX-11M provides new utilities: a fast backup utility (BRU), a Disk Volume Formatter utility (FMT), and an I/O Exerciser (IOX).

The size constraints of previous RSX-11M releases have been maintained, so systems running RSX-11M V3.2 should be approximately the same size as their predecessors in V3.1 (assuming the same selection of features was made).

Nonprivileged tasks that run under RSX-11M V3.1 also run on RSX-11M V3.2. Privileged tasks and most drivers only need to be Task Built to run on Version 3.2. However, applications written to use some of the advanced features of the half duplex driver for RSX-11M V3.1 may not be able to use the new Full Duplex Terminal Driver without some minor program modifications. (See Section 5.9.) Therefore, the half duplex driver is included in this release, and can be selected at System Generation.

The RSX-11S operating system includes many of the new features of RSX-11M V3.2, including the new terminal driver, improved system generation (including creation and use of saved answer files and the use of Phase I of the RSX-11M V3.2 system generation procedure), group global event flags, STOP bit synchronization directives, and parent-offspring tasking.

RSX-11S also includes the following system display programs:

RSDV1H (for VT100 terminals)

RSDV52 (for VT52 terminals)

RSDV05 (for VT05 terminals)

In addition, the Online Task Loader (OTL) now supports the RX02 and TU58 devices.

### 1.0 OUTLINE OF NEW FEATURES

This section provides a list of new devices supported by RSX-11M, improvements in existing features, and a list of many facilities new to RSX-11M V3.2. Section 1.1 provides a list of new device support and Section 1.2 describes some of these features in greater detail.

#### 1.1 New Device Support

- TU58 DECTape II
- RX211/RX02 floppy diskette
- TS11/TS04 magnetic tape
- LP11-K support in 22-bit systems
- VT100 terminal (full-duplex terminal driver)
- DL11-E modem support (full-duplex terminal driver)
- KMC11 line printer controller

## 1.2 Other System Features

### Full Duplex Terminal Driver

1. Limited typeahead ability available to attached tasks
2. Allows full-duplex operations
3. Provides full VT100 support
4. Uses the DH11 DMA transfers for output
5. Buffers the I/O in its own internal buffer area

### Improved Line Printer Spooling

1. Uses a general queue manager task
2. Maintains the queues on disk
3. Supports multiple device queues and despoolers
4. Allows manipulation of queue entries
5. Extensible to allow user-supplied despoolers

### Improved System Generation

1. Allows PREPGENS to perform safe System Generation
2. Creates and uses answer files
3. Fewer questions to answer
4. Restructured System Generation manual

### Executive Enhancements

1. Parent/Offspring Task Relations
2. STOP Bit Synchronization directives
3. Improved QIO Processing Logic to integrate user-written ACPs
4. Creation of dynamic regions (CRRG\$) from the top of available memory.
5. Console Log File and Console Driver
6. Use of 2-4 file window mapping

### MCR Enhancements

1. Revisions to ACNT and SHUTUP commands
2. Multiple mounts to add increased device access on multiuser systems.
3. Support for group global event flags with the MCR FLAGS command.
4. Stop bit task synchronization; MCR STOP and UNSTOP commands



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5. Support for system service messages to be put into error logging files; MCR SSM command
6. New DISMOUNT keywords: DEV, USER, TERM
7. Features in the HELP command that permit indirect references to other files and provides the ability to share text.
8. Improved INITIALIZE VOLUME command
9. Additional SET commands to support the full duplex terminal driver
10. New LOAD command keywords: SIZE, HIGH
11. New SAVE command keywords: MOU, SFILE
12. New special symbols for the indirect command file processor: DATE, TIME
13. New directives to the indirect command file processor: BEGIN, DISABLE/ENABLE QUIET, ERASE, END, EXIT, OPENA, STOP.

### Utilities Enhancements

1. FLX, the file transfer program, can write RT-11 format for RX02, RK06/07, RL01 disks and TU58 cartridge tapes. An inhibit rewind switch was added and a 1600 bpi option is included to allow fast magnetic tape operations.
2. SLP, the source line input utility, now processes 132 character input lines (as opposed to 80 in V3.1) and calculates a checksum to ensure the accuracy of corrections.
3. The BAD utility, which checks for bad blocks by writing, reading, and recording any bad block locations, now accepts manual entry of bad block information.
4. DMP, the file dump utility, provides detailed listings of the file headers for FILES-11 files.
5. PIP, the Peripheral Interchange Program, now provides users with the option of saving the original creation date while copying files, and has the ability to truncate a file back to the logical End-of-File. PIP allows selective deletion of files by listing each file name and soliciting a yes or no response.
6. DSC, the Disk Save and Compress utility, now allows you to set the size of the blocks it uses in its read and write operations.

### Microfiche

1. Component and file banner pages are present on the fiche and are visible to the naked eye.
2. There is an alphabetized index appearing on the last fiche. The index is ordered by component then by filename within each component group. The index contains fiche page number, row, and column information for every file.

## 2.0 BRIEF DESCRIPTIONS OF NEW FEATURES ON RSX-11M V3.2

The following sections describe new features in more detail. (See the RSX-11M Documentation Directory and the RSX-11M Mini-Index for references to additional information.)

### 2.1 Full Duplex Terminal Driver

The new full duplex terminal driver supports all of the capabilities of the current half duplex driver. It also offers many new features which are documented fully in the RSX-11M/M-PLUS I/O Drivers Reference Manual.

**2.1.1 Driver Operation** - Full duplex operation allows simultaneous input and output to occur on the same line (for example, allowing a task to have simultaneously outstanding input and output QIOs). This is useful, for example, in "split-screen" applications, where one part of the screen is used for continuous display and another part for input with echo. The full duplex driver is also useful for support of an intelligent terminal, or as a link to a machine or another computer, where either end may start transmission without having to prevent the other end from transmitting at the same time.

**2.1.2 Type-ahead Buffering for Attached Tasks** - Type-ahead buffering provides a place where input characters may reside when the driver or an attached task may not be ready for them. This prevents "lost" characters as well as unintended unsolicited input (especially visible with ODT on a heavily loaded system). The driver has support for task inquiry of the type-ahead buffer, to determine if input occurred, without requiring unsolicited ASTs or a pending read.

**2.1.3 Increased Transfer Length** - The driver will accept input and output requests up to a maximum of 8128 bytes per transfer.

**2.1.4 Cursor Control** - The driver supports terminal independent cursor control. In place of the carriage control parameter in a write or read with prompt request, the user may specify a row-column coordinate where the output should begin. The driver will output the correct cursor positioning command based on the terminal type.

**2.1.5 Added Hardware Support** - The driver takes advantage of the DMA capability of the DH11 interface, dramatically reducing the number of output interrupts, and therefore, load, on the system. In addition, support is included for the DL11-E with modem control.

### 2.2 System Generation

The System Generation process, which builds the operating system to match customer requirements, has been improved. System Generation can now be driven by a disk file that contains answers to System

Generation questions. Therefore, after your initial System Generation, you can do minor modifications to a standard System Generation, or multiple System Generations by simply editing the answer file. System Generation also provides a format for peripheral device questions that eliminates questions regarding devices your system does not have.

The System Generation manual has been restructured to improve readability. Now there are chapters dedicated to the setup and planning needed to start a SYSGEN. You are urged to read the manual, paying particular attention to the setup required for RK05 and RL01 systems.

### 2.3 Fast Back-up and Restore Utility (BRU)

BRU is a new fast backup and restore utility which features:

Disk-to-tape backup

Tape-to-disk restore

Disk-to-disk copying

Incremental facilities allowing you to backup or restore by UIC, filename, and creation or revision date.

Copying from a mounted or dismounted disk.

Copying to a disk that is either unmounted (BRU initializes the disk) or mounted (using the file system).

### 2.4 Console Output Task (COT)

A new console message handler exists for RSX-11M systems. The message handler is called the Console Driver and the Console Output Task (COT). COT is a privileged task that directs messages to:

- The default console output device (usually TT0:)
- Or any other terminal designated as the console output device by an MCR SET command
- And a console message log file

Special MCR SET commands allow you to direct the destination of the message to alternate terminals for printing or log files for storage. The Console Driver sends all messages to COT. COT forwards the messages to the terminal or logging device you have selected.

### 2.5 Parent/Offspring Task Relationships

New system directives allow tasks to be spawned from a master task. The master task receives status notification when spawned tasks exit. A connect directive allows other tasks to be notified when a spawned task exits.

Parent/Offspring Task directives also allow SPAWN, CONNECT, and EXIT WITH STATUS.

## 2.6 STOP Bit Synchronization

New STOP bit synchronization directives, which mirror the current WAIT directives, allow a task to stop and become eligible for checkpointing until a predefined condition, such as receiving a message from another task, is satisfied.

Stop bit synchronization is supported, using, STOP, RECEIVE DATA OR STOP, STOP FOR LOGICAL 'OR' OF EVENT FLAGS, STOP FOR SINGLE EVENT FLAG, or UNSTOP.

## 2.7 2-4 Window Support

The file system has been modified to minimize window turning (extra disk reads to locate the disk address of a data block) in large contiguous files. Previously, a retrieval pointer in a file window block could only "see" a maximum of 256 contiguous blocks. Only retrieval pointers from one file header were used in a window block. This restriction no longer exists. RSX-11M V3.2 can now see up to 65,000 contiguous blocks per retrieval pointer. However, both of these features are only apparent to the user through increased throughput and a positive impact on the amount of pool used.

You can specify the default number of retrieval pointers in a window when the device is initialized or when the volume is mounted. The number of retrieval pointers for a particular file can be specified in the program interface when the file is opened.

For systems that use small files and have a limited amount of pool space, the recommended default number of retrieval pointers is 3.

## 2.8 Magnetic Tape Support

The magnetic tape drivers have added some new and different functionality to support new tape devices.

**2.8.1 Addition of Function Codes to Magnetic Tapes** - The new support consists of a new function code: IO.ERS (erase). This function code, which is supported on all devices with a hardware erase function, allows users to erase three inches of tape.

Tapes can now use the IQ.X function modifier. This enables users to suppress device driver retry operations. The error code IE.EOT (tape at end-of-tape) is not generated when the driver performs a read operation. IO.SEC (sense characteristics) now returns the actual hardware selected density of tapes.

Only four TU77 tape drives can be attached to the TM03 controller at a time. Therefore, when you add TM03/TU77 support to an existing system, do not assign unit numbers greater than 3 to the TU77 drives.

RSX-11M now allows support for multiple TM02 and TM03 tape formatters on one RH11/RH70 controller. This permits users to add a new tape drive to the system without adding another RH11/RH70. However, only 8 drives can be attached to the RH11/RH70. This number is transparent to the user, however: there is no functional difference between 8 drives and 8 formatters or 8 drives and one formatter.

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You must specify the formatter number with the slave unit number when you configure a system with multiple TM02s and TM03s. The slave units are numbered sequentially from 0 to 7.

For example, if the system generation configuration is:

Formatter 0	Slaves 0-3
Formatter 1	Slave 4
Formatter 2	Slaves 5-7

Units 0-3 can be freely switched between each other and units 5-7 can be switched. Unit 4, however, can never be changed and units 0-3 cannot be switched with units 5-7. Only units on the same formatter can be reset to another unit select switch, and then only to numbers which were established at system generation for that formatter.

**2.8.2 Magnetic Tape Power Fail Procedure** - The power fail procedure in the magnetic tape drivers was written to ensure that output tapes are not overwritten accidentally and that improper data is not read unknowingly from an input tape. Following a power fail (or other loss of vacuum) the driver will reject all user requests until it receives a request to rewind to Beginning of Tape (IO.RWD, IO.RWU, or IO.SMO). This ensures that a read or write does not occur when the tape is not at its proper position. (Note that for this procedure system boot and driver load are a simulated power fail.)

### 2.9 KMC11 Line Printer Driver

A driver is supplied that allows up to four line printers to be controlled from a KMC11 microprocessor. The KMC11 eliminates the need for character interrupts from printers.

### 2.10 I/O Exerciser (IOX)

IOX is a software tool you can use to diagnose hardware and software I/O problems. IOX is intended for use by system programmers, system managers, and system operators who want to test mass storage devices to determine if the units are correctly executing I/O operations. IOX also allows you to obtain a broad measure of system I/O throughput.

IOX exercises I/O units on your system by writing a data pattern to a volume on a unit and reading the data that was written. IOX then compares the written and read patterns to determine if an error occurred. IOX reports errors as they occur and displays activity reports at intervals during the test and at the end of the exercise.

The IOX command language, which allows you to direct the exercise, includes commands to:

- Set up units in a test configuration

- Select specific units to be tested

- Set IOX execution conditions

- Control IOX execution

- Direct command lines to RSX-11M for execution

- Measure system activity, using the IOX idle loop.

## 2.11 Installation Verification Procedure

RSX-11M systems now include an Installation Verification Procedure to check the software and hardware system you created during System Generation. The procedure does not replace hardware diagnostics or software testing done during software development. It only verifies that the generated system produced a working system with the configuration that you requested during System Generation.

The Installation Verification Procedure:

Tests all disk and tape units on the system

Runs a CPU-bound load test

Verifies that the system utilities are installed and functioning

## 2.12 Autopatch

Many RSX-11M customers receive Autopatch, a facility which uses an indirect command file to apply corrections and patches to the RSX-11M Operating System and optional software. This process requires very little operator intervention. RSX-11M V3.2 Autopatch is supported on mapped and unmapped systems and can run online or stand-alone. The Autopatch Kit for RSX-11M V3.2 can be ordered on tape or TU58 cartridges only. Customers receiving V3.1 of Autopatch today will continue to receive the same media for V3.2 for the duration of their software maintenance agreement.

Autopatch covers three types of RSX-11M Distribution Kits:

1. Big Disk Distribution Kit (RK06/RK07, RM02/RM03, RP02/RP03, RP04/RP05/RP06), distributed on DSC format magnetic tapes.
2. Dual RL01 Distribution Kit or DSC magtape equivalent;
3. Dual RK05 Distribution Kit or DSC magtape equivalent.

Systems without one of the listed disk configurations can use the AUTOPATCH.CMD file as a checklist for application of patches and corrections, as the Autopatch Kit includes all the .COR, .OBJ, and .PAT files needed, in a machine-readable form.

The Autopatch Kit may include other files, such as source files for system functions or new versions of utilities. The kit also includes complete documentation for Autopatch.

Contact your local DIGITAL office to obtain information to order Autopatch.

## 3.0 REPORTING PROBLEMS AND ERRORS

RSX-11M includes several features to use if you encounter questions or problems with any part of your RSX-11M system, or if DIGITAL discovers patches to improve the software performance between releases. Software Performance Reports (SPRs) allow you to communicate your questions directly to DIGITAL. Utilities such as the Source Language Input Program (SLP), the Object Module Patch Utility (PAT) and the Task Image Patch Utility (ZAP) allow you to make changes in your RSX-11M system by applying corrections to the source file, object

module, or task image file. The following sections explain the SPR process and the process for correcting files on your system.

### 3.1 Software Performance Report (SPR)

When you complete a Software Performance Report (SPR) form, describe only one problem at a time. This simplifies record keeping and facilitates a speedy response.

When to use an SPR Report:

1. for software errors
2. for documentation errors when the manual's documentation comment form is not appropriate
3. for inquiries
4. for suggestions
5. to follow up a previous SPR

When not to use an SPR Report:

1. for software license and price policies
2. for obvious hardware problems
3. for logistical or clerical problems with kits or with Software Dispatch, such as blank media, or failure to receive the Software Dispatch.

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

Please supply the following information (in machine-readable form, if possible) when you report a problem:

1. CRASH - A copy of the executive task build map, output from the console terminal, system generation options (RSXMC.MAC), the Executive STB file, and the crash dump.
2. DRIVERS - Controller/device information, software options, error log output, copy of device registers, sample program
3. UTILITIES - A copy of your terminal output, showing setup commands, before and after effects, and relevant file information
4. TASK BUILDER - A copy of your terminal output command files, the task map and a dump of the first few blocks of the task image
5. FILE SYSTEM - Corrupted Volume: Output from Verify utility and dump of volume. - Improper Results: Error code, file header dump, sample program

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

Because the SPR process has a built-in time lag, contact the local DIGITAL office if you have a critical problem. In the meantime, read the Software Dispatch for the latest news on RSX-11M, including changes and problems other people have found and solved.

### 3.2 Applying Corrections to Files on the Source Disk

Interim changes to the Executive, MCR, and device drivers are made by creating correction files which are processed by the Source Language Input Program (SLP). SLP generates a new copy of the modules that contained the errors by applying the corrections to the source file on the distribution kit. (See the RSX-11 Utilities Manual for complete information on SLP.)

After you have applied the corrections and obtained a new version of the file, DO NOT delete the original source file. Interim changes which may be distributed later are cumulative and depend on the contents of the distributed sources.

Because RSX-11M is distributed on a wide variety of media, it is not practical to provide comprehensive examples for applying source corrections. The examples here illustrate the general techniques and the files to be used in applying corrections. In the sample procedures that follow, several assumptions are made: you must be a privileged user, executing on a multiuser, mapped, dual RK05 system, with the dual RK05 distribution kit.

If you have a single RK05 system, disk-to-disk transfers must be made, using PIP, in two steps:

1. Transfer from RK05 to secondary storage medium
2. Transfer from secondary storage medium to the target RK05.

If your system disk is large (RK06, RK07, RP02, RP03, RP04, RP05, or RP06), it already contains all of the necessary files and file transfers are not required.

To update an Executive source file (ABCDEF.MAC, for example) mount the disk labeled EXCSRC and create a SLP correction file named ABCDEF.COR in the UFD [11,40]. (For a device driver source file, mount the disk DRVSRC and create a correction file named XXDRV.COR.) Then, running under UIC [11,10], submit the correction file to SLP. For example, you could follow this sequence to update REQSB.MAC:



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```
>TIM mm/dd/yy hh:mm
>SET /UIC=[11,40]
>ALL DK1:
>MOU DK1:EXCSRC
>ASN DK1:=SY:
>EDI REQSB.COR
[CREATING NEW FILE]
INPUT
.
.
.
*EX
[EXIT]

>SET /UIC=[11,10]
>SLP @[11,40]REQSB.COR
```

If the updated Executive module in your system is not a loadable driver, rebuild the Executive and privileged tasks to incorporate the modification.

To rebuild, you need to repeat most of System Generation Phase 2, after following these steps:

1. Assemble the new module using the RSXMC.MAC file for the target system.
2. Use LBR to replace the old version of the module in RSX11M.OLB on the target system.
3. Rebuild the Executive, using the target system's RSXBLD.CMD
4. Use SYSGEN2.CMD to rebuild the privileged tasks and establish your system with VMR. (Answer "yes" to HAVE YOU ALREADY BUILT THE EXEC?) Note that before initiating VMR, you must assign devices SY: and LB: to the disk containing the target system.

If the modified file in your system is a loadable device driver (ZZDRV.MAC, for example), the updated module can be replaced without doing another system generation. Assemble the updated module and replace the resulting object file in the RSX11M.OLB of your target system.

Boot the target disk:

```
>TIM mm/dd/yy hh:mm
>ALL DK1:
>MOU DK1:EXCSRC
>SET /UIC=[1,24] ! [1,20] for unmapped systems
>MAC ZZDRV=[1,1]EXEMC/ML,[200,200]RSXMC/PA:1,DK1:[11,10]ZZDRV
>DMO DK1:
>DEA DK1:
>LBR RSX11M/RP=ZZDRV
>PIP ZZDRV.OBJ;*/DE
>
```

Use the indirect command file [200,200]BLDDRV.CMD to produce the files ZZDRV.TSK and ZZDRV.STB. Note that if you do not want the Task Builder map for the driver, BLDDRV gets rid of it by outputting it to the null device (NL:). If your system does not have an NL:, the Task Builder outputs a diagnostic message.

# RSX-11M V3.2 RELEASE NOTES

If necessary, copy ZZDRV.TSK and ZZDRV.STB into the UFD corresponding to the system UIC.

```
>@[200,200]BLDDRV
.
.
.
>SET /SYSUIC
SYSUIC=[g,m]
>SET /UIC=[g,m]
PIP /NV=[1,54]ZZDRV.TSK,ZZDRV.STB !or [1,50] for unmapped systems
>
```

Use VMR to unload the old device driver and to load the new one. If the new driver is larger than the old one, it may not fit into the same locations as the old one. It may be necessary to unload and reload all of the loadable drivers in that partition to create enough room. If the file system is unmapped, some other drivers may have to be rebuilt.

```
>VMR
ENTER FILENAME: RSX11M
VMR>UNL ZZ:
VMR>LOA ZZ:
VMR>^Z
>RUN $SHUTUP
```

Hardware boot the modified system.

Updating an MCR source file is similar to updating an Executive source file, except that the MCR source files are on a disk labeled MCRSRC in UFD [12,10]. The steps to update a source file for MCR (single user and multiuser) and external MCR tasks are the same. The procedures for rebuilding the components differ slightly. An example is provided below for each procedure.

To update the MCR source file SETOV.MAC, mount the RK05 disk labeled MCRSRC.

Create the SLP correction file SETOV.COR and use it to update SETOV.MAC. Assemble SETOV for the target system.

```
>TIM mm/dd/yy hh:mm
>SET /UIC=[12,40]
>ALL DK1:
>MOU DK1:MCRSRC
>ASN DK1:=SY:
>EDI SETOV.COR
[CREATING NEW FILE]
INPUT
.
.
.
*EX
[EXIT]

>SET /UIC=[12,10]
>SLP @[12,40]SETOV.COR
>
```

## RSX-11M V3.2 RELEASE NOTES

Boot the target system if necessary.

```
>TIM mm/dd/yy hh:mm
>ALL DK1:
>MOU DK1:MCRSRC
>SET /UIC=[1,24] !or [1,20] for unmapped systems
>MAC SETOV=[200,200]RSXMC/PA:1,[1,1]EXEMC/ML,DK1:[12,10]SETOV
>DMO DK1:
>DEA DK1:
>
```

Single-user and multiuser versions of MCR require different procedures for incorporating the modified module into the system. The procedures involve the following steps:

1. Copy the necessary indirect command files and libraries from the RK05 containing the privileged object files to SY:.
2. Incorporate the updated module into MCR's object library.
3. Rebuild MCR and install it into the system with VMR, ensuring that SY: and LB: are first assigned to the disk containing the target system.

All of the Task Builder command files output a map to the logical device MP:. MP: must be assigned to NL: or another device to avoid a diagnostic error message from the Task Builder.

To rebuild single-user MCR, use the following procedure:

```
>ALL DK1:
>MOU DK1:PRVOBJ
>SET /UIC=[1,24] !or [1,20] for unmapped systems
>PIP /NV=DK1:MCRBLD.CMD,MCRBLD.ODL,MCR.OLB
>DMO DK1:
>DEA DK1:
>LBR MCR/RP=SETOV
>PIP SETOV.OBJ;*/DE
```

If it was necessary to modify the MCR Task Builder command file (MCRBLD.CMD) during the last system generation, it may now be necessary to repeat those changes:

```
>ASN SY:=MP:
>TKB @MCRBLD
>SET /SYSUIC
SYSUIC=[[g,m]
>SET /UIC=[g,m]
>PIP /NV=[1,54]MCR.TSK !or [1,50] for unmapped systems
>VMR
ENTER FILENAME: RSX11M
VMR>REM MCR...
VMR>INS MCR
VMR>^Z
>RUN $SHUTUP
```

Hardware boot the system.

## RSX-11M V3.2 RELEASE NOTES

To rebuild multiuser MCR, use the following procedure:

```
>ALL DK1:
>MOU DK1:PRVOBJ
>SET /UIC=[1,24] !or [1,20] for unmapped systems
>PIP =DK1:MCRMUBLD.CMD,MCRMUBLD.ODL,SYSBLD,SYSROT.OBJ,MCR.OLB
>DMO DK1:
>DEA DK1:
>LIBR MCR/RP=SETOV
>PIP SETOV.OBJ;*/DE
```

If it was necessary to modify the MCR Task Builder command file (MCRMUBLD.CMD) during the last system generation, it may be necessary at this time to repeat those changes:

```
>ASN SY:=MP: !if your system supports ASN
>TKB @MCRMUBLD
>SET /SYSUIC
SYSUIC=[g,m]
>SET UIC=[g,m]
>PIP /NV=[1,54]MCRMU.TSK,SYS !or [1,50] for unmapped systems
>VMR
ENTER FILENAME: RSX11M
VMR>REM MCR...
VMR>REM ...MCR
VMR>INS MCRMU
VMR>INS SYS
VMR>^Z
>RUN $SHUTUP
```

Hardware boot the system.

There is only one procedure for replacing an external MCR task. It involves the following steps:

1. Copy the necessary command files and libraries from the disk containing the privileged object files to SY:.
2. Incorporate the updated module into the task's object library.
3. Rebuild the task and install it into the system using MCR or VMR. Before using VMR, you must assign SY: and LB: to the disk containing the target system.

The following example replaces the module INSLB of the external MCR task Install:

```
>ALL DK1:
>MOU DK1:PRVOBJ
>SET /UIC=[1,24] !or [1,20] for unmapped systems
>PIP /NV=DK1:INSBLD.*,INS.OLB,MCR.OLB
>DMO DK1:
>DEA DK1:
>LBR INS/RP=INSLB
>PIP INSLB.OBJ;*/DE
```

If it was necessary to modify the external task's Task Builder command file during the last system generation, it may be necessary at this time to repeat those changes:

```
>ASN SY:=MP:           !if your system supports ASN
>TKB @INSBLD
>SET /SYSUIC
SYSUIC=[g,m]
>SET /UIC=[g,m]
>PIP /NV=[1,54]INS.TSK           !or [1,50] for unmapped systems
>VMR
ENTER FILENAME: RSX11M
VMR>REM ...INS
VMR>INS INS
VMR>^Z
>RUN $SHUTUP
```

Hardware boot the system.

### 3.3 Applying Corrections To The File Systems (FllACP)

Several versions of FllACP can be built, using the Task Build files on the RSX-11M distribution kit. To avoid confusion during the process of patching these files, you must understand how the FllACP versions relate to each other.

There are 15 versions of FllACP that can be built from the distribution kit. You can choose from FCPSM0, FCPMD1, FCPLG1, FCPR02, or FCPNMH at system generation representing, respectively, the logical selection of small, medium, large, resident overlaid, and nonmultiheader file systems. This section explains patching procedures specifically for the five FCPs listed above.

All FCPs except for FCPNMH contain the same modules and, therefore, are Task Built from the same library (FCP.OLB). The FCPs have the same capabilities, but differ in their overlay structures: each is optimized for a particular environment.

FCPNMH, a nonmultiheader FllACP, is built from two libraries: FCP.OLB and FCPNMH.OLB. The modules from FCP.OLB are the ones used to build the other FCPs. The modules from FCPNMH.OLB have the same names as modules in FCP.OLB (except FCPNMH), but, because of conditional assembly, contain different object code.

Updates for all FllACPs begin by entering and assembling the patch file(s). The following example patches a module called WTRN1, on a system using an RK05 distribution kit. For an RL01 distribution kit, mount MAPSRC for mapped systems and UNMSRC for unmapped systems. For all other distribution kits, use RSXM26.

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Mount PRVOBJ on an RK05 kit and copy the PAT file from the Software Dispatch article as follows:

```
>SET /UIC=[13,40]
>ALL DK1:
>MOU DK1:PRVOBJ
>ASN DK1:=SY:                !           if your system supports ASN
>EDI WTRN1.PAT
[CREATING NEW FILE]
INPUT
.
.
.
*EX
[EXIT]

>
```

Assemble the patch source module, as follows, and use the resulting object code to patch the original object module.

```
>ASN                                !if your system supports ASN
>SET /UIC=[1,24]
>MAC WTRN1.POB=[1,1]EXEMC/ML,[200,200]RSXMC/PA:1,DK1:[13,40]WTRN1.PAT
>DMO DK1:
>DEA DK1:
>
```

Next, apply the patch file to the appropriate modules in FCP.OLB and/or FCPNMH.OLB. Determine which of the two libraries to update by the code that the patch affects. If the code is common to both versions of a module, both libraries must be updated. If the patch affects conditionally assembled code, only one library is updated. In either case, the patch file contains instructions as to which libraries are affected.

All FllACPs require similar, but not identical, procedures for incorporating the modified module into the system. The procedures always involve the following steps:

1. Copy the necessary command files and libraries from the distribution kit containing the privileged object files to SY:
2. Incorporate the updated module into an object library.
3. Rebuild FllACP and install it into the system, using VMR, making sure that SY: and LB: are assigned to the disk containing the target system.

All of the Task Build command files output a map to the logical device MP:. MP must be assigned to NL: or another device to avoid getting a diagnostic error message from TKB.

Depending on the size of the patch, it may be necessary to edit the Task Build command file. For Task Building an unmapped FllACP, it may be necessary to edit the following statement to increase the value nnn:

```
PAR=FCPPAR:0:nnn
```

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The increase is necessary if the patch is larger than the amount of extra room allowed in the original Task Build file. There is approximately 100(8) bytes of room if you use the statement in the system supplied Task Build files.

For either a mapped or unmapped FllACP, it may be necessary to increase the size of the memory partition to accommodate the larger FllACP. Any tasks that share the same partition and were built, using the AL switch, also have to be rebuilt so the task's checkpoint space can accommodate the larger partition size.

If you copy the patched object libraries to the disk you use to perform system generations, all subsequent system generations benefit from the patch. However, there may not be enough room on the small disk kits for the larger object library. In this case, you can sometimes compress the object library or truncate it to gain some room.

**3.3.1 FCPNMH Patch on RK05 Kit** - The following example illustrates the procedure for patching module WITRN for the FCPNMH distributed on an RK05 kit:

```
>ALL DK1:
>MOU DK1:PRVOBJ
>SET /UIC=[1,24]      !           or [1,20] for unmapped systems
```

The object module being patched must be obtained from the distributed object library. Never apply a patch to an object module that has been altered in any way.

```
>PIP /NV=DK1:FCPNMHBLD.CMD,FCPNMHBLD.ODL,FCPNMH.OLB;1,FCP.OLB;1
>DMO DK1:
>DEA DK1:
>LBR WITRN.NMH;1=FCPNMH/EX:WITRN
>PAT WITRN.NMH;2=WITRN.NMH;1/CS:123456,WITRN.POB/CS:654321
>LBR FCPNMH/RP=WITRN.NMH;2
>PIP WITRN.NMH;*,.POB;*/DE
```

If it was necessary to modify the Task Build command file (FCPNMHBLD.CMD) during the last system generation, it may be necessary at this time to repeat these changes.

```
>ASN SY:=MP                      !           if your system supports ASN
>TKB @FCPNMHBLD
>SET /SYSUIC
SYSUIC=[g,m]
>SET /UIC=[g,m]
>PIP /NV=[1,54]FCPNMH.TSK      !           or [1,50] for unmapped systems
>VMR
ENTER FILENAME: RSX11M
VMR>REM FllACP
VMR>INS FCPNMH
VMR>^Z
>RUN $SHUTUP
```

Hardware boot the system.

**3.3.2 Patch for Other FllACPs** - The following example illustrates patching for module WTRN1 for all other FllACPs, based on an RK05 distribution kit. To use this example with a specific FllACP, substitute the name for every occurrence of xxx in the example:

```
>ALL DK1:
>MOU DK1:PRVOBJ
>SET /UIC=[1,24]          !          or [1,20] for unmapped systems
```

The object module being patched must be obtained from the distributed object library. Do not apply a patch to an object module that has been altered in any way.

```
>PIP /NV=DK1:FCP.OLB,FCPXXXBLD.CMD,FCPXXXBLD.ODL
>DMO DK1:
>DEA DK1:
>LBR WTRN1.OBJ;1=FCP/EX:WTRN1
>PAT WTRN1.OBJ;2=WTRN1.OBJ;1/CS:123456,WTRN1.POB/CS:654321
>LBR FCP/RP=WTRN1.OBJ;2
>PIP WTRN1.OBJ;*,.POB;*/DE
```

If you modified the Task Build command file (FCPxxxBLD.CMD) during the last system generation, you may now have to repeat the changes.

```
>ASN SY:=MP:
>TKB @FCPxxxBLD
>SET /PIP:SYSUIC
SYSUIC=[g,m]
>SET /UIC=[g,m]
PIP /NV=[1,54]FCPxxx.TSK    !          or [1,50] for unmapped systems
>VMR
ENTER FILENAME: RSX11M
VMR>REM FllACP
VMR>INS FCPxxx
VMR^Z
>RUN $SHUTUP
```

Hardware boot the system.

### 3.4 Patching Object Modules

The Object Module Patch Utility (PAT) incorporates an object patch into an existing object module. DIGITAL publishes a patch file written in MACRO-11 assembly language to correct an error or make a change. You then create and assemble the published file and input it to PAT along with the object file being patched.

You must include the published checksum values in the specification for the input file and the correction files. If the checksum value does not agree with the computed result, PAT reports an error. If the correction file caused the error, check the source file against the original published source file to verify that it was copied correctly. If the input file caused the error, verify that the correct version of the file is being patched.

Note that it normally is necessary to use LBR to extract the original object module from a library. PAT produces a new object module file containing the corrected object code. When you patch modules from a library, take the object module from the distributed library and put a copy with all patches into that library.



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The following guidelines apply to the formats for PAT command input and correction files.

Specify an explicit name, extension and version number for each file. Use the following conventions for names:

<u>File</u>	<u>Specification</u>
Correction file source	name.PAT
Correction file object	name.POB
Input file object	name.OBJ;n
Corrected input file	name.OBJ;n+1

Specify checksums for all input and correction files.

The following example illustrates the command formats for creating the correction file and the PAT output file:

```
>MAC NAME.POB=NAME.PAT
>LBR NAME.OBJ;1=LIBRARY.OLB;1/EX:NAME
>PAT NAME.OBJ;2=NAME.OBJ;1/CS:3471,NAME.POB/CS:1532
>LBR LIBRARY.OLB;2/RP=NAME.OBJ;2
```

The correction source input file is used to accumulate all patches for a given module. Prepare this module in the format described in Appendix E of the IAS/RSX-11 MACRO-11 Reference Manual, with the following additions:

- The .TITLE statement must contain the name of the module to be patched.
- The preface to the module should contain a summary of all patches made.
- The module must include a list of equated symbols that defines the initial location counter values for each program section containing a patch.
- The module should be subdivided into one or more patch blocks containing the following information:
  1. An .IDENT statement in the format described in Section E.10 of the IAS/RSX-11 MACRO-11 Reference Manual
  2. Any equated symbols, local macros, or local data associated with the patch,
  3. A description of the patch code,
  4. The patch code, and
  5. A set of equalities that reset the location counter for each program section to the initial value

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The following example illustrates this format:

```
.TITLE      NAME
:
:

; copyright statement
;
; VERSION 00
;
; MODIFICATIONS:
;
; 03-MAY-79
;
; 00A -- CORRECT SYNCHRONOUS TRAP PROCESSING
;
; 30-MAY-79
;
; 00B -- PROVIDES INTERLOCKING MECHANISM
;         FOR DATA BASE ACCESS
;
; .IDENT /00A/      ; ADD FIRST PATCH HERE
; .PSECT            ; DEFINE PROGRAM SECTIONS USED
.BLK.=.
; PSECT A
A=.
; .PSECT B
B=.

;
;           ; SPECIFY PATCH CODE
;
MODULE CODE

:
:

; .IDENT /00B/      ; ADD SECOND PATCH HERE
; .PSECT            ; RESPECIFY PROGRAM SECTIONS USED
.=.BLK.
; .PSECT A
.=A
; .PSECT B
.=B

;
; module code      ; SPECIFY PATCH CODE
;
;
;
; ADD NEXT PATCH HERE
;
.END
```

See the RSX-11 Utilities Manual for a complete description of PAT.

### 3.5 Patching Task Image Files

You can make interim changes to task image files by executing an interactive command sequence with the Task File Patch Utility program (ZAP). You specify two command sequences, one for each of the distributed task image files.

Most ZAP patching procedures assume that virtual disk block 2 is the beginning of all task images and, for unmapped task images, 40000(8) is the base address of the task. If the task being patched was rebuilt with checkpoint space allocated or with a nonstandard base address, modify the ZAP relocation commands to reflect the differences.

See the RSX-11 Utilities Manual for a complete description of ZAP.

### 4.0 OPTIONAL SOFTWARE

The following information is provided on software products that can be purchased as separate products. These products are not included as part of RSX-11M V3.2, except for RMS V1.8.

#### 4.1 Installation of DBMS

The current version of DBMS-11 does not install properly under RSX-11M V3.2. This problem only occurs when DBMS-11 is installed (or reinstalled) under RSX-11M Version 3.2. Task images built under RSX-11M V3.1 will work properly if the DBCS privileged task (named DBMPRV) is rebuilt. See the installation procedures and mandatory update patches for DBMS-11 in the RSX-11M/S Software Dispatch Review.

#### 4.2 RMS

RMS V1.8 is bundled with RSX-11M V3.2. It is distributed on a separate medium and has its own installation procedures.

The installation of RMS-11 V1.8 or RMS-11K V1.8 creates a new library (RMSLIB.OLB) and places several modules into SYSLIB.OLB. The use of these libraries together is a requirement. You can not install RMS-11 V1.8 and then substitute an RMSLIB created by V1.5.

This warning is significant for users who are upgrading to RSX-11M V3.2 (with RMS-11 V1.8) and do not have an upgrade to RMS-11K V1.8. Note that the application programs will continue to work. The potential problems arise when the programs must be modified and task built.

#### 4.3 BASIC-PLUS-2

Version 1.5 of BASIC-PLUS-2 can be used with the previous release of RMS-11 (V1.5) and the new release (V1.8) as well. However, the BASIC-PLUS-2 user must limit the use of RMS V1.8 to a bug-fix version of RMS V1.5. BASIC-PLUS-2 users cannot use memory-resident overlay RMS libraries and other new RMS features. These will be available in a subsequent release of BASIC-PLUS-2.

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In order for BASIC-PLUS-2 V1.5 to work properly with the new full-duplex terminal driver, a couple of patches to BP2 are required. These patches will be published in the RSX-11M/S Software Dispatch. Until you have installed these upgrade patches to BP2, you should select the half-duplex terminal driver for your system.

### 4.4 COBOL

The following sections explain some additions and changes to COBOL installation and operating procedures which were not included in the COBOL documentation.

**4.4.1 COBOL Installation** - COBOL-11 V4.0 must be reinstalled after bringing RSX-11M V3.2 and RMS-11 V1.8 up. In order to do this without undue disruption of system libraries used by other layered software products, a new installation procedure has been provided. A file named CBLV40.CMD is contained on the RMS-11 V1.8 kit. This file should be used to control the installation of COBOL V4.0.

**4.4.2 COBOL File Specification Qualifiers** - In PDP-11 COBOL, you can identify a file by its file specification, using the following:

1. an Environment Division SELECT statement (with the ASSIGN clause)
2. the VALUE OF ID clause in the Data Division file-description-entry

You can qualify a file with various switches. The following switches are new or have been changed:

1. /DQ:n - Specifies a quantity of n blocks to extend the file during creation. A large extension quantity minimizes the number of extensions needed. If the rightmost character of the number n is a decimal point, the Object Time System (OTS) interprets the value as a decimal number. Otherwise, the OTS treats n as an octal number.
2. /DW Causes I/O buffers to be written only when full, as contrasted to the default case, in which every write operation causes a physical I/O operation. This option is available only for files that are not write-shared.
3. /MI optimizes the insertion (into an indexed file) of records sorted in order of ascending prime key values. Mass insertion eliminates the index search for subsequent writes.

**4.4.3 COBOL Merge Dialogue** - The following text documents a response to question 4 in the COBOL Merge dialogue that is not displayed in the COBOL manual.

DO YOU WANT TO OVERLAY I/O SUPPORT ROUTINES? PLEASE ANSWER Y(ES), N(O), OR H(ELP).

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If you answer NO to the question, a library of I/O routines (RMSLIB) is included in the task image. The program will execute faster than if you overlay I/O. However, the included routines could cause your program to exceed its maximum size. If you enter NO, the Merge dialogue continues at Step 7.

If you answer YES, Merge asks more questions about the overlaying of I/O routines. At this point, you choose from standard Record Management Services (RMS), the Overlay Descriptor Language (ODL), or your own I/O overlay routines.

If you enter R (for RMS), Merge includes directives in the output ODL file that instruct the Task Builder to use the RMS memory resident library (RMSREF) to resolve global references.

### 5.0 IMPORTANT NOTES AND CHANGES TO RSX-11M SOFTWARE

The following sections show changes in software features and include some hints on efficient system operation.

#### 5.1 Crash Dump Analysis

The following changes were not documented in the crash dump analyzer manual.

**5.1.1 CDA AST Queue** - When listing the AST queue for an active task, CDA now prints an additional line, identifying the type of AST as one of the following:

- unsolicited character AST
- buffered I/O AST
- emit status AST
- completion AST from:
  - QIO\$
  - MRKT\$
  - SPWN\$
  - CNCT\$
- specified AST from:
  - SFPA\$
  - SRDA\$
  - SRRA\$
  - SPFA\$

**5.1.2 Crash File Format** - The format of the crash file has changed. You cannot analyze RSX-11M V3.1 crash dumps with the new version of CDA and you cannot analyze new crash dumps with previous versions of CDA.

You can now dump all of memory on the PDP-11/70.

#### 5.2 Monitor Console Routine (MCR)

The following sections document changes in the Monitor Console Routine (MCR). For a complete description of all commands, see the RSX-11M/M-PLUS MCR Operations Manual.

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**5.2.1 MCR TASK NAMES** - The names of the MCR tasks in RSX-11M have been changed to allow you to write MACRO programs using SPWN\$ in a portable fashion. The changes are:

<u>Task</u>	<u>Old Name</u>	<u>New Name</u>
MCR primary dispatcher	...MCR	MCR...
MCR secondary task	...SYS	...MCR

**5.2.2 MCR REDIRECT COMMANDS** - Terminals redirected to devices other than terminals on a multiuser system must be redirected to themselves before being logged off. Failure to do this can cause a system crash.

**5.2.3 MCR SET COMMANDS** - In systems that do not use the full duplex terminal driver, the MCR SET /LA180S keyword was replaced by the /FORMFEED keyword. This indicates that the device uses hardware form feeds. In systems that use the full duplex terminal driver, both keywords are available:

/FORMFEED sets or displays devices using hardware formfeeds

/LA180S sets or displays LA180S terminals

The MCR command SET /NOVT05B is no longer available.

SET /MAIN allows device partitions to overlap. However, no subpartitions can be created on the I/O page.

**5.2.4 MCR Commands to Control Disk Access** - Several changes have been made to the MCR Mount, Dismount, Allocate, and Public commands.

1. RSX-11M now permits more than one user to mount a single device.

Users are automatically dismounted from any device they mounted when they log off the system. However, the device remains mounted for the other users who mounted it. (Previously, all allocated devices were dismounted when the user logged off.

2. Ownership of a disk has three states:
  - a. An allocated disk, which can be mounted by the owner or by any privileged user
  - b. A public disk, which must first be mounted by a privileged user and can then be mounted by anyone
  - c. An unowned device, which can be mounted by anyone
3. Any user who can mount a device can access that device, within the bounds of other protection limits.
4. Only privileged users can set devices to be public.

5. Mounted devices cannot be set public, nonpublic, allocated, or deallocated. Allocated devices cannot be set public.
6. The system, effectively, owns mounted public devices. To dismount public devices, the keyword /DEV must be used. This command, when issued from a privileged terminal, dismounts everyone from the device.
7. New keywords for the MCR Dismount command can dismount everyone from a device, all devices from a user, or a specific device from a specific user.

**5.2.5 Bootstrapping an RK06-Based System** - The MCR BOOT command can loop indefinitely when it boots a system from an RK06 if Boot encounters an ECC correctable error when reading the system image. The bootstrap driver is not large enough to include ECC logic. Therefore, it retries the read operation, which never succeeds.

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

**5.2.6 Bootstrapping a Mapped System from an Unmapped System** - BOOT can loop indefinitely when it boots a mapped system from an unmapped system on a processor with MOS memory. This is caused by random parity bit settings in the parity registers for memory above 28K. The disk controller fails to successfully transfer the system image to that portion of memory and the bootstrap drivers retry the read operation, which never succeeds.

You can avoid this problem by running a standalone memory diagnostic before bringing the unmapped system into memory or by using a mapped system to boot the target mapped system.

**5.2.7 SAVE Relocates Saved System Vectors** - In a saved system image, SAVE relocates locations 0-1000(8). Because VMR has no OPEN command, these locations can only be examined or modified with ZAP in absolute mode.

The relative address of these locations within the file is stored by SAVE in the two words at \$SYSIZ+2 and \$SYSIZ+4. The first word contains the relative virtual block number and the second contains the byte offset into the block of relocated location 0.

**5.2.8 Indirect Command Processor (IND)** - The indirect command file processor (IND) for RSX-11M V3.2 is capable of using parent-offspring tasking to spawn tasks. If IND uses parent-offspring tasking, the .ENABLE QUIET directive suppresses command line printing on the invoking terminal. In addition, the <EXSTAT> special variable may be used to determine the exit status of tasks spawned by indirect.

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As distributed, indirect will not use parent-offspring tasking, whether or not the option is present in the executive. IND is capable of determining whether or not parent-offspring tasking is present in the system, and if so, using it. To allow indirect to use parent-offspring tasking, remove the line "GBLPAT-INIT:FEOFF:0" from the build file for the indirect command file processor, and rebuild indirect.

If parent-offspring tasking is not enabled, and the ALTER PRIORITY directive is available, IND lowers its priority to a waiting priority, defined at Task Build time (MPRI). It remains at that priority until the MCR command is completed. If the ALTER PRIORITY directive is not available, IND waits at its normal installed priority.

If parent-offspring tasking is enabled, IND does not use the ALTER-PRIORITY directive. (Be sure to remove with a comment character the disabling of parent-offspring tasking if you enable it.) This can cause memory contention problems on RSX-11M systems, since IND is still competing for memory space, even when it suspends while waiting for the task to complete. IND may be rebuilt to use the STOP directive while waiting for task completion. This removes IND from competition for memory.

To modify IND to use the STOP directive, three conditional assembly lines must be edited and the modules reassembled and IND rebuilt. Two of these conditional assemblies are in [12,10]INDIMP.MAC and one is in [12,10]INDPDW.MAC. The procedure for modifying IND is described below:

To edit the modules, list [12,10]INDIMP.MAC and [12,10]INDPDW.MAC and look for comments identifying the conditional assemblies to be modified. They are in the form:

```
.IF DF R$$MPL
```

and must be changed to:

```
.IF DF R$$MPL!S$$STOP
```

Do not change the number of lines in the modules when you modify the three lines: modify the three conditional lines only. If this is done, SLP correction files applied to the modules will work and the modified modules can be properly maintained.

Since future SLP correction files assume the version number of the original source module is 1, rename the updated source modules to version 1 so the SLP correction files can be applied directly.

The modules must be reassembled after they have been edited, using the following commands:

```
>MAC INDIMP,INDIMP/-SP=[1,1]EXEMC/ML,[11,10]RSXMC/PA:1,[12,10]INDIMP
>MAC INDPDW,INDPDW/-SP=[1,1]EXEMC/ML,[11,10]RSXMC/PA:1,[12,10]INDPDW
```

The modules must be replaced in the [1,2x]IND.OLB object library prior to rebuilding IND. The library is in [1,24] on a mapped system, or [1,20] on an unmapped system. To replace the modules, issue the following command:

```
LBR IND/RP=INDIMP,INDPDW
```



IND may then be rebuilt. The command files for the Task Builder to rebuild are [1,24]INDBLD.CMD and [1,24]BIGINDBLD.CMD for a mapped system, and [1,20]INDBLD.CMD and [1,20]BIGINDBLD.CMD for an unmapped system. When the command files are executed, your default UIC must be the same as the UIC in which the command file resides. The command to perform the task build is:

TKB @INDBLD

or

TKB @BIGINDBLD

When IND is rebuilt, it may be installed and tested, and installed with VMR so that it is available when the system is booted.

### 5.3 Reassign LUN Directive

Any LUN associated with an attached device may be reassigned with an ASSIGN LUN directive as long as at least one LUN remains assigned to the attached device. Otherwise, the ASSIGN LUN is not allowed.

### 5.4 Librarian (LBR)

LBR can now create and maintain libraries of a universal type. Any file can be inserted as a module into a universal library.

### 5.5 Source Language Input Program (SLP)

You can obtain a checksum (CRC) value for an SLP correction file, using the SLP CS switch. If a switch value is supplied for the CS switch (/CS:n), that value is compared with the checksum calculated by SLP for the correction file. If the values are the same, SLP reprompts. However, if the values are different, SLP generates an error message. If specified without a value, SLP calculates and reports the checksum value.

With the new TR switch, SLP reports the number of lines on the output file that were truncated during the SLP processing. These truncated lines are indicated in the listing file.

The first character of a user-supplied audit trail becomes the default audit trail delimiter until it is changed by a later user-supplied audit trail. The default audit trail delimiter is a semicolon. For example, with the facility, FORTRAN programs can be updated using SLP by specifying an exclamation (!) as the audit trail delimiter.

### 5.6 Object Module Patch (PAT) Utility

If PAT applies a correction with different PSECT attributes than the attributes for the same PSECT in the input module, the corrected module retains the PSECT attributes of the input module. PAT does not change the attributes of the original PSECT.

### 5.7 Driver Cancel I/O Entry Point

When a task is aborted, part of the clean-up job for the Executive is to cancel all I/O requests outstanding for that task, regardless of whether the requests are currently active. The Executive flushes all I/O requests for the aborted task that have been queued up for device drivers. Then for each of those drivers, if there is an I/O request actually being processed, the driver is called at its cancel I/O entry point. It is the driver's responsibility to verify that the TCB of the I/O request being processed matches the TCB of the aborted task. This way, the driver will only kill an active I/O request if it was issued by the task that is being aborted.

### 5.8 LPAll-K Laboratory Peripheral Accelerator

The LPAll-K micro-code that was distributed with RSX-11M V3.2 has four known errors. They are described here to prevent problems in the future.

1. An unwarranted error code is returned if a random-channel-bit is specified for output sweeps in multi-request mode.
2. Digital start triggering will not work for output sweeps in multi-request mode.
3. Multiple non-fatal buffer overruns are flagged with an incorrect error code.
4. If an LPAll-K has less than two D/A converters, only one A/D sweep is allowed in dedicated mode before the micro-code hangs up.

Further news concerning the LPAll-K micro-code will be published in the RSX-11M/S Software Dispatch.

The LPAll-K driver is supported on 22-bit systems now. Also, a number of other minor internal enhancements have been made to the support routines.

In order to take advantage of the LPAll-K power and flexibility, its driver never looks busy to the RSX-11M Executive. Because of this technique, a privileged user can unload the driver when the LPAll-K is being used. Therefore, you must be certain that no one else is using the driver when you unload it.

### 5.9 Differences Between the Full Duplex and Half Duplex Drivers

Although the full duplex driver was designed to function identically to the half duplex driver for all common functions, due to different databases and the desire to overcome the deficiencies of the half duplex driver, some behavior of the half duplex driver was not carried over to the full duplex driver. At this time there is no clear method of a task determining the type of driver in use, but one method is to issue the IO.RTT function with null arguments, and observe the resultant error code. If the error is IE.IFC, then the half duplex driver is present.

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1. <CTRL/C> ASTs during solicited reads happen immediately with the full duplex driver. The half duplex did not invoke the AST until the read completed.
2. The half duplex driver required up to one second to process an IO.KIL function. The full duplex driver processes that function as soon as it is received.
3. The full duplex driver uses the third word of the parameter list of an ATTACH QIO to specify the address of a <CTRL/C> specific AST routine. The half duplex driver, however, ignored that parameter. This may cause problems if a task leaves random values in that word, which would work with the half duplex driver but would cause unpredictable results with the full duplex driver.
4. The full duplex driver will not echo solicited and unsolicited input if a line is set to no-echo.
5. After completing a break-through write request, the full duplex driver will restore the line to a <CTRL/S> (XOFF) state if the line was in that state previous to the break-through write. Thus, the use of a break-through write to clear the <CTRL/S> status of a line will no longer work with the full duplex driver. However, the full duplex driver can set/clear the <CTRL/S> status via the set multiple characteristics function (see the RSX-11M/M-PLUS I/O Drivers Reference Manual).
6. The half duplex driver used the LA180S terminal type to disable software simulation of formfeeds only. The full duplex driver sets many characteristics (line width, hardware tabs, etc.) based upon the terminal type, including formfeed simulation.
7. The full duplex driver will not echo unsolicited input typed after a <CTRL/S>, although that input will be processed. The half duplex driver will ignore the <CTRL/S> in this situation.
8. The half duplex driver did not intercept the <CTRL/X> character. However, the full duplex driver will clear the type-ahead buffer upon receipt of this character.

### 5.10 Tasks Using Floating Point

The Specify Floating Point AST directive was modified so the directive is rejected if the issuing task was not built with a floating point save area (using the TKB /FP switch). Therefore, FORTRAN and BASIC tasks that using floating point, that were not built with the FP switch, will fail at initiation time rather than randomly during execution.

FORTRAN programs which need the Floating Point OTS will report the message INITIALIZATION FAILURE if the FP switch was not specified. The task can then be rebuilt using the FP switch. If the task does not require the Floating Point OTS, it can use the Extended Instruction Set (EIS) OTS. (See the FORTRAN User's Guide for the version of FORTRAN you are using for information on the EIS OTS.)

Prior releases of RSX-11M allowed floating point FORTRAN tasks to run correctly without the FP switch if they were the only task in the system using floating point. They ran as if the FP switch was specified. If more than one task ran, using floating point, unpredictable results occurred and intermediate results were lost during the transition from one task to another.

### 5.11 Magnetic Tape Ancillary Control Processor (MTAACP)

The following changes and bug fixes were made in the MTAACP:

1. The MTAACP considers the file version number to be simply an addition to the file name.

When the MTAACP opens an existing file:

- a. If the version number is specified, version numbers must match
- b. If the version number is not specified, the ACP will open the first file it finds with the same name, no matter what its version number.

When the MTAACP creates a new file:

- a. If the version number is not specified, it is changed to 1. (Even if the PIP NV switch is used.)
- b. In all other cases, the file will be created regardless of whether some other file with the same version number exists. Invalid version numbers on input or output tapes are converted to 1. (See Appendix G of the IAS/RSX-11 I/O Operations Reference Manual.)

2. It is possible to abort tasks which are waiting for tapes to be mounted.
3. Tasks may be aborted during Find and Enter operations. The abort occurs when the end of the current file or volume is reached. The abort cannot occur immediately because the MTAACP uses the Space File function which does not return control to the ACP until either a tape mark is encountered or an error occurs. Setting the drive offline after aborting the task will cause an immediate abort.
4. Tasks will not hang if there is an error creating the file (such as a bad spot on tape).
5. The Mount/Dismount error handling routine has been improved. The ACP returns special positive error numbers on the mount command and negative error numbers, which are standard I/O errors.
6. When Mount requests service from MTAACP, it will have outstanding I/O until MTAACP can complete the request with success or error. If MTAACP does not have access to memory, the mount operation will never complete. Since Mount has an outstanding I/O to an ACP, it cannot be aborted, shuffled, or checkpointed.

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This can be solved at System Generation by using a dedicated partition for the MTAACP.

7. When additional output volumes are requested, the MTAACP accepts any new volume after all volumes specified in the Mount command have been filled. You can keep several blank initialized tapes on hand to use when tape output is longer than anticipated. However, tasks can now be aborted if a tape is not available.
8. The timeout message now prints the correct task name.
9. Many MTAACP problems have been traced to the use of a PIP which does not support ANSI files. At System Generation, you must build PIP with ANSLIB or with a copy of SYSLIB which includes the FCSMTA routines.

To determine whether PIP was built with ANSI support, copy a short text file to a tape. Then, using the DMP utility, examine the file. If ANSI FCS was included in PIP, the first four characters will be the decimal byte count (in ASCII). The first character of the first record will appear in the fifth character of the block.

10. If the input block size of a tape file is greater than 512 bytes, specify the Block Size switch when you copy the file with PIP.
11. Sequential files with fixed or variable length records are supported for ANSI magnetic tape. The file must be readable by FCS in record mode for PIP to copy it.
12. Since the current ANSI standard does not support spanned block records, all files on magnetic tape have the no span blocks attribute. The PIP SB switch merely allows control of that attribute when copying the file back to disk from tape.
13. The DMP HD switch is for dumping the headers of Files-11 files. It does not apply to ANSI magnetic tape.

To obtain ANSI tape header information:

- a. Use the RMS DSP utility
- b. Dismount the volume and use DMP in Device Mode. (See the IAS/RSX I/O Operations Manual, Appendix G.) The file attributes are stored in the HDR1 and HDR2 records.
- c. The format of the HDR2 record has been updated to support FCS sequenced records. If the file is FCS sequenced, CP38-40 will contain the ASCII characters 002. If a file in this format is transported to an operating system which does not support this attribute, the records will contain the sequence number, in binary, in the first two bytes of each record. Although FCS sequenced is a subset of RMS variable with fixed control (VFC), at this point only FCS sequenced is supported. RMS VFC is not supported.
- d. When a magtape is dismounted, the tapes are rewound and unloaded. This ensures that the correct tapes are mounted before the drive is used again.

### 5.12 KMC11 Line Printer Driver

The KMC11 microcode version of the line printer driver (LKDRV) does not recognize the following MCR command:

```
SET /[NO]LOWER=LPn:
```

However, the standard line printer driver (LPDRV) correctly interprets the command.

### 5.13 System Verification Procedures on RK05 Systems

1. Operating instructions unique to unmapped RK05 systems were omitted from the RSX-11M System Generation and Management Manual. The procedure files are in [2,300] of the RK05 Utilities Pack.

To run, after booting the system disk and allocating checkpoint space, assign the Utilities Disk as SY:. For example:

```
MOU DK1:UTLOBJ
ASN DK1:=SY:
```

Continue as with other systems.

2. Results from running Installation Verification Procedures on an unmapped system are not complete when the number of drivers exceeds the capacity of the driver partition. In this case, the verification procedure tries to load the extra driver(s) into the partition GEN. Testing of these drivers fails.

However, the procedure completes the testing of the loaded drivers. The untested drivers can be tested by running the I/O Exerciser (also documented in the System Generation and Management Guide) after the verification procedure completes.

3. Each magnetic tape drive must contain a tape and be set ON LINE if the drive is powered up. Otherwise the system will loop on a SELECT ERROR indefinitely.

### 5.14 Queue Manager

5.14.1 **Errors in Second Print Request** - The following sequence of Queue Manager commands causes the second print request to fail:

```
>PRI FILEA
```

Sets printer not ready and waits for LP0: NOT READY message

```
>QUE FILEA/DE
```

```
>PRI FILEB
```

Make printer ready

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The message LPP0--PRINT ERROR -14. ON FILEB is generated by this message.

The following sequence of commands can corrupt the queue file:

```
>PRI FILE
>QUE FILE/DE      ;while flag page(s) are printing
>QUE FILE/DE
>PRI FILE
```

Two copies of the job appear to be active in the queue on the printer. QUEUE.SYS must be deleted and the Queue Manager restarted.

**5.14.2 QUE /SPOOL /EX Switch** - The /EXternal switch to the QUE /SPOOL command has an additional effect not mentioned in the command description, Section 7.3.3 of the RSX-11 Utilities Manual. When setting an external processor spooled, the /EX switch names and starts a queue named after the device name of the external processor. Thus, if the processor is LZ0:, use of the /EX switch will name and start a queue LZQ0. This queue is NOT assigned to the processor. You must use the QUE /ASSIGN command if you wish to use this queue. Jobs can be sent to the queue LZQ0 without its being assigned. You cannot use the QUE /DEASSIGN command to break this assignment.

The /EX switch also names and starts a user-written output processor task. When you use the /EX switch, no check is made for the existence of a physical device.

### 5.15 New Switches in Utilities

Table 1-1 summarizes switches that have been added to existing system programs. It does not include switches that are included in completely new software.

Table 1-1  
Switches Added to RSX-11M System Software

Program	How to Do It	Outcome
Bad Block Locator (BAD)	command /MAN	BAD prompts for bad block information and enters the blocks specified in the bad block descriptor file.
	command /UP	Allows the bad block descriptor file to be updated by entering additional bad block information in response to prompts.

(Continued on next page)

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Table 1-1 (Cont.)  
Switches Added to RSX-11M System Software

Program	How to Do It	Outcome
Back-up and Restore Utility (BRU)*	command /NOPRESERVE	Suppresses the warning message that it is not preserving file identifiers.
Crash Dump Analysis (CDA)	command /-SYS	Suppresses listing of system information.
	command /DECNET	Supports DECnet CDA subroutine.
File Dump Utility (DMP)	command /FI:filename:sequencenumber	Allows you to enter a file number as a file identifier instead of a file name.
	command/HF	Formats blocks which have FILES-11 header structures. Other blocks are output as an unformatted octal dump.
	command /HD	Dumps the file header block in readable forms.
	command /RW	Dump issues a rewind command before it refers to a specific tape.
Disk Save and Compress (DSC)	command /BL	Sets the block factor at which DSC will write blocks of data to magnetic tape
File Exchange Utility (FLX)	command /DNS:n	Specifies the density of a magnetic tape; n is either 800 or 1600 bits per inch.
	command /-RW	Suppresses rewinding of magnetic tape.

(Continued on next page)

\*Switch added after manual was printed.



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Table 1-1 (Cont.)  
Switches Added to RSX-11M System Software

Program	How to Do It	Outcome
Monitor Console Routine (MCR)	FLA[GS]	Command which establishes group global event flags.
	Dismount Keywords:	
	DEV	Device to be dismounted.
	USER	Dismounts all devices mounted by the user who issues the command.
	TERM	Dismounts all devices mounted from the indicated terminal.
	System Service Message SSM	Inserts text into error log report.
	LOA[D] keywords: SIZE	Minimum size in words into which the driver is to be loaded.
	HIGH	Driver loaded into the highest sufficiently large available area of partition.
	SAV[E] keywords: MOU	Adds a string to the Mount command for the system disk when it is booted.
	SFILE	File specification for indirect command file, to be used when the system is booted.
Peripheral Interchange Program (PIP)	command /TR	Truncates files to logical end-of-file.
	command /FR	Displays the amount of free space on the specified volume and the largest contiguous free space on the volume.
	command /SD	Selectively deletes files by prompting for user response before deletion.

(Continued on next page)

Table 1-1 (Cont.)  
Switches Added to RSX-11M System Software

Program	How to Do It	Outcome
Peripheral Interchange Program (PIP) (Cont.)	command /NM	No message - suppresses certain PIP error messages.
	command /CD	Allows the output file to take the creation date of the input file instead of the date of transfer.
	command /EOF	Specifies the end-of-file pointer for a file.
	command /LD	Lists the files that have been deleted.
	command /SR	Allows shared reading of a file that has already been opened for writing by another user or task.
Source Language Input Program (SLP)	command /CS:n	Obtains (or verifies) a checksum value for SLP edit commands.
	command /TR	Reports the number of lines on the output file that were truncated by the audit trail during SLP processing.

#### 5.16 K-Series Call Using the DR11-K

An undocumented value for 'mode' exists for the DISWP call. If your digital input sweep is driven by the external control lines of the DR11-K and the input register is non buffered, specify a mode bit of +32. This ensures proper interrupt handling for applications that drive the external control lines at very high speeds.

#### 5.17 Post Mortem/Snapshot Dump

1. The file extend size for the Dump File has changed from 24. blocks to 5. blocks.
2. The SNAP\$ macro was modified to correctly display \$DSW. Any tasks which were assembled with the old version of SNAP\$ must be reassembled. If this is not done, SNAP\$ will still work, but the value of \$DSW will be incorrect.

### 5.18 Task Builder (TKB)

The Task Builder manual explains how to change default switch settings. However, the manual does not indicate which default value to choose for checkpointable task images.

Two flags are defined in the switch word \$DFTSK:

```

bit 15 (1000000): task is not checkpointable
bit 1 (      2): task has no checkpoint space allocated

```

The effect of combining switches is:

<u>Bit 15</u>	<u>Bit 1</u>	<u>Mask</u>	<u>Default Switches</u>
0	0	0	/AL
0	1	2	/CP
1	0	100000	illogical
1	1	100002	/-CP/-AL

If you want to select default checkpointable tasks and your system has dynamic checkpointing, select mask = 2.

Selecting a mask word of 0 implies that /AL is the default. This will have the following effects:

1. Your task images will occupy more disk space
2. Your tasks will not be extendable. This creates problems with BASIC-PLUS-2 programs ("Memory limit exceeded"), DBMS, and probably others.

### 5.19 User-Written Drivers

Chapter 4 of the RSX-11M Guide to Writing an I/O Driver describes the I/O packet field I.PRM as having read-only access by a device driver. In fact, several DIGITAL-supplied drivers store temporary data into unused portions of this eight word field. However, you should not use the I/O packet as scratch storage. For example, if a driver completes an I/O request and leaves word I.PRM+16 nonzero, a system crash occurs if RMS record locking was included in the Executive.

### 5.20 Resident Library Restrictions

The error code IE.SPC indicates that a directive's DPB or required buffer is outside the user task's address space when a system directive was issued. In addition, IE.SPC results from issuing a system directive when the DPB or any buffer is located in a read-only resident library. In that case, the address check algorithm fails and IE.SPC results.

### 5.21 FCSRES Resident Library Update

To use an FCSRES resident library built before RSX-11M V3.2, you may require special steps to assemble or build tasks to use the library on V3.2.

While files produced by any version of FCS are compatible, the FCS internal data structures were changed for V3.2. Therefore, if you assemble a source program which links to an old FCSRES, be sure that FCSMAC.MAC in RSXMAC.SML is the same version of FCS as your FCSRES. If this is not the case, the global symbols in the object file and those in FCSRES will be different.

A task which links to FCSRES normally uses only FCS modules from the resident library. However, it is possible to link to FCS modules in SYSLIB by manipulating FCSRES.STB, as described in the August 1978 RSX-11M/S Software Dispatch. Then the FCS modules in SYSLIB must be the same version as FCSRES.

## 5.22 IE.PRI Error Code

The IE.PRI error code for disk and DEctape drivers is returned when:

1. A nonprivileged task tries to perform logical I/O (such as IO.WLB) to a mounted volume
2. A user attempts to attach (IO.ATT) a mounted volume
3. A user attempts to perform virtual block I/O (IO.RVB) to an unmounted volume.

It is also possible to get the IE.PRI error status from the magnetic tape drivers if the system supports ANSI magnetic tape. The criteria for the error in this case are the same as that used by the disk drivers. This is discussed further in the RSX-11M/M-PLUS I/O Drivers Reference Manual.

## 5.23 Macro Assembly Language

The following information updates the IAS/RSX-11 MACRO-11 Reference Manual:

1. A macro call statement may be constructed so that an argument is specified both as a positional argument and a keyword argument (see Section 7.3.6 of the IAS/RSX-11 MACRO-11 Reference Manual). When this occurs, the positional specification takes precedence.
2. The symbols STA0 and STB0 are diagnostic floating point op codes which have the values 170005 and 170006, respectively. These symbols were omitted from the Permanent Symbol Table in Appendix C.
3. The L assembly error, described in Appendix D, is generated with an input line greater than 132 characters. The condition no longer results in a fatal I/O error.
4. The E assembly error, described in Appendix D, can be encountered during expression analysis if the assembler's stack overflows. In this case, in addition to flagging the statement with an E error, a question mark (?) is inserted into the line where the overflow occurred. To avoid this condition, simplify the expression or build the MACRO-11 assembler with a larger stack.

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5. The size of the MACRO assembler's command line buffer was increased from 80 to 132 characters. Command input may continue to additional lines if each line to be continued terminates with a hyphen. The subset 8K assembler, described in Appendix G, does not support increased line length or continuation lines.

### 5.24 User Mode Diagnostics

The TE10 and TE16 magnetic tape drives replace the TU10 and TU16, respectively. For the most part, these units are program compatible at the user level. However, the system user mode diagnostic tasks (TU10.TSK and TU16.TSK) cannot be used on the TE10 and TE16.

There are also no user mode diagnostics for the RM02/03, or the RL01 disk drives.

### 5.25 VT55 Support

This release of RSX-11M includes software support for the VT55 Graphics Display Terminal. The software support consists of the following files:

[1,1]PLOT55.OBJ (in SYSLIB.OLB)

[200,200]TEST55.FTN

PLOT55 is a FORTRAN-callable routine that provides access to the graphics features of the VT55 terminal.

PLOT55 is already incorporated into [1,1]SYSLIB.OLB on the kits and, thus, is automatically linked to your program at Task Build time.

To test the PLOT55 package and the VT55 itself, run the test program as follows:

1. Logon to [200,200] from a VT55 (set baud rate as high as possible.)
2. >FOR TEST55,TEST55=TEST55 or  
>F4P TEST55,TEST55=TEST55
3. >TKB TEST55=TEST55
4. >RUN TEST55

The TEST55 program tests the terminal and software and demonstrates the VT55 capabilities.

### 5.26 Console Output Device (CODRU and COT)

When time-scheduled tasks and tasks initiated by a DECnet-connected request require input from TI:, the time-scheduled task gets CO: as its TI:. If the Console Log Task (COT) is running and the task writes to CO:, the message is logged on the console terminal and/or in a log file. However, if the task attempts to do a read operation while COT is running, the Console Driver (CODRV) returns an invalid function code error to the task issuing the read. CODRV only allows the task named COT... to read from CO:.

If you have time scheduled tasks that require input, you can use the following procedure:

1. Use a global assign statement to create a new logical device that is redirected to a pre-specified terminal you want to use for input.
2. When you Task Build the tasks to be time scheduled, assign the input LUN to the new global device.

### 5.27 Spawning With ASTS

ASTs used in connection with the FORTRAN call for spawning tasks require special considerations. In the CALL SPAWN command line, you can specify an AST to be called when the offspring task exists or emits status. Since FORTRAN does not support ASTs, they must be implemented as subroutines. The following example illustrates how to set up the call with an AST routine:

```

C
C DECLARE THE ROUTINE
C
  EXTERNAL ASTRTN
  .
  .
  .
  CALL SPAWN (.....ASTRTN,...)
  .
  .
  .
C
C DEFINE THE AST ROUTINE HERE
C
  SUBROUTINE ASTRTN
  .
  .
  .
  RETURN

```

### 5.28 RMDEMO

The system display program, RMDEMO, has been rewritten for V3.2 to provide more information on your system.

**5.28.1 Changes in Memory Display Program** - Before installing RMDEMO on your system, you should read the comments in [14,10]RMDEMO.MAC and [14,10]MDCOM.MAC on the MCRSRC disk. These extensively commented source files explain a number of items on the RMDEMO memory display program which may be changed to suit your system. The most notable change is the list of devices for which you can display free-block counts. (Alter the display to reflect the devices in use in your installation, as explained in MDCOM.MAC.) You can also change the replot rate of the display. Both the replot rate and the free-block devices can also be altered dynamically. Finally, you can alter the placement of each of the fields of the display on any particular terminal type, as explained in the comments. See also [14,10]V52MDM.MAC for an example of what a map looks like.

**5.28.2 ATTACH FOR UNSOLICITED CHARACTER AST** - To use RMDEMO, you should include both this terminal driver option and AST support at system generation.

If you do not include unsolicited character AST support, you cannot replot the screen or move from one page to another. In addition, you can only exit from RMDEMO by typing <CTRL/C> and aborting RMDEMO. You must then set the terminal buffer to the proper width.

## 5.29 BRU

The Fast Back-up and Restore utility can be built with varying privileges. The following sections describe two alternatives.

**5.29.1 BRU Privileged File Activity** - BRU is built privileged (PR:0) to enable it to copy from a mounted volume without using the file system. However, since it is built privileged, when using BRU to copy to a mounted volume, the file system does not perform protection checks on the mounted volume. If BRU is installed on the system, a nonprivileged user can write or supersede files that he normally would not have write or delete privilege to. If this is a problem, rebuild BRU as a nonprivileged task and install the nonprivileged version for general use.

**5.29.2 Build BRU Non-Checkpointable** - There is no standalone version of BRU. If your system configuration is only two disks, with no tape drives, and you wish to copy your non-system disk, use this procedure:

Using the FIX command, fix in memory MOU, DMO, and BRU. If you have an active checkpoint file, you must deactivate it. You can now dismount the system disk, replace it with a backup pack, copy your nonsystem disk to this pack with BRU, and then remount your system disk.

If your system configuration is one disk only with tape drives, you will be able to restore your system using BRU to a mounted disk. If, however, you wish to do a restore and initialize the output disk, then you must also fix MOU, DMO, and BRU in memory. Dismount the system disk, replace it with the disk to be restored to, and use BRU to copy to this disk.

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If you have a one-disk configuration and are using BRU for backups, you must keep an extra bootable system on a spare disk or on a DSC tape in case your system disk is destroyed.

You cannot copy a nonsaved (virgin) system with BRU or with DSC, because a nonsaved system uses logical blocks instead of file IDs to locate tasks on the disk. If you do copy a nonsaved system, you must use VMR to reinstall all tasks in the system image.

### 5.30 ACNT Error Message

When you receive the message NOT ENOUGH APRS FOR TASK when attempting to install ACNT, edit the build file ACNTBLD.CMD, in [1,24] for mapped systems and [1,20] for unmapped systems to lower the EXTTSK= parameter. The value should be EXTTSK=2400.

## 6.0 RSX-11M FILE SYSTEM AND FllACP

### 6.1 Choosing Your Native FllACP

You can build FllACP with several different overlay structures. The correct choice for your system involves a tradeoff between memory and performance. The following sections discuss some of the factors to consider in making this choice.

1. FCPNMH or the small FCP (FCPSM0) require the least amount of memory.
2. The middle sized FCP (FCPMD1) provides a combination of memory saving features and superior performance. This FCP is optimized to handle simple applications that primarily open/close and read/write files.
3. The large FCP (FCPLG1) or a resident overlay FCP (FCPRO2) is useful on systems where performance is the most critical requirement. FCPLG1 is especially suited to creating and extending files and handling error conditions. It uses overlays only on rare occasions and when deleting files. FCPRO2, the resident overlay FCP, has no overlay activity and, therefore, performs file deletions faster than FCPLG1. FCPLG1 is suited to conditions when file deletion speed or resident overlays are unimportant.

### 6.2 Directory File Names

Do not rename User File Directories (UFD). The only valid form for a UFD is the output of the MCR UFD command. FllACP expects the name of the UFD to be the same as its owner UIC.



### 6.3 Dedicated ACPs

Dedicated ACPs can be used with individual volumes to improve system performance when the volume is accessed. Since file system performance is improved on RSX-11M V3.2 (with the addition of 2-4 window support), your system configuration may now require a smaller number of dedicated ACPs.

The example below shows how this can work on medium to large system configurations.

Situation: High traffic to one disk (for example, SY0:) and traffic scattered randomly to the rest of the devices.

Configuration: A dedicated ACP (probably a resident overlay ACP) for the high traffic disk. A second resident overlay ACP can service the remaining high speed disks. A small ACP as the default for low speed devices: This avoids having a slow device tie up the other system ACPs.

### 6.4 ACP Routing Of I/O Requests

Multiblock and multibuffered file I/O operations performed on a single Logical Unit (LUN) are now performed in sequence and interlocked.

However, if an I/O operation on one LUN depends upon the sequence of an operation on a different LUN, the dependent operation must still wait. If sequencing is critical to an operation, it must be done explicitly by the individual tasks.



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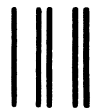
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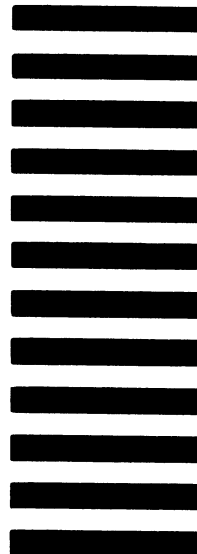
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