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RSX-11M
System Generation Manual

Order No. DEC-11-OMGIA-B-D

digital

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Order No. DEC-11-OMGIA-B-D

RSX-11M Version 2

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PREFACE

0.1 MANUAL OBJECTIVES AND READER ASSUMPTIONS

System generation is a fairly complicated process. To understand fully what is taking place requires that the user be knowledgeable in the operation of RSX-11M and its component tasks. Refer to section 0.3 below for further information regarding related manuals and recommended reading.

CAUTION

No user should undertake a system generation without adequate preplanning. This includes a thorough study of the SGN program queries in Chapter 3 and the answers the user will provide, so that the Executive options, processor options and peripheral complement are those describing his intended target system. In addition, a preliminary layout of memory partitions is essential if the later phases of the system generation process are to proceed smoothly.

0.2 STRUCTURE OF THE DOCUMENT

This manual provides information on how to generate an RSX-11M system tailored to a particular installation's hardware configuration. As delivered, RSX-11M includes an operational Executive, called the Baseline System. The Baseline System is described in section 0.4 below and is initiated by following the procedures discussed in section 2.3.

Chapter 1 contains an overview of the system generation process. It is intended to familiarize the reader with the various phases involved in producing a tailored system.

Chapter 2 describes the contents of the distribution kit and provides information on getting started.

The actual procedures involved in system generation are provided in Chapter 3. The step-by-step process followed in generating a system is described.

Chapter 4 covers procedures needed for generating larger multi-function systems.

Chapter 5 describes the commands and operation of Virtual MCR (VMR), a program which is used in the final stage of system generation to initialize the user's target system.

The remaining sections comprise appendices describing the Volume Preservation Program (PRESRV), UIC conventions, RSX-11M operational hints, the File Patch Utility (ZAP), RSX-11M control blocks, and a sample system generation.

0.3 ASSOCIATED DOCUMENTS

Other manuals closely allied to the purposes of this document are described briefly in the RSX-11M/RSX-11S Documentation Directory, Order No. DEC-11-OMUGA-B-D. The Documentation Directory defines the intended readership of each manual in the RSX-11M/RSX-11S set and provides a brief synopsis of each manual's contents.

0.4 THE BASELINE SYSTEM

RSX-11M efficiently services a wide range of PDP-11 hardware configurations. Tailoring a system to a local set of hardware and performance requirements is accomplished through the system generation process.

The tailoring process is run on an RSX-11M system called the Baseline System. The Baseline System is a fully operational RSX-11M system built explicitly for generating target systems. It is not designed for general use due to the small size of the dynamic memory pool. The Baseline System contains the following Executive options and device support:

Executive options in the Baseline System

Files-11 Ancillary Control Processor (F11ACP)

Checkpointing

Nonresident task support

Address checking (mapped system only)

I/O rundown

External MCR functions

Task termination and device-not-ready messages

Get Partition Parameters directive

Get Task Parameters directive

Install, Request, and Remove on Exit directives support

Logical device assignment support

256 words of dynamic memory

Processor options in the Baseline System

For unmapped RK disk systems:

16K of memory

For unmapped RP02, RP03, and RP04 systems:

24K of memory

For all mapped systems:

24K of memory

Memory management unit (KT-11)

Peripheral device support in the RK disk Baseline System

- 2 RK05 disk drives
- 2 TA11 cassette drives
- 1 TU56 DECTape drive
- 1 RX01 floppy disk drive
- 1 TU10 or TS03 magtape drive
- 1 TU16 magtape drive
- 1 LP11 or LS11 line printer
- 1 terminal

Peripheral device support for the RP disk Baseline System

- 1 RP02, RP03 or RP04 disk drive
- 1 TU10 or TS03 magtape drive
- 1 TU16 magtape drive
- 1 LP11 or LS11 line printer
- 1 terminal

0.5 USING THIS MANUAL TO ACQUIRE SYSTEM GENERATION SKILLS

RSX-11M system generation, being based on conditional assemblies, affords the user a vast number of configuration options. Most users, however, will not have a need to exploit all the flexibility inherent in the RSX-11M system generation process. To assist the user in his option selection, the entire system generation process is under the direction of two indirect Monitor Console Routine (MCR) command files.

Learning how to generate a system is best achieved by active experience with the indirect command files. It is suggested that the user read through the manual (excluding appendices) before attempting a system generation for his target system.

CHAPTER 1

INTRODUCTION TO SYSTEM GENERATION

1.1 SYSTEM GENERATION OVERVIEW

The object of the system generation procedure (SYSGEN) is to create an RSX-11M system tailored to the user's local hardware configuration and performance requirements. This chapter provides an outline of the stages involved in performing system generation. The system generation procedures are contained in Chapter 3.

The system generation process implies variability and choice. Five categories of choices are available:

1. Executive service options,
2. Processor options,
3. Peripheral devices,
4. Partition configurations, and
5. Member tasks.

A system is tailored to local needs by selecting options from these five categories.

1.2 FUNCTIONAL FLOW OF SYSTEM GENERATION

The system generation process (SYSGEN) can be viewed as having two milestones. The particular set of user actions and system output in achieving a milestone is considered a phase of SYSGEN. The milestones are:

1. Configuration and assembly of the Executive, and
2. Building the Executive, privileged tasks, and non-privileged tasks; setting up partitions, installing tasks, and bootstrapping and saving the system.

The entire SYSGEN process, of which these phases are components, is directed by two indirect MCR command files. The file SYSGEN.CMD directs the first phase; SYSGEN2.CMD directs the second phase.

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1.2.1 Configuration and Assembly of the Executive - Phase 1

Using the Baseline Executive, which exists on the distribution disks, the user conducts this phase by answering interactive queries posed by the System Generation Configuration Query Program (SGN). Answering these questions determines the:

Executive service options,
Processor options, and
Peripheral complement

that will be incorporated into the Executive being created to service the user's configuration.

NOTE

The SGN task is the means for specifying all Executive options, processor options and peripherals to be generated into the target system. Thus, it is necessary to thoroughly read Chapter 3 and the RSX-11M Executive Reference Manual to know what and how to specify the options required in the target Executive. It is during SGN that the Processor and Executive options are determined; also determined are the number and type of disks, tapes, printers, etc., that are to be generated into the target system.

User interaction with the SGN program results in the creation of five files on the disk:

1. RSXMC.MAC
2. SYSTB.MAC
3. RSXASM.CMD
4. RSXBLD.CMD
5. ICTAB.MAC

RSXMC.MAC contains the conditional assembly parameters necessary to produce the user-tailored Executive.

SYSTB.MAC is a file of device table descriptions needed to service the peripheral configuration.

RSXASM.CMD is a MACRO-11 indirect command file that directs the assembly of the user-tailored Executive.

RSXBLD.CMD is a Task Builder indirect command file which directs the building of the user-tailored Executive.

INTRODUCTION TO SYSTEM GENERATION

ICTAB.MAC is a MACRO-11 source file which defines the module layout of an ICS/ICR subsystem. It is generated only when the user selects the ICS/ICR subsystem for inclusion in the target system.

After the queries posed by SGN have been answered and SGN has created its five output files, the user-tailored Executive is assembled via the indirect command file RSXASM.CMD. Both the configuration and assembly are directed by the indirect MCR command file SYSGEN.CMD. Thus, Phase 1 is initiated by:

1. Mounting the correct disk,
2. Bootstrapping the Baseline System,
3. Entering the time and date, and
4. Initiating the indirect MCR command file, SYSGEN.CMD.

1.2.2 Setting Up Partitions, Building and Installing Tasks - Phase 2

During this phase, the user-tailored Executive is built, the privileged tasks are built, and, under certain conditions, some non-privileged system tasks may also have to be built. At the completion of the build of the Executive, the user has an operational Executive, and the value of the symbol \$SYTOP is known.

The symbol \$SYTOP represents the address of the last word in the user-tailored Executive, enabling the user to determine the size of the Executive. A complete operational system consists of:

1. An Executive,
2. Privileged and non-privileged system tasks,
3. User tasks, and
4. A set of memory partitions into which tasks can be installed and run.

This phase is directed by the indirect MCR command file SYSGEN2.CMD, which, once initiated, completely guides the user through the building and installation of requisite tasks.

Having the value of \$SYTOP, the user can lay out memory into the partitions and subpartitions needed to meet the application and performance requirements of his system. Also, the requirements of the privileged and non-privileged system tasks can be met.

The building of privileged and non-privileged system tasks occurs after the user has established his partition boundaries, since these tasks ultimately execute in partitions defined by the user.

During this phase, an operational Executive was created and placed into a file on disk. Note that the system generation process was being carried out under the Baseline System Executive.

INTRODUCTION TO SYSTEM GENERATION

Using Virtual MCR (VMR) and the disk image of the target system, the user can now establish the partitions and install the tasks needed to complete the operational system.

Having created the operational system, complete with partitions and tasks, the user now must bootstrap the system, using the MCR Boot command, and then save the system, using the MCR Save command with the /WB switch appended. MCR saves the system and then automatically re-boots it.

The running of VMR to set partitions and to install tasks, and the bootstrapping and saving of the system, are carried out under the direction of the indirect command file named SYSGEN2.CMD.

1.3 DIFFERENCE BETWEEN MAPPED AND UNMAPPED SYSTEM

RSX-11M is designed to run on almost all models of the PDP-11 processor (11/04/05/10/15/20/35/40/45/50/70). The basic addressing scheme of the processor instructions allows direct addressing of up to 32K words (64K bytes) of memory. In order to use memories larger than 32K words, the memory management unit (KT-11) is available on the PDP-11/35/40/45/50/70. This unit maps a virtual address (0-32K words) into a physical address (0-124K words on all processors embodying the KT-11, except the 11/70 which is expandable to 2048K words). An unmapped system does not use the KT-11, whereas, the mapped system does. This difference has an impact on the building of tasks for RSX-11M. On an unmapped system, tasks must be linked to the physical base address of the partition in which they run. However, in a mapped system, all tasks are mapped with the KT-11, and the virtual base address of the task is always zero. If it is desired to run a task built for an unmapped system in a partition with a different base address, the task must be rebuilt to link it to the physical base address of the new partition. This is not necessary on a mapped system, since the physical base address of the partition is transparent to the user because the KT-11 converts virtual addresses to physical addresses. All tasks in a mapped system (except privileged tasks) are built with a virtual base address of zero. Thus, any task on a mapped system can be run in any partition large enough for it, whether or not it is the partition for which the task was built. This affects the SYSGEN procedure, since the alteration of the partitions in an unmapped system may force the user to rebuild all the utility tasks, whereas, in a mapped system, this will not happen.

CHAPTER 2
GETTING STARTED

2.1 CONTENTS OF THE DISTRIBUTION KITS

RSX-11M is distributed in three different kits:

1. Four RK disks,
2. Two 600-foot, 800-BPI tapes of RK disk images, and
3. Four 600-foot, 800-BPI tapes containing an image of an RP02, RP03, and RP04 disk, and a source tape.

2.1.1 RK Release Kits

2.1.1.1 RK Disk Release Kit Contents - Summary

The RK disk distribution kit contains four RK05 disk cartridges identified as:

1. The Executive Source Disk,
2. The Unmapped Object Disk,
3. The Mapped Object Disk, and
4. The MCR, FCP, and DMP Source Disk.

For a given generation type, mapped system, or unmapped system, only two of these disks are used: the Executive source disk and the applicable object disk. Users building a mapped system must have a hardware configuration with a minimum of 24K of memory and a Memory Management Unit. The MCR, FCP, and DMP source disk is used if the user wishes to modify MCR or FCP. DMP is supplied as an example of how a typical MCR utility program is written.

The Executive source disk is used during the first phase of SYSGEN.

Among its files are:

1. The Baseline System Executive,
2. The text for the System Generation Configuration Query Program (SGN),

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3. A subset of the system tasks,
4. Complete source code for the Executive,
5. The SGN task, and
6. The system generation indirect MCR command file named SYSGEN.CMD.

Output files created during the first phase of system generation are generated on the source disk.

The object disk (mapped or unmapped) is used for the final phases of SYSGEN and contains among its files:

1. The Baseline System Executive and system tasks;

The unmapped object disk contains a 16K unmapped Baseline System and the object libraries for an unmapped MCR and FCP.

The mapped object disk contains a 24K mapped Baseline System and the object libraries for a mapped MCR and FCP.
2. Task build command files to create all system tasks;
3. Object library files for all system tasks; and
4. The system generation indirect MCR command file, SYSGEN2.CMD.

In addition, the concatenated Executive object file, RSX11M.OBJ, the Executive task build command file, RSXBLD.CMD, and the ICS/ICR table module, ICTAB.MAC, created on the source disk during phase 1, are copied to the object disk. During the latter part of SYSGEN, the user-tailored Executive is created on the object disk, which ultimately becomes the user's system disk.

To obtain a detailed list of the contents of the disks, use the commands:

```
RUN $PIP  
PIP>DK0:[*,*]/LI
```

This command sequence produces, via the console terminal, a complete directory listing of the volume mounted on DK0:.

2.1.1.2 RK Magtape Release Kit Contents - Summary

The RK magtape release kit consists of two 600-foot, 9-track, 800-BPI magtapes. The magtapes contain four RK disk images. These four images correspond to the four disks described in the previous section on the RK disk release kit. The two magtapes are:

1. Executive source and unmapped object tape containing the files:

RSX11MBL12EX - Executive source disk image
RSX11MBL12UN - Unmapped object disk image

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2. Mapped object and MCR, FCP, and DMP source tape containing the files:

RSX11MBL12MP - Mapped object disk image
RSX11MBL12MF - MCR, FCP, and DMP source disk image

Before beginning a SYSGEN, the appropriate disks must be copied onto RK cartridges using the Volume Preservation Program (PRESRV). This procedure is described in section 2.2.3.5.

2.1.2 RK Release Contents - Details

2.1.2.1 Executive Source Disk Contents

The Executive source disk contains the following:

| UIC | CONTENTS |
|-----------|---|
| [1,1] | System and Executive MACRO libraries |
| [1,2] | Error message text file, SYSGEN text file, startup command file |
| [1,50] | Baseline unmapped Executive and limited task complement |
| [11,10] | Executive source modules |
| [11,20] | Directory for unmapped Executive object modules |
| [11,24] | Directory for mapped Executive object modules |
| [11,40] | Directory for Executive correction files |
| [200,200] | SYSGEN part 1 command file |

The RSX-11M system distributed on this disk has a limited number of tasks provided.

The tasks are:

| | |
|--------|---|
| BOO | - MCR Boot command |
| DMO | - MCR Dismount command |
| IND | - MCR indirect command file processor |
| INI | - MCR Disk Initialization command |
| INS | - MCR Install command |
| MCR | - Monitor console routine |
| MOU | - MCR Mount command |
| SAV | - MCR Save command |
| TKN | - Task termination notification routine |
| UFD | - MCR User File Directory command |
| FCP | - 2K file system |
| SGN | - System Generation Configuration Query Program |
| PIP | - Peripheral Interchange Program |
| FLX | - File Transfer Program |
| BIGMAC | - 14K macro assembler |
| MAC | - 8K macro assembler |
| EDI | - Line Text Editor program |
| SLP | - Source Language Input Program |
| VFY | - File Structure Verification Program |

The partition layout for the system on the source disk is shown in Figure 2-1.

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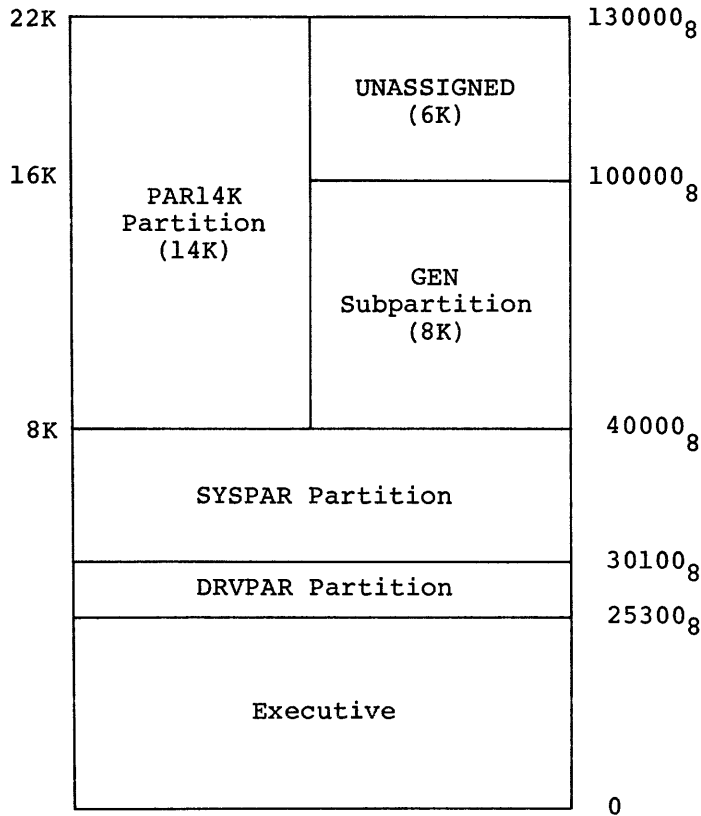


Figure 2-1
Baseline RK Unmapped System Partition Layout

This system will run on a machine with 16K of memory or more. The subpartition GEN is used for the assembler on 16K systems, and partition PAR14K is used for the assembler on systems with more than 16K of memory. On 16K systems, it is not possible to produce both object modules and listings during a single assembly of the Executive. Two assemblies are required; one to produce the object modules, and one to produce the listings. On systems with more than 16K of memory, this restriction does not exist.

The PAR14K partition must not be used to run tasks on a 16K machine, since it maps into 6K of non-existent memory.

Devices generated into this system are:

- 2 RK05 drives
- 1 TU56 DEctape drive
- 2 TA11 cassette drives
- 1 RX01 floppy disk drive
- 1 TU10 or TS03 magtape drive
- 1 TU16 magtape drive
- 1 LP11 or LS11 line printer
- 1 terminal

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2.1.2.2 Unmapped Object Disk Contents

The unmapped object disk contains the following:

| UIC | CONTENTS |
|-----------|---|
| [1,1] | System object library, Executive symbol definition library, ODT and TRACE object modules, and concatenated object module files for the FORTRAN object time system (OTS) |
| [1,2] | Error message text file, startup command file |
| [1,3] | Directory for lost files found by VFY |
| [1,4] | Directory for Snap-Shot and Post-Mortem Dumps |
| [1,20] | Object module libraries, task build command files, and overlay description files for all DEC-supported tasks, including the unmapped versions of the privileged tasks |
| [1,30] | Directory for task maps |
| [1,50] | RSX-11M Baseline System Executive and all DEC-supplied tasks built to run with the Baseline System Executive |
| [1,60] | Directory for RSX-11S Executive and tasks |
| [200,200] | SYSGEN Part 2 command file and source modules for building resident FORTRAN OTS and file control services (FCS) libraries |

The partition layout and device configuration of the system distributed on the unmapped object disk is identical to that of the source disk. This disk is used to build a new, unmapped RSX-11M system to user specifications.

2.1.2.3 Mapped Object Disk Contents

The mapped object disk contains the following:

| UIC | CONTENTS |
|--------|---|
| [1,1] | System object library, Executive symbol definition library, ODT and TRACE object modules, and concatenated object module files for the FORTRAN object time system (OTS) |
| [1,2] | Error message text file, startup command file |
| [1,3] | Directory for lost files found by VFY |
| [1,4] | Directory for Snap Shot and Post-Mortem Dumps |
| [1,20] | Object module libraries and overlay description files for all DEC-supported non-privileged tasks |

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- [1,24] Object module libraries and overlay description files for all DEC-supported privileged tasks, task build command files for all tasks
- [1,34] Directory for task maps
- [1,54] RSX11M mapped 24K Baseline System Executive and all DEC-supplied tasks built to run with the Executive
- [1,64] Directory for RSX-11S Executive and tasks
- [200,200] SYSGEN part 2 command file and source modules for building resident FORTRAN OTS and file control services (FCS) libraries.

The device configuration for this system is identical to that of the system on the source disk. The partition layout appears in Figure 2-2.

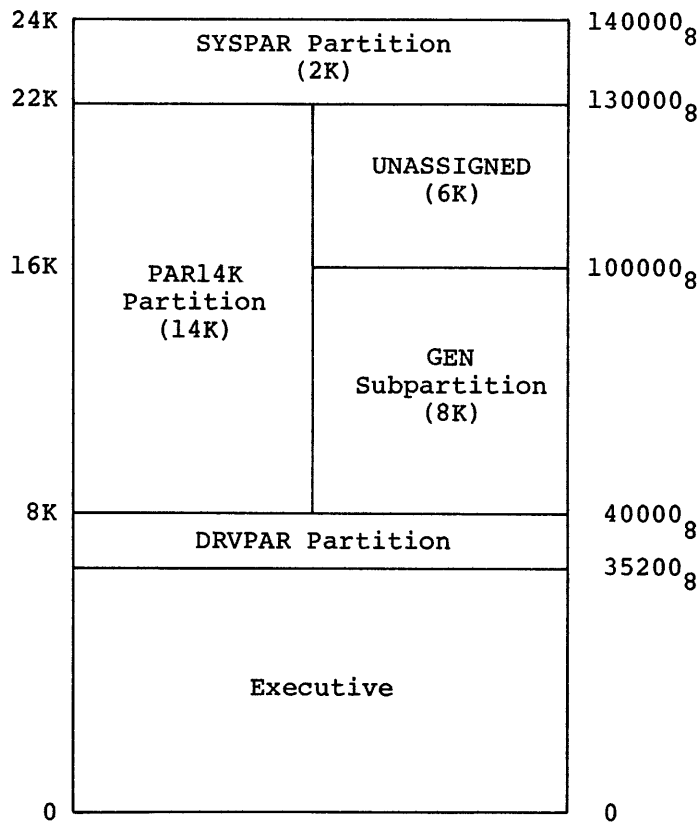


Figure 2-2
Baseline RK Mapped System Partition Layout

The minimum configuration supported by the mapped RSX-11M system is 24K words. The partitioning scheme is such that all tasks except BIGMAC and BIGTKB run in partition GEN. BIGMAC and BIGTKB are built to run in partition PAR14K.

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2.1.2.4 MCR, FCP, and DMP Source Disk Contents

The MCR, FCP, and DMP source disk contains the following:

| UIC | CONTENTS |
|---------|---|
| [1,1] | System and Executive macro libraries |
| [1,2] | Error message text file, startup command file |
| [1,50] | Baseline unmapped Executive and limited task complement |
| [12,10] | MCR source modules |
| [12,20] | Unmapped MCR assembly command file |
| [12,24] | Mapped MCR assembly command file |
| [12,30] | Directory for unmapped MCR listing files |
| [12,34] | Directory for mapped MCR listing files |
| [13,10] | FCP source modules |
| [13,20] | Unmapped FCP assembly command file |
| [13,24] | Mapped FCP assembly command file |
| [13,30] | Directory for unmapped FCP listing files |
| [13,34] | Directory for mapped FCP listing files |
| [35,10] | DMP source file |
| [35,20] | DMP assembly command file |
| [35,30] | Directory for DMP listing files |

The RSX-11M system distributed on this disk is identical to the one on the Executive source disk.

2.1.2.5 Device Combinations Supported by RK Distribution Kits

The following list contains the valid combinations of devices for use in generating a target system. The user must have one of the following combinations to successfully complete a system generation with the RK kits:

1. RK05 disk and TAll cassette (working storage)
2. RK05 disk and TU56 DECTape (working storage)
3. RK05 disk and RX01 floppy disk (working storage)
4. RK05 disk and TU10 magtape (working storage)
5. RK05 disk and TU16 magtape (working storage)
6. RK05 disk and TS03 magtape (working storage)
7. Two RK05 disks (source and object disk simultaneously mounted)

2.1.3 RP Magtape Release Kit

The RP magtape release kit consists of four magtapes. One tape contains the MCR, FCP, and DMP source files, and the other three tapes contain (on separate tapes) RP02, RP03, and RP04 disk images in PRESRV format. The source tape is in FLX format and is needed only if the user wishes to modify MCR or FCP or to list the DMP task for examination. Each RP disk image contains a running unmapped and mapped Executive and all tasks. The unmapped Executive is

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bootstrapped in from a hardware bootstrap. In addition to the two systems, the disks contain all of the files necessary to build a target system. The user may generate a mapped system while running either the unmapped or mapped Executives or may generate an unmapped system while running either the unmapped or mapped Executive. The only difference between the three system disk images is that they have the appropriate disk driver for the disk on which they are to run.

2.1.3.1 RP Magtape Release Contents

The disk images in the RP magtape release kit contain the following:

| UIC | CONTENTS |
|---------|---|
| [1,1] | Executive and system macro libraries, system object library, Executive symbol definition library, FORTRAN OTS object modules, ODT and TRACE debugging aids |
| [1,2] | SYSGEN text file, system error message file, startup command file |
| [1,3] | Directory for lost files found by VFY |
| [1,4] | Directory for Snap Shot and Post-Mortem Dumps |
| [1,20] | Unmapped system privileged task object module libraries, non-privileged task object module libraries, and unmapped system task build command and overlay descriptor files |
| [1,24] | Mapped system privileged task object module libraries, and mapped system task build command and overlay descriptor files. |
| [1,30] | Directory for unmapped system task build maps |
| [1,34] | Directory for mapped system task build maps |
| [1,50] | RSX-11M unmapped Baseline System Executive and all system-supplied tasks built to run with this Executive. |
| [1,54] | RSX-11M mapped Baseline System Executive and all system-supplied tasks built to run with this Executive. |
| [1,60] | Directory for unmapped RSX-11S Executive and tasks |
| [1,64] | Directory for mapped RSX-11S Executive and tasks |
| [11,10] | Executive source files |
| [11,20] | Directory for unmapped Executive object files |
| [11,24] | Directory for mapped Executive object files |
| [11,30] | Directory for unmapped Executive listing files |
| [11,34] | Directory for mapped Executive listing files |
| [11,40] | Directory for Executive source correction files |

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- [12,10] Directory for MCR source files
- [12,20] Unmapped MCR assembly command file and object library build command file
- [12,24] Mapped MCR assembly command file and object module library build command file
- [12,30] Directory for unmapped MCR listing files
- [12,34] Directory for mapped MCR listing files
- [13,10] Directory for FCP source files
- [13,20] Unmapped FCP assembly command file
- [13,24] Mapped FCP assembly command file
- [13,30] Directory for unmapped FCP listing files
- [13,34] Directory for mapped FCP listing files
- [35,10] DMP source files
- [35,20] DMP assembly command file
- [35,30] Directory for DMP listing files
- [200,200] SYSGEN part 1 and part 2 command files, FORTRAN resident library file and FCS resident library file.

The device configuration for this kit is:

- 1 RP02, RP03, or RP04 disk drive
- 1 TU10 or TS03 magtape drive
- 1 TU16 magtape drive
- 1 LP11 line printer
- 1 terminal

The partition layouts for the unmapped and mapped systems are identical to those for the RK distribution disks. Both the mapped and unmapped Executives are supplied with running copies of all the system tasks.

2.2 PRESERVING DISTRIBUTION DISKS

2.2.1 Preserving the RK Distribution Disks

If the release kit is received on RK disk cartridges, the user is strongly urged to back up the distribution disks prior to their actual use in system generation. Since these disks are actively manipulated during the generation of a user-tailored system, as well as during system operation with the Baseline System Executive, inadvertent corruption is possible during the user's initial learning experiences with RSX-11M. To facilitate preservation of various storage media, Digital provides a stand-alone utility called the Volume Preservation Program (PRESRV). PRESRV is described in Appendix A. The user must

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always preserve the object disk on which he plans to generate his system, since the target system will replace the Baseline System on that disk. The system generation procedure is designed to run only on the Baseline System. The source disks are not corrupted by the system generation procedure; however, it is good practice to preserve them too.

Before preserving the RK release disks, it is advisable to verify that they can be read on the user's disk drives by invoking VFY. All disks contain the task VFY. One of the functions of VFY is to read all allocated blocks on a disk to locate blocks which cannot be read; VFY also determines the file to which each bad block is allocated. After bootstrapping a disk, run VFY and specify the /RC (read check) switch. If any blocks are unreadable, the task will report them. VFY is described in the RSX-11M Utilities Procedures Manual. If the disk or disks are unreadable, the user should immediately call the local Digital software support specialist for assistance.

A minimum RK system must contain one of the following peripheral complements:

1. An RK05 disk and a dual TU56 DEctape unit,
2. An RK05 disk and a dual TAll cassette tape unit,
3. Dual RK05 units,
4. An RK05 and an RX01 floppy disk, or
5. An RK05 disk and a TU10, TU16, or TS03 magtape drive.

To preserve the disks in the distribution kit, use the bootstrapping procedure described in section 2.3 to boot the unmapped object disk. Then, using the MCR Boot command, bootstrap the Volume Preservation Program (PRESRV). The full sequence is described below.

Bootstrap the system; the following display results:

```
RSX11M V02 BL12 16K
>RED DK0:=SY0:
>MOU SY0:
>@STARTUP
>@<EOF>
```

Bootstrap PRESRV using the following MCR commands:

```
>INS [1,50]BOO*
>BOO [1,50]PRESRV*
```

PRESRV is bootstrapped and the following display occurs on the console terminal:

```
RSX11S V01 BL12
VOLUME PRESERVATION PROGRAM - V02.1
FOR HELP TYPE /HE
nn. - BLOCKS AVAILABLE FOR BUFFERING

PRE>
```

* Contained on the RK mapped object disk under UIC [1,54].

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indicating that the PRESRV program is ready for input. The message "nn. - BLOCKS AVAILABLE FOR BUFFERING" indicates how many 256 word blocks are available for buffering. Depending on the specific backup medium being used (cassette, DEctape, RK05 disk, or magtape), select one of the procedures described in sections 2.2.1.1 through 2.2.1.5.

2.2.1.1 Preserving from an RK05 to DEctape

```
PRE>DT0:label/BL:1/VE=DK0:/BL:1      (16K machines)
PRE>DT0:label/BL:4/VE=DK0:/BL:4      (all others)
```

where label is the name to be given to the file on DEctape.

2.2.1.2 Preserving from an RK05 to Cassette

```
PRE>CT0:label/BL:1/VE=DK0:/BL:1      (16K machines)
PRE>DT0:label/BL:3/VE=DK0:/BL:3      (all others)
```

where label is the name to be given to the file on the cassette.

2.2.1.3 Preserving from an RK05 to an RK05

```
PRE>DK1:/BL:1/VE/FO=DK0:/BL:1        (16K machines)
PRE>DK1:/BL:12/FO/VE=DK0:/BL:12.     (all others)
```

2.2.1.4 Preserving from an RK05 to Floppy Disk

```
PRE>DX0:label/BL:1/VE=DK0:/BL:1      (16K machines)
pre>dx0:label/BL:6./VE=DK0/BL:12.    (all others)
```

2.2.1.5 Preserving from an RK05 to Magtape

The minimum RK magtape system is 24K.

```
PRE>MT0:label/BL:12./VE=DK0:/BL:12.  (TU10 and TS03)
```

```
PRE>MM0:/VEC=224/CSR=172440          (TU16)
```

```
PRE>MM0:label/BL:12./VE=DK0:/BL:12.
```

NOTE

For TU16's at non-standard vectors or CSR'S, the first line should be modified to reflect the vector and CSR assignment. See Appendix A for a complete discussion.

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The first DECTape, cassette, or magtape used in preserving a volume contains a bootstrappable image of PRESRV; thus, if the system disk is inadvertently destroyed, it can be restored by bootstrapping from the first tape created. Such bootstrapping automatically initiates PRESRV, which can then be used to restore the original disk contents.

PRESRV copies to and from any supported disk or tape and has a number of options. The complete documentation for PRESRV appears in Appendix A.

2.2.2 Preserving the RP Distribution Kit

The RP02, RP03, and RP04 distribution kit is supplied on 600-foot, 9-track, 800-BPI magtapes. To create an RP disk, the proper file must be copied from tape to the disk. This is done using PRESRV. The first step is to select the proper tape and mount it on drive zero. Mount the RP disk on drive zero and allow it to reach operating speed. Using the bootstrap ROM on the host computer, bootstrap PRESRV from the distributed magtape.

The command strings presented below will copy the disk image from tape to disk.

For RP02 and RP03 disks:

```
PRE>DP:/FO/VE=MT0:RSX11MBL12      (TU10 and TS03)
PRE>DP:/FO/VE=MM0:RSX11MBL12      (TU16)
```

For RP04 disks:

```
PRE>DB:/BL:6/FO/VE=MT0:RSX11MBL12  (TU10 and TS03)
PRE>DB:/BL:6/FO/VE=MM0:RSX11MBL12  (TU16)
```

2.2.3 Restoring Damaged Volumes

If a system disk is destroyed on a single RK05 system, it must be re-created via a backup tape that has been created by PRESRV. The bootstrapping of a backup tape, with the exception of cassettes (which are discussed below), is identical to that of the Baseline System. Refer to section 2.3. Bootstrapping a backup tape created via PRESRV produces the following console display:

```
RSX-11S V01 BL12
VOLUME PRESERVATION PROGRAM - V02.1
FOR HELP TYPE /HE
nn. - BLOCKS AVAILABLE FOR BUFFERING
```

PRE>

PRESRV is now ready to accept commands. To restore the contents of a set of backup tapes, assuming the disk and tapes are mounted on unit 0 of their respective controllers, enter the commands given in the appropriate section (2.2.3.1 through 2.2.3.5).

2.2.3.1 Cassette Restoration

```
PRE>DK0:/VE/BL:1/FO=CT0:label      (16K machines)
PRE>DK0:/VE/FO=CT0:label            (all others)
```

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where label is the name that was specified when the disk was preserved to the cassette. Cassette bootstrapping without a cassette ROM bootstrap requires an extensive key-in via the console switch register.

On a 11/05/10/20/35/40/45/50/70, proceed as follows:

1. Press HALT.
2. Enter the address 001000 in the console switch register and press LOAD ADRS.
3. Enter the first value from the right-hand column of the table below in the console switch register; lift the DEP switch.
4. Enter the next value from the right-hand column of the table in the console switch register; lift the DEP switch.
5. Repeat Step 4 for the remaining 26 values in the table.
6. Enter the address 001000 in the console switch register and press LOAD ADRS.
7. Lift the HALT switch.
8. Press START.

The cassette will be bootstrapped, and PRESRV will display its initial message and prompt.

ADDRESS VALUE TABLE

| | |
|--------|--------|
| 001000 | 012700 |
| 001002 | 177500 |
| 001004 | 005010 |
| 001006 | 010701 |
| 001010 | 062701 |
| 001012 | 000052 |
| 001014 | 012702 |
| 001016 | 000375 |
| 001020 | 112103 |
| 001022 | 112110 |
| 001024 | 100413 |
| 001026 | 130310 |
| 001030 | 001776 |
| 001032 | 105202 |
| 001034 | 100772 |
| 001036 | 116012 |
| 001040 | 000002 |
| 001042 | 120337 |
| 001044 | 000000 |
| 001046 | 001767 |
| 001050 | 000000 |
| 001052 | 000755 |
| 001054 | 005710 |
| 001056 | 100774 |
| 001060 | 005007 |
| 001062 | 017640 |
| 001064 | 002415 |
| 001066 | 112024 |

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2.2.3.2 DECTape Restoration

```
PRE>DK0:/VE/BL:1/FO=DT0:label/TP          (16K machines)
PRE>DK0:/VE/FO=DT0:label/TP                (all others)
```

where label is the name that was specified when the disk was preserved to DECTape.

2.2.3.3 Disk-to-Disk Restoration

```
PRE>DK1:/BL:1/VE/FO=DK0:/BL:1             (16K machines)
PRE>DK1:/BL:12./VE/FO=DK0:/BL:12.        (all others)
```

2.2.3.4 Floppy Disk-to-RK Disk Restoration

```
PRE>DK0:/VE/FO/BL:1.=DX0:label/TP        (16K machines)
PRE>DK0:/VE/FO/BL:12.=DX0:label/TP       (all others)
```

where label is the name that was specified when the disk was preserved to floppy disk.

2.2.3.5 Magtape-to-RK Disk Restoration

```
PRE>DK0:/VE/FO=MT0:label                  (TU10 and TS03)
PRE>DK0:/VE/FO=MT0:label                  (TU16)
```

where label is the name that was specified when the disk was preserved to magtape.

It is advisable to create a backup disk. In the event that inadvertent destruction of a system disk occurs, a backup will already be available, and a second backup can be created at will.

Systems with more than one disk unit, such that disk is the normal backup medium, may restore damaged system disks by copying the existing backup disk.

2.2.4 Exiting from PRESRV

Since PRESRV is a stand-alone program, the only way to exit from it is to bootstrap in a new system or stand-alone program.

2.2.5 Formatting Disks

Formatted disks are required to restore or create a disk copy of the preserved distribution kit disks. Disks that have never been used require formatting before any data can be written on them. Formatting a disk causes timing and addressing information to be recorded on the disk and is accomplished using the stand-alone PRESRV program. The command lines given in section 2.2.3 include the switch /FO, indicating that a format pass should be made before copying the backup to the disk. This will ensure that all data is readable on the disk.

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2.3 BOOTSTRAPPING THE BASELINE SYSTEM

The procedure for bootstrapping depends on which hardware bootstrap is present on the host processor. On the 11/05/10/15/20/35/40/45/50/70 processors, the operator must first halt the processor by pressing the HALT key, set the console switches to the hardware bootstrap ROM address, press the LOAD ADRS key, and then press the START key. The RSX-11M system message is then displayed at the console terminal. The step-by-step procedure is carried out as described in section 2.3.1, 2.3.2, or 2.3.3. On an 11/04 processor having the M9301-YA/YB ROM, the operator must press the BOOT button and enter (via the console terminal) the device name and unit number of the peripheral device from which the bootstrap is to occur. The step-by-step procedure is described in section 2.3.4.

2.3.1 Start-up Using the BM792-YB Bootstrap ROM

1. Depress HALT.
2. Set the console switches to 173100.
3. Depress LOAD ADRS.
4. Enter the address of the load device in the console switches:

| | |
|--------------|--------|
| RK11 disk | 177406 |
| RF11 disk | 177462 |
| RP11 disk | 176716 |
| TC11 DECTape | 177344 |
5. Lift up the HALT key.
6. Press START.

The start-up sequence shown in section 2.4 is then displayed on the console terminal.

2.3.2 Start-up Using the MR11-DB Bootstrap ROM

1. Depress HALT.
2. Enter the address of the load device in the console switches:

| | |
|--------------|--------|
| RF11 disk | 173100 |
| RK11 disk | 173110 |
| TC11 DECTape | 173120 |
| TM11 magtape | 173136 |
| RP11 disk | 173154 |

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3. Depress LOAD ADRS.
4. Lift up the HALT key.
5. Press START.

The start-up sequence shown in section 2.4 is then displayed on the console terminal.

2.3.3 Start-up Using the BM873-YA Bootstrap ROM

1. Depress HALT.
2. Enter the address of the load device in the console switches:

| | |
|----------------|--------|
| RF11 disk | 173000 |
| RK11 disk | 173010 |
| TC11 DEctape | 173030 |
| TM11 magtape | 173050 |
| RP11 disk | 173100 |
| RC11 disk | 173144 |
| KL11/DL11 | 173210 |
| TA11 cassette | 173230 |
| PC11 papertape | 173312 |

3. Depress LOAD ADRS.
4. Lift up the HALT key.
5. Press START.

The start-up sequence shown in section 2.4 is then displayed on the console terminal.

2.3.4 Start-up Using the BM873-YB Bootstrap ROM

1. Depress HALT.
2. Enter the address of the load device in the console switches:

| | |
|---|--------|
| RH11/RH70/RS03/RS04 disk (unit 0) | 173000 |
| RH11/RH70/RS03/RS04 disk (unit in switch register) | 173002 |
| RK11 disk (unit 0) | 173030 |

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| | |
|--|--------|
| RK11 disk (unit in switch register) | 173032 |
| TC11 DECTape (unit 0) | 173070 |
| TM11/TMAll magtape (unit 0) | 173110 |
| RF11 disk | 173136 |
| RH11/RH70/TM02/TU16 magtape (unit 0) | 173150 |
| RC11 disk | 173212 |
| RH11/RH70 device combination (unit zero) | 173230 |
| RH11/RH70 device combination (unit in switch register) | 173232 |
| RH11/RH70/RP04 disk (unit 0) | 173320 |
| RH11/RH70/RP04 disk (unit in switch register) | 173322 |
| RP11/RP02/RP03 disk (unit 0) | 173350 |
| RP11/RP02/RP03 disk (unit in switch register) | 173352 |
| KL11/DL11 console terminal reader | 173510 |
| TAll cassette (unit zero) | 173524 |
| TAll cassette (unit in switch register) | 173526 |
| PC11 papertape reader | 173620 |

3. Depress LOAD ADRS. (For units other than zero, enter unit number in switch register.)
4. Lift up the HALT key.
5. Press START.

The start-up sequence shown in section 2.4 is then displayed on the console terminal.

2.3.5 Start-up Using the M9301-YA or M9301-YB Bootstrap ROM

1. Press the BOOT switch.
2. In response to the "\$" prompt on the console terminal, enter one of the following:

| | |
|--------------------------|---------------|
| DB - RJP04 disk | M9301-YB only |
| DK - RK11 disk | |
| DP - RP11 (RP02/03) disk | |
| DS - RS03/04 disk | M9301-YB only |

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DT - TC11 DECTape
DX - RX11 floppy disk
CT - TA11 cassette tape
MC - Mixed massbus device M9301-YB only
MM - TM02/TU16 magtape M9301-YB only
MT - TM11/TU10 magtape
PR - PC11/PR11 paper tape reader
TT - KL11/DL11 console terminal reader

followed by an optional, single octal digit for bootstrapping from units other than zero, and terminated by a carriage return.

The start-up sequence shown in section 2.4 is then displayed on the console terminal.

2.4 CONSOLE DISPLAY

If the system being bootstrapped was built on a system with a different device configuration than the current host configuration, a series of display lines appears on the console in the following form:

```
DEVICE ddnn: NOT IN CONFIGURATION
```

where:

dd = device name
nn = unit number

Messages of this form indicate which devices are not physically present on the host system.

Then the system displays:

```
RSX-11M <version-number> <base level> nnnnK [MAPPED]  
>RED ddnn:=SY0:  
>MOU ddnn:  
>@[1,2]STARTUP
```

where:

<version number> - The RSX-11M release number.
<base level> - The RSX-11M base level (Release 2 is BL12).
nnnnK - Size of memory on hardware configuration from which the system was bootstrapped.
MAPPED - MAPPED is displayed for systems built to use the memory management unit.
dd - Load device name.

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- nn - Load device unit.
- [1,2]STARTUP - Start-up MCR command file which contains user determined commands to initialize the system. File may be null.

The system is now ready to run. The RED and MOU commands displayed are internally generated Redirect and Mount commands. The Redirect command establishes the load device as the system device (SY:), and the Mount command mounts the load device as a Files-11 volume. The @[1,2]STARTUP command is also internally generated and is used to execute a set of MCR commands which initialize the user's system (e.g., to request that the operator set the time and date and then mount a set of other disks to run other tasks).

CHAPTER 3
SYSGEN DIALOGUE DETAILS

3.1 SYSGEN DIALOGUE

This chapter provides details of the SYSGEN dialogue. Each phase of the process is discussed:

Section 3.2 covers phase 1,

Section 3.3 covers the SGN query program, and

Section 3.4 covers phase 2.

All text, questions, and commands displayed during the running of the command file are described. However, during any single run of the command file, many of these questions and commands will not be executed, since they depend on the machine configuration that the system generation is being run on and the target machine the system is being built for. Appendix G contains the console output for an actual system generation run.

At various places during the execution of the SYSGEN.COMD and SYSGEN2.COMD files, the user will be asked questions to which he must reply Y<CR> (YES), N<CR> (NO), or simply <CR> (NO), where <CR> represents the carriage return character. Questions are distinguished by a leading asterisk (*) and trailing "? [Y/N]:". Command file processing is suspended until an answer is keyed in.

In many places in the description of the command files, two very similar commands will be shown together, the only difference being the UIC specified in the command (e.g., [1,20] and [1,24]). Both commands are shown for completeness. However, the user should keep in mind during the running of the command files that only one of the two commands will actually be issued. The specific command issued is a function of whether the host system is mapped or unmapped and whether the target system is mapped or unmapped.

The SYSGEN command files have been designed to inhibit the installation and removal of tasks already installed in the host system. This makes it possible to perform a SYSGEN on a multi-user system without affecting the tasks in that system. By using the Assign (ASN) command to define a logical device (SY:) which is assigned to a physical device containing a release disk, a SYSGEN may be accomplished on-line with a multi-user system.

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3.2 SYSGEN.CMD FILE DETAILS

This section describes the entire SYSGEN.CMD indirect command file by adding descriptive text to the actual command file to clarify the SYSGEN process. The command file is presented in upper-case text; the descriptive text is presented in upper- and lower-case text.

```
;
; SYSGEN PART 1    <VERSION 02>
;
; COPYRIGHT (C) 1975, DIGITAL EQUIPMENT CORP., MAYNARD MASS. 01754.
;
;     DETERMINE SYSTEM FEATURES AND ASSEMBLE THE EXECUTIVE
;
;
; IF YOU ARE PLANNING TO INCLUDE ICS/ICR OR UDC11 SUPPORT YOU
; SHOULD CONSULT THE LATEST RELEASE NOTES BEFORE PROCEEDING FURTHER.
;
* DO YOU WISH TO CONTINUE? [Y/N]:
;
; LONG DIALOGUE PRINTS A DESCRIPTION OF EVERY STEP IN THIS
; SYSGEN COMMAND FILE.  ON THE OTHER HAND, SHORT DIALOGUE
; PROVIDES VIRTUALLY NO EXPLANATORY TEXT.
;
* DO YOU WANT LONG DIALOGUE? [Y/N]:
```

For the experienced programmer who has performed many SYSGENs, much of the descriptive text in the file may be suppressed by answering N to this question. It is recommended that the less experienced user answer Y, since it will lead him through the system generation process correctly.

* ARE YOU BUILDING AN RSX11S SYSTEM? [Y/N]:

The selection of features and assembly of the Executive are controlled by the SYSGEN.CMD command file. This question is used later to select the correct SYSGEN phase 2 command file for RSX-11M or RSX-11S.

* ARE YOU BUILDING A MAPPED SYSTEM? [Y/N]:

This query determines the UIC settings that will be generated during the SYSGEN process. See Appendix B for UIC conventions used on the distribution kit disks.

* ARE YOU RUNNING ON A MACHINE WITH AT LEAST 24K WORDS? [Y/N]:

The Baseline System Executive is set up with a 14K partition which can be used if the host machine has at least 24K of memory. If this is the case, SYSGEN will use the larger and faster version of MACRO-11 during the generation process.

* WILL YOUR SYSTEM INCLUDE ICS/ICR-11 SUPPORT? [Y/N]:

When generating ICS/ICR-11 support into the Executive, device common blocks which map to the ICS/ICR-11 device registers must be copied from the source disk to the disk on

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which SYSGEN phase 2 will be run. This question will cause the proper files to be copied at the right time.

* WILL YOUR SYSTEM INCLUDE UDC11 SUPPORT? [Y/N]:

When generating UDC11 support into the Executive, device common blocks which map to the UDC11 device registers must be copied from the source disk to the disk on which SYSGEN phase 2 will be run. This question will cause the proper files to be copied at the right time. This question will not be asked if ICS/ICR-11 support was selected, since ICS/ICR-11 support precludes UDC11 support.

```
;
; INSTALL THE NECESSARY TASKS
;
SET /UIC=[1,50]
SET /UIC=[1,54]
```

The SET command appears frequently in the SYSGEN.CMD file. Generally, its use in this file is to establish a default UIC. This makes it unnecessary to include UIC specifications in subsequent commands.

The UIC [1,50] is the one under which unmapped system tasks are stored. The UIC [1,54] is the one under which mapped system tasks are stored. Only one of the two above commands will be issued, depending on the type of system the SYSGEN is being run on. Similarly, at various places in the file where both of the commands appear, only one will be issued during an actual SYSGEN.

INS PIP

The Baseline System has a limited pool of dynamic memory, and since installed tasks consume dynamic memory even when they are inactive, the strategy is to install tasks only when they are needed and remove them as soon as practical. Tasks are installed and removed only if they are not installed in the host system. This makes it possible to perform SYSGENs on multi-user systems.

```
;
; DELETE FILES FROM PAST SYSGENS
;
; NOTE: ON VIRGIN DISKS, NONE OF THE FILES WE TRY TO
; DELETE WILL EXIST. PIP WILL GIVE ERROR MESSAGES
; THAT SHOULD INDICATE THAT THE FILE DOES NOT EXIST.
;
```

In generating a system, several files are created. These files are of no use after successfully completing a SYSGEN. If another SYSGEN is to be performed from a disk on which a previous SYSGEN was performed, these files should be deleted to free valuable disk space. The following commands accomplish the desired cleanup.

```
SET /UIC=[11,20]
```

By convention, the following files in an unmapped system are stored under UIC [11,20]:

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1. The assembly command file to assemble the Executive (RSXASM.CMD),
2. The build command file to build the Executive (RSXBLD.CMD),
3. Executive object modules created during the assembly of the Executive,
4. A file of concatenated Executive object modules built by PIP and used by the Librarian to build the Executive object module library, and
5. Files for the ICS/ICR-11 or UDC11 used to build device common blocks for tasks which reference the device.

```
PIP RSXASM.CMD;*/DE
PIP RSXBLD.CMD;*/DE
PIP *.OBJ;*/DE
PIP *.UDC;*/DE
PIP *.ICR;*/DE
```

The preceding PIP commands delete:

1. All versions of the assembly command file,
2. All versions of the task build command file,
3. All object module files,
4. All versions of UDC11 modules, and
5. All versions of ICS/ICR-11 modules.

On a release kit disk that has never had a SYSGEN performed on it, no residual files from a previous SYSGEN exist. Thus, the attempted deletion is flagged by PIP. For example, the command line:

```
>PIP RSXASM.CMD;*/DE
```

produces:

```
PIP -- NO SUCH FILE(S)
SY:[11,20]RSXASM.CMD;*
```

These are warning diagnostics and do not affect the SYSGEN currently in progress.

```
SET /UIC=[11,24]
PIP RSXASM.CMD;*/DE
PIP RSXBLD.CMD;*/DE
PIP *.OBJ;*/DE
PIP *.UDC;*/DE
PIP *.ICR;*/DE
```

It cannot be known whether the previous SYSGEN done on the source disk was for a mapped or an unmapped system. The preceding commands delete the files generated for building a mapped system.

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```
SET /UIC=[11,30]
PIP UDCOM.LST;*/DE
PIP ICTAB.LST;*/DE,ICOM.LST;*
SET /UIC=[11,34]
PIP UDCOM.LST;*/DE
PIP ICTAB.LST;*/DE,ICOM.LST;*
```

The previous commands delete listing files generated for ICR/ICS-11 or UDC11 common blocks for both mapped and unmapped areas on the disk.

```
SET /UIC=[11,10]
```

By convention, UIC [11,10] is used for the device table file (SYSTB.MAC), prefix file (RSXMC.MAC), and the ICR/ICS-11 table file produced during the running of the SGN query program. The output of SGN is used to configure the system.

```
PIP SYSTB.MAC;*/DE
PIP RSXMC.MAC;*/DE
PIP ICTAB.MAC;*/DE
```

Delete all existing versions of the device table file, prefix file, and ICS/ICR-11 table.

```
;
; NOW WE RUN THE SYSGEN PROGRAM TO SELECT THE EXECUTIVE
; FEATURES AND DEVICES WE WANT IN THE NEW SYSTEM
;
; NOTE: IF YOU ARE RUNNING ON A 16K WORD MACHINE, YOU SHOULD
; SPECIFY THAT NO ASSEMBLY LISTINGS BE GENERATED.
; IF YOU ARE RUNNING ON A MACHINE WITH AT LEAST 24K WORDS,
; YOU MAY GET ASSEMBLY LISTINGS. HOWEVER, THE FOLLOWING
; CONDITIONS APPLY:
; 1) RK SYSTEM DISK - DIRECT LISTINGS TO LP: OR DK1:
; 2) RP02/03, RP04 SYSTEM DISK - DIRECT LISTINGS TO LP: OR SY:
;
RUN $SGN
```

The SGN query program is run to produce the five files mentioned previously. This process consists of a number of interactive queries. The operator-supplied answers to these queries provide SGN with the information necessary to construct its output files. These files are then used by MACRO-11 and the Task Builder to create the user-tailored system.

The production of the Executive map MUST be specified as "Y" (yes), since it is required in phase 2 of SYSGEN to determine partition layout.

The Baseline System does not contain a print spooler; therefore, spooling of the listings or map should not be specified.

SGN presents queries which, when answered, define:

Executive options,
Processor options, and the
Peripheral complement

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for the user-tailored system. For a detailed explanation of SGN dialogue details, see section 3.3. For brevity, these queries, which are essentially self-explanatory, are omitted here.

If answers to the SGN queries are unsatisfactory, the command file provides a means of orderly exit. Abort SGN by typing CTRL/C and <CR>; when MCR prompts, type ABO. This command will abort the SGN program. Allow the indirect file processor to process the next commands in the file and wait until the next question is asked. Answer N to this question and a clear exit can be made (see next question).

```
;
; AT THIS POINT WE RENAME THE ASSEMBLY COMMAND FILE
; AND THE SYSTEM BUILD COMMAND FILE TO
;   [11,20]
;   [11,24]
;
PIP [11,20]/RE=RSXASM.CMD;*,RSXBLD.CMD;*
PIP [11,24]/RE=RSXASM.CMD;*,RSXBLD.CMD;*
```

SGN runs under UIC [11,10] and produces five files which are recorded in the [11,10] file directory. Command files are conventionally stored in [11,20] or [11,24]. The preceding PIP commands, only one of which is actually issued, puts the command files into the proper directory.

* DID YOU ANSWER THE SYSGEN QUESTIONS TO YOUR SATISFACTION? [Y/N]:

If, for any reason, the SGN query program included incorrect responses that would result in a user-tailored Executive which did not reflect the user's intentions, an "N" (no) response to this query will effect a controlled exit and permit the user to restart the entire system generation process. If N <CR> is answered, the following lines are displayed:

```
;
; WE WILL EXIT NOW SO THAT YOU MAY RESTART THIS COMMAND FILE
; FROM THE BEGINNING. THIS WILL ALLOW A CLEAN UP OF THE
; DISK AND A NEW RUN OF SGN TO SELECT THE PROPER OPTIONS
; FOR YOUR SYSTEM.
;
REM PIP
```

If no errors occurred during SGN, the following lines are displayed.

* ARE YOU RUNNING AN RP02/03 OR RP04 AS THE SYSTEM DISK? [Y/N]:

This question is asked to determine whether the output from the assembly of the Executive will have to be transferred to another medium and to determine where the optional source listings are going. If this is answered "Y", the next line displayed begins with the assembly of the Executive. If not, the next question is displayed.

* ARE YOU GENERATING ASSEMBLY LISTINGS ON DK1? [Y/N]:

For RK disk SYSGENs, it is possible to specify DK1: as the output device for listing files. If this question is

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answered "Y<CR>", the disk will be mounted, and the proper directory will be added for the listing files by the following commands.

```
;
; PLACE A DISK IN DRIVE 1 (WRITE-ENABLED).
;
* IS THE DISK READY IN DRIVE 1? [Y/N]
```

This question causes the indirect file processor to suspend itself until the disk reaches operating speed. When the disk is ready, answer "Y" to this question.

```
* IS THE DISK IN DRIVE 1 INITIALIZED AS A FILES-11 VOLUME? [Y/N]:
```

If the disk is not initialized, an "N" answer will cause the disk to be initialized by the following commands, which install task INI, initialize the disk, and then remove INI. If the disk is already initialized, processing continues at the Mount (MOU) command.

```
INS [1,50]INI
INS [1,54]INI
INI DK1:
REM INI
```

Whether or not the disk needs to be initialized, DK1: processing continues at this point.

```
MOU DK1:
INS [1,50]UFD
INS [1,54]UFD
UFD DK1:[11,30]
UFD DK1:[11,34]
REM UFD
```

Processing of all disk types continues at this point.

```
;
; NOW WE ASSEMBLE THE EXECUTIVE
;
SET /UIC=[1,50]
SET /UIC=[1,54]
INS MAC
INS BIGMAC
```

The proper version of MACRO-11 is installed, depending on whether or not the host system is mapped, and whether or not it has at least 24K of memory. BIGMAC is the assembler of choice and is always chosen when at least 24K of memory is available.

```
SET /UIC=[11,20]
SET /UIC=[11,24]
TIM
MAC @RSXASM
TIM
```

The Set command establishes the default UIC. MACRO-11 is requested to run with RSXASM as an input indirect command file. Note that MACRO-11 is running under [11,20] or

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[11,24] and, since RSXASM is part of an indirect file request, .CMD is the default file type. The assembly will require from 15 minutes to 2 hours to complete, depending upon the hardware available and the configuration of the target system.

If the UDC11 or ICS/ICR-11 was selected for the target system, the following text and commands are displayed:

```
;
; NOW WE ASSEMBLE THE MODULES NECESSARY FOR TASKS TO ACCESS
; UDC11 OR ICS/ICR-11 I/O MODULE REGISTERS WITHIN THE I/O
; PAGE. I/O MODULE TYPES ACCESSED DIRECTLY ARE:
;
; UDC11:
;
;         ANALOGUE OUTPUTS
;         SINGLE SHOT DIGITAL OUTPUTS
;
;         DIGITAL INPUTS
;         COUNTER INPUTS
;
; ICS/ICR-11
;
;         DIGITAL INPUT
;         COUNTER INPUT
;
```

If the ICS/ICR-11 was selected, the following question is asked:

* IS DIRECT ACCESS TO THE ICS/ICR-11 I/O MODULES REQUIRED? [Y/N]:

If the UDC11 was selected, the following question is asked:

* IS DIRECT ACCESS TO THE UDC-11 I/O MODULES REQUIRED? [Y/N]:

If either of the above questions is answered "Y", the following text is displayed:

```
;
; IN AN UNMAPPED SYSTEM ACCESS TO I/O MODULES IS
; THROUGH UNRESTRICTED REFERENCE TO THE I/O PAGE
; OR VIA A GLOBAL COMMON BLOCK THAT OCCUPIES THE SET
; OF PHYSICAL LOCATIONS RESERVED FOR THE DEVICE REGIS-
; TERS. IF YOU WISH TO ACCESS THE DEVICE THROUGH THE
; COMMON BLOCK, YOU MUST EDIT THE FILE RSXMC.MAC UNDER
; UIC [11,10], AS SHOWN IN THE FOLLOWING EXAMPLE:
;
```

For UDC11

```
;         *PL U$$D11
;         U$$D11=0
;         *I U$$DCM=0
;         *ED
```

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For ICS/ICR-11

```
; *PL I$$C11
; I$$C11=0
; *I I$$COM=0
; *ED
```

In either case, the following question is asked:

* DO YOU HAVE TO EDIT FILE RSXMC.MAC? [Y/N]:

If this question is answered "Y", the following commands are issued:

```
INS [1,50]EDI
INS [1,54]EDI
EDI [11,10]RSXMC.MAC
```

The user should perform the edit specified. The Line Text Editor (EDI) will be removed and the correct modules will be assembled.

REM ...EDI

```
MAC [11,24]ICTAB.ICR,[11,34]ICTAB/-SP=[11,10]ICTAB
MAC [11,24]ICOM.ICR,[11,34]ICOM/-SP=[11,10]RSXMC,ICOM
MAC [11,20]ICTAB.ICR,[11,30]ICTAB/-SP=[11,10]ICTAB
MAC [11,20]ICOM.ICR,[11,30]ICOM/-SP=[11,10]RSXMC,ICOM
MAC [11,24]UDCOM.UDC,[11,34]UDCOM/-SP=[11,10]RSXMC,UDCOM
MAC [11,20]UDCOM.UDC,[11,30]UDCOM/-SP=[11,10]RSXMC,UDCOM
```

Whether or not UDC11 or ICS/ICR-11 support is selected, all processing continues here.

REM ...MAC

DMO DK1:

```
;
; NOW WE BUILD THE CONCATENATED OBJECT MODULE FILE
; FOR THE EXECUTIVE.
;
```

The assembly of the Executive has resulted in the creation of a number of individual object module files. These individual files can be concatenated into a single file with a substantial savings in disk space. Later, during the build phase, the Task Builder processes a library produced from this concatenated file to create the task image of the user-tailored Executive.

```
PIP RSX11M.OBS=*.OBJ
PIP .OBJ/RE=RSX11M.OBS
```

All existing object files cataloged under the default UIC are concatenated as a result of this command. The file RSX11M.OBS is then renamed RSX11M.OBJ

For purposes of SYSGEN, a host system is defined as one of the following:

1. 2 RK disks;
2. 1 RK disk, 1 TAll dual cassette;

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3. 1 RK disk, 1 TU56 DECTape;
4. 1 RK disk, 1 TU10, TU16 or TS03 magtape;
5. 1 RK disk, 1 RX01 floppy disk; or
6. 1 RP02, RP03, or RP04 disk.

Queries are posed until one of these configuration types is established. For disk-tape configurations, two files, RSXBLD.CMD and RSX11M.OBJ, must be copied to backup tape for later restoration to the object disk. In addition, if the UDC11 was included, the common block module UDCOM.UDC must be copied. If the ICS/ICR-11 was included, the files ICOM.ICR and ICTAB.ICR must be copied.

```
;  
; NOW WE COPY THE BUILD COMMAND FILE, THE ASSEMBLY PREFIX  
; FILE, THE UDC OR ICS/ICR FILES AND THE CONCATENATED  
; OBJECT MODULES TO SECONDARY STORAGE.  
;  
* IS YOUR SECONDARY STORAGE DEVICE AN RK CARTRIDGE DISK? [Y/N]:
```

The following instructions and commands are executed if the host system is a 2-RK disk system.

```
;  
; PUT THE UNMAPPED OBJECT DISK IN DRIVE 1  
; PUT THE MAPPED OBJECT DISK IN DRIVE 1  
; AND MAKE SURE THAT THE DRIVE IS WRITE ENABLED.  
;  
* IS THE DISK IN DRIVE 1 READY? [Y/N]:  
MOU DK1:  
SET /UIC=[1,20]  
SET /UIC=[1,24]  
PIP DK1:/NV=[11,20]RSXBLD.CMD,RSX11M.OBJ  
PIP DK1:/NV=[11,24]RSXBLD.CMD,RSX11M.OBJ  
PIP DK1:/NV=[11,24]UDCOM.UDC  
PIP DK1:/NV=[11,24]ICOM.ICR,ICTAB.ICR  
PIP DK1:/NV=[11,20]UDCOM.UDC  
PIP DK1:/NV=[11,20]ICOM.ICR,ICTAB.ICR  
PIP DK1:[200,200]/NV=[11,10]RSXMC.MAC  
DMO DK1:
```

End of 2-RK system processing. The next display begins after the RX01 questions.

```
INS [1,50]FLX  
INS [1,54]FLX
```

All other configurations, except the RX01, require the File Transfer Program (FLX) to copy the files to the medium. Thus, the proper version of FLX is installed.

```
* IS YOUR SECONDARY STORAGE DEVICE A CASSETTE TAPE? [Y/N]:
```

End of RK-CT processing. The next display begins after the RX01 questions. The following instructions and commands are executed if the host is an RK-CT system.

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```
LOA CT:
;
; PUT A BLANK CASSETTE IN DRIVE 0
;
* IS THE BLANK CASSETTE IN DRIVE 0 READY? [Y/N]:
FLX CT0:/ZE
FLX CT0:/VE/BS:512.=RSXBLD.CMD/RS,RSX11M.OBJ
FLX CT0:/VE/BS:512.=[11,10]RSXMC.MAC/RS
FLX CT0:/VE/BS:512./FB=UDCOM.UDC/RS
FLX CT0:/VE/BS:512./FB=ICTAB.ICR,ICOM.ICR/RS
```

End of RK-CT system processing. The next display begins after the RX01 questions.

```
* IS YOUR SECONDARY STORAGE DEVICE A DECTAPE? [Y/N]:
```

The following instructions and commands are executed if the host is an RK-DT system.

```
LOA DT:
;
; PUT A BLANK DECTAPE IN DRIVE 0
;
* IS THE BLANK DECTAPE IN DRIVE 0 READY? [Y/N]:
FLX DT0:/ZE
FLX DT0:/DO=RSXBLD.CMD/RS,RSX11M.OBJ
FLX DT0:/DO/FB=UDCOM.UDC/RS
FLX DT0:/DO/FB=ICTAB.ICR,ICOM.ICR/RS
FLX DT0:/DO=[11,10]RSXMC.MAC/RS
```

The following instructions and command are executed if the host is an RP02/RP03 or RP04 system.

```
;
; COPY THE EXECUTIVE OBJECT MODULE FILE, TASK BUILD
; COMMAND FILE AND UDC OR ICS/ICR FILES TO THE PROPER
; DIRECTORY.
;
SET /UIC=[1,20]
SET /UIC=[1,24]
PIP /NV=[11,20]RSX11M.OBJ,RSXBLD.CMD
PIP /NV=[11,24]RSX11M.OBJ,RSXBLD.CMD
PIP /NV=[11,20]ICTAB.ICR,ICOM.ICR
PIP /NV=[11,20]UDCOM.UDC
PIP /NV=[11,24]ICTAB.ICR,ICOM.ICR
PIP /NV=[11,24]UDCOM.UDC
PIP [200,200]/NV=[11,10]RSXMC.MAC
REM ...PIP
REM ...FLX
```

```
* DO YOU WANT TO GO DIRECTLY TO THE NEXT PHASE OF THIS SYSGEN? [Y/N]:
```

Since all files needed for a SYSGEN reside on an RP disk, it is possible to invoke SYSGEN phase 2 immediately. If this question is answered "Y", the following commands and text are displayed.

```
@ [200,200]SYSGEN2
@ [200,200]11SGEN
```

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For RSX-11M SYSGEN, the command file selected will be SYSGEN2.CMD. For RSX-11S SYSGEN, the command file selected will be 11SGEN.CMD. After phase 2, the command file will exit.

```
;  
; WHEN THIS COMMAND FILE IS FINISHED, YOU MAY CONTINUE WITH  
; THE NEXT PHASE OF THIS SYSGEN WITH THE FOLLOWING COMMAND:  
;
```

If SYSGEN phase 2 on an RP disk is not selected, it may be done manually at a later time by following the directions given at the end of the command file. At this point, RP processing terminates and the command file will exit.

* IS YOUR SECONDARY STORAGE DEVICE A MAGTAPE? [Y/N]:

The following instructions and commands are executed if the host is an RK magtape (TU10, TS03, TU16) system.

```
;  
; MOUNT A MAGTAPE IN DRIVE 0  
;  
* IS THE MAGTAPE IN DRIVE ZERO READY? [Y/N]:  
* IS THE MAGTAPE DRIVE A TU16? [Y/N]:
```

The device mnemonic for TU16 magtape is MM. The device mnemonic for TU10 and TS03 is MT. This question is used to select the proper sequence of commands.

```
LOA MT:  
FLX MT0:/ZE  
FLX MT0:[1,20]/DO=SY:RSXBLD.CMD/RS,RSX11M.OBJ  
FLX MT0:[1,20]/DO=SY:[11,10]RSXMC.MAC/RS  
FLX MT0:[1,24]/DO=SY:RSXBLD.CMD/RS,RSX11M.OBJ  
FLX MT0:[1,24]/DO=SY:[11,10]RSXMC.MAC/RS  
FLX MT0:[1,20]/DO/FB=SY:UDCOM.UDC/RS  
FLX MT0:[1,20]/DO/FB=SY:ICTAB.ICR,ICOM.ICR/RS  
FLX MT0:[1,24]/DO/FB=SY:UDCOM.UDC/RS  
FLX MT0:[1,24]/DO/FB=SY:ICTAB.ICR,ICOM.ICR/RS
```

The above commands are issued for TU10 and TS03 magtape. The next display begins after the RX01 questions.

```
LOA MM:  
FLX MM0:/ZE  
FLX MM0:[1,20]/DO=SY:RSXBLD.CMD/RS,RSX11M.OBJ  
FLX MM0:[1,20]/DO=SY:[11,10]RSXMC.MAC/RS  
FLX MM0:[1,24]/DO=SY:RSXBLD.CMD/RS,RSX11M.OBJ  
FLX MM0:[1,24]/DO=SY:[11,10]RSXMC.MAC  
FLX MM0:[1,20]/DO/FB=SY:UDCOM.UDC/RS  
FLX MM0:[1,20]/DO/FB=SY:ICTAB.ICR,ICOM.ICR/RS  
FLX MM0:[1,24]/DO/FB=SY:UDCOM.UDC/RS  
FLX MM0:[1,24]/DO/FB=SY:ICTAB.ICR,ICOM.ICR/RS
```

The above commands are issued for TU16 magtape. The next display begins after the RX01 questions.

* IS YOUR SECONDARY STORAGE DEVICE AN RX01 FLEXIBLE DISK? [Y/N]:

The following instructions and commands are executed if the host is an RK-RX01 system.

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```

LOA DX:
;
; PLACE A BLANK FLEXIBLE DISK IN DRIVE 0
;
*IS THE FLEXIBLE DISK IN DRIVE 0 READY? [Y/N]:
SET /UIC=[1,50]
SET /UIC=[1,54]
INS INI
INI DX0:
REM ...INI
MOU DX0:
INS UFD
SET /UIC=[1,20]
UFD DX0:[1,20]
SET /UIC=[1,24]
UFD DX0:[1,24]
REM ...UFD
PIP DX0:=[11,20]RSX11M.OBJ,RSXB LD.CMD
PIP DX0:=[11,24]RSX11M.OBJ,RSXB LD.CMD
PIP DX0:=[11,20]UDCOM.UDC
PIP DX0:=[11,20]ICTAB.ICR,ICOM.ICR
PIP DX0:=[11,24]UDCOM.UDC
PIP DX0:=[11,24]ICTAB.ICR,ICOM.ICR
PIP DX0:=[11,10]RSXMC.MAC
DMO DX0:
;

```

End of RK-RX01 processing. Processing begins with "REM ...FLX" below.

If none of the supported configurations are selected, the following text is displayed and the questions are repeated.

```

;
; *** E R R O R ***
; THE CONFIGURATION YOU ARE RUNNING ON IS NOT
; A STANDARD SYSGEN CONFIGURATION. YOU MUST HAVE ONE OF THE
; COMBINATIONS OF DEVICES SPECIFIED ABOVE. WE WILL
; REPEAT THE CONFIGURATION QUESTIONS.
;

```

Normal processing continues here after specific device processing is completed.

```

REM ...FLX
REM ...PIP

```

The FLX and PIP tasks are removed; their function is complete, and they are removed to bring the system back to its initial state.

```

;
;
; DISMOUNT THE SYSTEM DISK AND MOUNT THE
; UNMAPPED OBJECT DISK
; MAPPED OBJECT DISK
; IN DRIVE 0 AND BOOT IN THE SYSTEM ON THAT DISK
; WHEN THE SYSTEM IS UP, SET THE TIME AND DATE
; AND INITIATE THE INDIRECT COMMAND FILE

```

SYSGEN DIALOGUE DETAILS

```
; [200,200]SYSGEN2.CMD. FOR EXAMPLE:  
; [200,200]11SGEN.CMD. FOR EXAMPLE:  
;  
; >TIM 10:20 9/15/75
```

The above text is displayed only for RK-disk host systems.

```
; >@SYSGEN2  
; >@11SGEN  
;  
SET /UIC=[200,200]
```

3.3 SGN QUERY LIST

The SGN task consists of a series of questions which the user answers. At the completion of SGN, the user has, in effect, specified his:

1. Executive options,
2. Processor options,
3. Peripheral complement.

This section contains every question (listed in order of appearance) in the dialogue conducted by SGN. The dialogue itself has two options, long and short. Short dialogue consists only of the queries. Long dialogue precedes each query with explanatory text.

In the text which follows, upper case is produced by the SGN task. Any additional explanation required appears in lower case, prefaced with the heading:

Additional explanation:

BEGIN SGN

Additional explanation:

The System Generation Configuration Query Program (SGN) has started execution. A slight pause occurs while necessary files are opened.

EVERY QUERY INCLUDES REQUIRED ANSWER OPTIONS. OPTIONS ARE:

[Y/N] FOR YES/NO

[DDU] IF A DEVICE-UNIT IS REQUIRED

[O] IF REQUIRED NUMBER IS ASSUMED OCTAL

[D] IF REQUIRED NUMBER IS ASSUMED DECIMAL

THE OPTIONS WHICH APPLY TO A GIVEN QUERY ARE IMPLIED IN THE QUERY. A CARRIAGE RETURN WILL DEFAULT AN ANSWER TO NO FOR [Y/N] AND ZERO FOR A NUMERIC. NO DEFAULT APPLIES FOR THE DEVICE-UNIT.

SYSGEN DIALOGUE DETAILS

THE NUMERIC DEFAULT, [D] OR [O], CAN BE OVERRIDDEN BY PREFIXING NUMBERS TO BE ACCEPTED AS OCTAL WITH A NUMBER SIGN (#) OR SUFFIXING THOSE TO BE ACCEPTED AS DECIMAL WITH A DECIMAL POINT.

SOME QUERIES SUBSEQUENT TO KEY QUERIES HAVE PRESTORED REPLIES. THESE REPLIES CAN BE OVERRIDDEN BY TERMINATING A REPLY TO A KEY QUERY WITH ALTMODE.

ANSWERS WHICH ARE IN ERROR ARE IMMEDIATELY FLAGGED BY AN ERROR MESSAGE DISPLAY; SGN WILL WAIT TO ACCEPT THE CORRECTED ANSWER. SGN PROVIDES LONG OR SHORT DIALOGUE OPTIONS. SHORT DIALOGUE LISTS THE QUERY ONLY. LONG DIALOGUE PROVIDES EXPLANATORY TEXT WITH EACH QUERY. THE DIALOGUE PROPER NOW COMMENCES.

LONG DIALOGUE RESULTS IN THE DISPLAY OF EXPLANATORY TEXT PRECEDING EACH QUERY. SHORT DIALOGUE OMITTS THE TEXT. LONG DIALOGUE IS AVAILABLE ON A PER QUERY BASIS BY ENTERING ESCAPE OR ALTMODE FOLLOWING THE DISPLAY OF THE QUERY.

LONG DIALOGUE DESIRED? [Y/N]:

Additional explanation:

Once long dialogue is chosen, the explanatory text is displayed prior to each query and cannot be suppressed (except on a line-by-line basis with CTRL/O). Selective short dialogue, which is used in the descriptions which follow, produces explanatory text following the query and is the recommended mode of operation.

ASSEMBLY LISTING FILES DESIRED? [Y/N]:

SGN PRODUCES INDIRECT FILES WHICH ARE SUBSEQUENTLY USED TO ASSEMBLE THE USER-TAILORED EXECUTIVE. LISTING PRODUCTION IS TIME CONSUMING AND IS NOT RECOMMENDED. IF AN 8K ASSEMBLER IS BEING USED (WHICH IS REQUIRED ON A 16K SYSTEM) YOU CANNOT HAVE BOTH A LISTING FILE AND AN OBJECT FILE DURING THE SAME RUN.

Additional explanation:

Two passes are required to produce object files and listings on a 16K system or any system using the 8K assembler. The first pass can be used to produce the object modules. Then the file RSXASM should be edited to produce listing files. The next two queries do not appear unless assembly listings were requested.

WHAT IS TO BE THE LISTING DEVICE? [DDU]:

NOTE, THE DDU REPLY IS NOT TERMINATED WITH A COLON. THUS TO INDICATE LINE PRINTER ZERO ENTER:

LPO

IF SPOOLED OUTPUT IS DESIRED ANSWER THIS QUERY WITH:

SY0

SYSGEN DIALOGUE DETAILS

Additional explanation:

The listing files need not be directed to a line printer. They can be directed to a terminal or a disk, e.g., TT0: or DK1:.

SPOOL LISTING FILE? [Y/N]:

SPOOLING WILL ONLY ACTUALLY OCCUR FOR DIRECTORY DEVICES.

Additional explanation:

The Baseline System does not have a print spooler. Therefore, the user should select no spooling of either listing files or map files.

TASK BUILDER MAP DESIRED? [Y/N]:

A TASK BUILDER MAP IS STRONGLY RECOMMENDED. ESTABLISHING PARTITIONS AND DIAGNOSING SYSTEM FAILURES REQUIRE THIS MAP.

Additional explanation:

The only way to lay out partitions for a target system is to have the value of the last address used by the Executive. This value can only be obtained from the Executive memory allocation map. The next two queries do not appear unless a map was requested.

WHAT IS TO BE THE LISTING DEVICE? [DDU]:

NOTE, THE DDU REPLY IS NOT TERMINATED WITH A COLON. THUS TO INDICATE LINE PRINTER ZERO ENTER:

LP0

IF SPOOLED OUTPUT IS DESIRED ANSWER THIS QUERY WITH:

SY0

Additional explanation:

The listing files need not be directed to a line printer. They can be directed to a terminal or a disk, e.g., TT0: or DK1:.

SPOOL MAP FILE? [Y/N]:

SPOOLING WILL ONLY ACTUALLY OCCUR FOR DIRECTORY DEVICES.

THE PRECEDING QUERIES DO NOT AFFECT THE USER-TAILORED EXECUTIVE. THE EXECUTIVE OPTION QUERIES THAT FOLLOW WHICH ARE PRECEDED BY A SINGLE ASTERISK ARE INCLUDED IN THE BASELINE SYSTEM. THE FEATURE, HOWEVER, IS NOT ESSENTIAL TO THE OPERATION OF A MINIMUM SYSTEM. DOUBLE ASTERISKED QUERIES MUST BE SELECTED FOR FULL SUPPORT OF THE MINIMUM SYSTEM. QUERIES WITH NO ASTERISKS ARE NOT IN THE MINIMUM SYSTEM AND ARE OPTIONAL.

SYSGEN DIALOGUE DETAILS

BEGIN SELECTION OF EXECUTIVE OPTIONS.

ARE YOU BUILDING AN RSX-11S SYSTEM? [Y/N]:

AS DISTRIBUTED, THE RSX-11M SOURCE DISK PROVIDES FOR THE GENERATION OF AN RSX-11S EXECUTIVE. IN ORDER TO GENERATE SUCH A SYSTEM YOU MUST HAVE AN RSX-11S LICENSE AND CANNOT INCLUDE FILES-11, CHECKPOINTING, NONRESIDENT TASK, OR DYNAMIC MEMORY ALLOCATION SUPPORT.

Additional explanation:

If an RSX-11S system is being generated, then the next four queries do not appear.

**DO YOU WANT FILES-11 ACP SUPPORT? [Y/N]:

FAILURE TO INCLUDE THIS OPTION ELIMINATES ALL THE SERVICES DESCRIBED IN THE RSX-11 I/O OPERATIONS REFERENCE MANUAL. SINCE DEC-SUPPLIED SOFTWARE MAKES USE OF THESE SERVICES, THEIR ELIMINATION IS NOT RECOMMENDED.

**DO YOU WANT CHECKPOINTING? [Y/N]:

IF TASKS ARE TO BE DISPLACED FROM A PARTITION TO YIELD THE PROCESSOR RESOURCES TO A TASK OF HIGHER PRIORITY ABLE TO USE THE PARTITION, THEN CHECKPOINTING IS REQUIRED.

Additional explanation:

For large systems, checkpointing may not be required if MCR, TKN, and FCP each operates in its own dedicated partition; thus, checkpointing may be omitted. Note that, in a minimum system, these tasks must run in the same partition and, therefore, checkpointing is required.

If checkpointing is selected, then the following query is posed, and the nonresident task query does not appear.

DO YOU WANT TASKS TO BE CHECKPOINTABLE DURING TERMINAL INPUT? [Y/N]:

SELECTION OF THIS OPTION ALLOWS CHECKPOINTABLE TASKS TO BE DISPLACED FROM MEMORY DURING TERMINAL INPUT BY HIGHER PRIORITY TASKS.

**DO YOU WANT NON-RESIDENT TASK SUPPORT?

IF SELECTED, THE SYSTEM WILL CONTAIN A TASK LOADER. NOT INCLUDING THIS LOADER MEANS TASKS MUST BE PERMANENTLY RESIDENT IN THE GENERATED SYSTEM.

DO YOU WANT MEMORY MANAGEMENT UNIT SUPPORT? [Y/N]:

REQUIRED IF THE USER-TAILORED TARGET SYSTEM HAS A MEMORY MANAGEMENT UNIT.

SYSGEN DIALOGUE DETAILS

Additional explanation:

If memory management is selected and an RSX-11M system is being generated, then the following query is posed.

DO YOU WANT DYNAMIC MEMORY ALLOCATION SUPPORT? [Y/N]:

THIS OPTION ALLOWS AS MANY TASKS AS WILL FIT IN A PARTITION TO BE SIMULTANEOUSLY RESIDENT. THE ALLOCATION OF PARTITION MEMORY IS AUTOMATIC AND IS CARRIED OUT DYNAMICALLY BY THE RSX-11M EXECUTIVE.

Additional explanation:

If dynamic memory allocation is selected, the next query is also posed. This feature may not be included in an RSX-11S system.

DO YOU WANT AUTOMATIC MEMORY COMPACTION? [Y/N]:

AUTOMATIC MEMORY COMPACTION MINIMIZES THE EFFECTS OF FRAGMENTATION IN DYNAMICALLY ALLOCATED PARTITIONS. IT IS INVOKED WHEN FREE SPACE EXISTS BETWEEN RESIDENT NONCHECKPOINTABLE TASKS AND TASKS ARE WAITING TO BE LOADED INTO THE PARTITION.

Additional explanation:

Memory compaction is implemented as a nonresident task called the Shuffler. Whenever it is necessary to compact memory in a partition, the Shuffler is automatically loaded and proceeds to move tasks toward the front of the partition in an attempt to provide better memory utilization.

DO YOU WANT ADDRESS CHECKING? [Y/N]:

IF ADDRESS CHECKING IS INCLUDED, USER GENERATED ADDRESSES PASSED IN EXECUTIVE DIRECTIVES WILL BE SUBJECT TO BOUNDARY, ALIGNMENT, AND MODULUS CHECKS.

Additional explanation:

This feature is automatically included if the target system contains a memory management unit.

**DO YOU WANT I/O RUNDOWN? [Y/N]:

I/O RUNDOWN INSURES THE INTEGRITY OF AN RSX-11M SYSTEM BY MAKING SURE ALL OUTSTANDING TASK RELATED I/O OPERATIONS ARE CLEANED UP BEFORE ALLOWING THE TASK TO EXIT. OMISSION OF THIS FEATURE SHOULD BE CAREFULLY CONSIDERED.

Additional explanation:

This feature is automatically included if the target system contains a memory management unit. Its omission is recommended only in RSX-11S systems.

SYSGEN DIALOGUE DETAILS

DO YOU WANT NETWORK ACP SUPPORT? [Y/N]:

AS DISTRIBUTED, THE RSX-11M SOURCE DISK PROVIDES FOR THE GENERATION OF AN RSX-11M OR RSX-11S EXECUTIVE THAT CONTAINS SUPPORT FOR NETWORK COMMUNICATIONS. IN ORDER TO GENERATE SUCH A SYSTEM YOU MUST HAVE THE APPROPRIATE NETWORK SOFTWARE LICENSE.

Additional explanation:

Network software provides the capability for simultaneously operating tasks on different systems to establish logical communication links and to exchange data. If this option is not selected, the next seven queries are omitted.

DO YOU WANT SUPPORT FOR REMOTE TASK LOADING? [Y/N]:

SELECTION OF THIS OPTION PROVIDES SUPPORT FOR THE LOADING OF TASKS FROM A MASS STORAGE DEVICE ON ANOTHER SYSTEM.

Additional explanation:

This query is posed only for RSX-11S systems. If selected, the next query is also posed.

DO YOU WANT REMOTE TASK CHECKPOINTING SUPPORT? [Y/N]:

THIS OPTION ALLOWS TASKS THAT ARE REMOTELY LOADED TO BE CHECKPOINTED BY HIGHER PRIORITY TASKS. CHECKPOINT STORAGE SPACE IS PROVIDED ON THE HOST MASS STORAGE DEVICE.

Additional explanation:

Remote task checkpointing on slow communication links can be a lengthy process. Selection of this feature should be given careful thought.

SHOULD THE NETWORK ACP BE OVERLAID? [Y/N]:

IN AN RSX-11M SYSTEM THE NETWORK ACP MAY BE OVERLAID. OVERLAYING CONSERVES APPROXIMATELY 1K OF MEMORY AT THE COST OF A SLIGHT DEGRADATION IN PERFORMANCE.

Additional explanation:

This query is posed only for RSX-11M systems. The network ACP cannot be overlaid in an RSX-11S system.

DOES THE TARGET SYSTEM HAVE A KGL1 CRC OPTION? [Y/N]:

THIS HARDWARE OPTION PROVIDES EFFICIENT CALCULATION OF MESSAGE BLOCK CHECK CHARACTERS.

Additional explanation:

This option cannot be selected unless the hardware is actually present.

SYSGEN DIALOGUE DETAILS

WHAT IS THE TIMEOUT PERIOD FOR NETWORK MESSAGES? [D]:

NETWORK MESSAGE TIMEOUT IS PROVIDED TO DETECT COMMUNICATION LINK AND REMOTE SYSTEM FAILURES. TYPICAL TIMES (IN SECONDS) ARE ON THE ORDER OF TWICE THE LONGEST MESSAGE ROUND TRIP TIME.

RESPONSE LIMITS: 3.-60.

WHAT IS THE MAXIMUM NETWORK DATA MESSAGE SIZE IN BYTES? [D]:

TYPICAL NETWORK MESSAGE LENGTHS ARE 80. TO 120. BYTES.

RESPONSE LIMITS: 64.-528.

HOW MANY LOGICAL CHANNELS CAN BE ACTIVE SIMULTANEOUSLY? [D]:

THE COMMUNICATION BETWEEN TASKS IN A NETWORK IS VIA LOGICAL CHANNELS. ONE LOGICAL CHANNEL IS REQUIRED FOR EACH PAIR OF COMMUNICATING TASKS.

RESPONSE LIMITS: 1.-254.

DO YOU WANT AST SUPPORT? [Y/N]:

IF YOU INTEND TO USE EITHER THE PRINT SPOOLER OR THE FORTRAN ISA PROCESS CONTROL SUBROUTINE CALLS, THEN ASYNCHRONOUS SYSTEM TRAP PROCESSING IS REQUIRED. SEE THE RSX-11M EXECUTIVE REFERENCE MANUAL FOR A DETAILED DESCRIPTION OF THE AST FACILITY PROVIDED IN RSX-11M/S.

Additional explanation:

AST support will be selected automatically if Floating Point Processor or network support is selected.

**DO YOU WANT SUPPORT FOR EXTERNAL MCR FUNCTIONS? [Y/N]:

THIS OPTION IS ALWAYS REQUIRED IN AN RSX-11M SYSTEM AND NEVER IN AN RSX-11S SYSTEM.

Additional explanation:

External MCR functions are tasks that have a 6-character name that starts with "...". If this option is selected (RSX-11M system only), these tasks may be initiated by simply typing their name.

**DO YOU WANT TASK TERMINATION AND DEVICE NOT READY MESSAGES? [Y/N]:

ABNORMAL TASK TERMINATION AND DEVICE NOT READY MESSAGES ARE AUTOMATICALLY PRODUCED BY THE SYSTEM IF THIS OPTION IS SELECTED.

Additional explanation:

If this option is included in an RSX-11S system, then the Task Termination Notification Task (TKN) must also be included in the system for the messages to actually be printed.

SYSGEN DIALOGUE DETAILS

DO YOU WANT POWERFAIL RECOVERY? [Y/N]:

IF THE POWER FAILS AND THIS OPTION HAS BEEN OMITTED, THE SYSTEM WILL HALT OPERATIONS. OTHERWISE SYSTEM OPERATION IS AUTOMATICALLY COMMENCED WHEN POWER IS RESTORED.

**DO YOU WANT GET PARTITION PARAMETERS DIRECTIVE? [Y/N]:

REQUIRED IF DEC-SUPPLIED PROGRAM DEVELOPMENT SOFTWARE (I.E., TKB, MAC, ETC.) IS TO BE RUN.

DO YOU WANT GET SENSE SWITCHES DIRECTIVE? [Y/N]:

THIS DIRECTIVE PROVIDES THE CAPABILITY TO READ THE PROCESSOR SWITCH REGISTER AND RETURN ITS CONTENTS TO THE REQUESTING TASK.

**DO YOU WANT GET TASK PARAMETERS DIRECTIVE? [Y/N]:

REQUIRED IF DEC-SUPPLIED PROGRAM DEVELOPMENT SOFTWARE (I.E., TKB, MAC, ETC.) IS TO BE RUN.

DO YOU WANT SEND/RECEIVE DIRECTIVES? [Y/N]:

THESE DIRECTIVES PROVIDE THE CAPABILITY FOR CO-OPERATING TASKS TO COMMUNICATE VIA SYSTEM MAINTAINED MESSAGE QUEUES. IF THE TARGET SYSTEM WILL CONTAIN THE PRINT SPOOLER, THIS OPTION MUST BE INCLUDED.

*DO YOU WANT INSTALL, REQUEST, AND REMOVE ON EXIT SUPPORT? [Y/N]:

THIS FACILITY OF MCR CAN SUBSTANTIALLY REDUCE THE NUMBER OF INSTALLED TASKS NEEDED FOR CONVENIENT SYSTEM OPERATION. SEE DESCRIPTION OF THE RUN COMMAND IN THE RSX-11M OPERATOR'S PROCEDURES MANUAL FOR DETAILS.

*DO YOU WANT LOGICAL DEVICE ASSIGNMENT SUPPORT? [Y/N]:

LOGICAL DEVICE ASSIGNMENT PROVIDES THE CAPABILITY TO ASSOCIATE A LOGICAL NAME TO A PHYSICAL DEVICE UNIT. ASSIGNMENTS MAY BE MADE ON A PER TERMINAL OR SYSTEM WIDE BASIS.

DO YOU WANT TERMINAL-HOST SYNCHRONIZATION SUPPORT? [Y/N]:

TERMINAL-HOST SYNCHRONIZATION ALLOWS OUTPUT TO BE TURNED OFF (CTRL S) AND ON (CTRL Q) FROM A TERMINAL. THIS MAY BE USEFUL FOR HIGH BAUD RATE DISPLAY TERMINALS AND IS REQUIRED IF THE TARGET SYSTEM CONTAINS VT50 TERMINALS WITH THE COPIER OPTION.

DO YOU WANT SETTABLE CASE CONVERSION FOR TERMINAL INPUT? [Y/N]:

NORMALLY THE TERMINAL DRIVER ACCEPTS AND ECHOS CHARACTERS AS RECEIVED. SELECTION OF THIS OPTION PROVIDES THE CAPABILITY TO SELECTIVELY ENABLE A TERMINAL SO THAT THE TERMINAL DRIVER WILL AUTOMATICALLY CONVERT ALL LOWER CASE INPUT TO UPPER CASE.

Additional explanation:

Enabling a terminal for case conversion is accomplished via the MCR Set/Lower command.

SYSGEN DIALOGUE DETAILS

DO YOU WANT TRANSPARENT TERMINAL READ/WRITE SUPPORT? [Y/N]:

TERMINAL INPUT IS USUALLY FILTERED ON BOTH INPUT AND OUTPUT. THIS IS NECESSARY TO RECOGNIZE CONTROL CHARACTERS THAT HAVE SPECIAL MEANING (I.E., ALTMODE OR ESC) OR REQUIRE FILL CHARACTERS (I.E., CARRIAGE RETURN). THIS OPTION PROVIDES SUPPORT FOR I/O FUNCTIONS (IO.RAL AND IO.WAL) THAT BYPASS CHARACTER FILTERING.

DO YOU WANT EXECUTIVE LEVEL ROUND ROBIN SCHEDULING? [Y/N]:

ROUND ROBIN SCHEDULING PROVIDES THE CAPABILITY FOR A GROUP OF TASKS WITHIN A RANGE OF PRIORITIES TO SHARE THE AVAILABLE PROCESSING TIME. EACH PRIORITY CLASS WITHIN THE RANGE IS ROUND ROBIN SCHEDULED AT EACH SCHEDULE INTERVAL (TIME SLICE).

Additional explanation:

Round-robin scheduling refers to the algorithm where each task of a group of tasks is successively given preference in allocating available processor time. The actual algorithm used in RSX-11M is to locate the first task within each priority class that is not blocked from executing, and to move that task to the end of its respective priority class. Compute-bound tasks tend to actually round robin, whereas I/O-bound tasks tend to remain at the front of their respective priority class.

If this option is not selected, the next three queries are omitted.

HOW MANY CLOCK TICKS ARE TO EXPIRE BETWEEN SCHEDULE INTERVALS? [D]:

ROUND ROBIN SCHEDULING IS EXECUTED ON A PERIODIC BASIS. TYPICAL SCHEDULING INTERVALS ARE ON THE ORDER OF 100 MILLISECONDS. (6 CLOCK TICKS FOR A 60 CYCLE LINE FREQUENCY CLOCK.)

RESPONSE LIMITS: 1.-1000.

WHAT IS THE HIGHEST PRIORITY CLASS TO BE CONSIDERED? [D]:

ROUND ROBIN SCHEDULING IS EXECUTED FOR A RANGE OF PRIORITY CLASSES. TYPICAL RANGES ARE 1. TO 100.

RESPONSE LIMITS: 1.-249.

WHAT IS THE LOWEST PRIORITY CLASS TO BE CONSIDERED? [D]:

ARE YOU PLANNING TO INCLUDE A USER WRITTEN DRIVER? [Y/N]:

ADDITION OF A USER WRITTEN DRIVER REQUIRES THAT ADEQUATE SPACE BE ALLOCATED FOR INTERRUPT VECTORS DURING THE ASSEMBLY OF THE GENERATED EXECUTIVE. ACTUAL DRIVER INCLUSION OCCURS WHEN THE TARGET EXECUTIVE IS BUILT.

Additional explanation:

If a user-written driver is not being incorporated, the next query is omitted.

SYSGEN DIALOGUE DETAILS

WHAT IS THE ADDRESS OF THE HIGHEST DEVICE INTERRUPT VECTOR? [O]:

DO YOU WANT TO INCLUDE THE EXECUTIVE DEBUGGING TOOL? [Y/N]:

THE EXECUTIVE DEBUGGING TOOL PROVIDES A SUBSET ODT-11 THAT RUNS AS A PART OF THE RSX-11M EXECUTIVE. THIS TOOL ALLOWS INTERACTIVE DEBUGGING OF EXECUTIVE MODULES, I/O DRIVERS, AND INTERRUPT SERVICE ROUTINES.

Additional explanation:

See the RSX-11M Guide To Writing An I/O Driver for subset description.

DO YOU WANT REPORT AT SYSTEM CRASHES? [Y/N]:

IF THIS OPTION IS NOT SELECTED AND THE SYSTEM CRASHES, THEN THE SYSTEM SIMPLY HALTS.

Additional explanation:

If the crash display option is not selected, then the next query does not appear.

WHAT IS THE OUTPUT DEVICE CSR ADDRESS? [O]:

THE DEVICE ON WHICH THE CRASH NOTIFICATION APPEARS MUST BE A PAPER TAPE, TELETYPE, OR LINE PRINTER COMPATIBLE DEVICE; THAT IS, THE DEVICE MUST TRANSMIT A SINGLE BYTE AT A TIME. THE NORMAL CRASH OUTPUT DEVICE IS THE CONSOLE TERMINAL WHICH HAS A CSR ADDRESS 177564.

DO YOU WANT A PANIC DUMP ROUTINE? [Y/N]:

IF THIS OPTION IS NOT SELECTED AND A SYSTEM FAILURE OCCURS, IT MAY NOT BE POSSIBLE FOR THE USER TO CAPTURE VITAL DATA ON THE STATE OF THE SYSTEM AT THE TIME THE FAILURE OCCURRED.

Additional explanation:

The panic dump routine is normally used in debugging new drivers or privileged tasks. It provides a means of generating a formatted dump of memory on a line printer or a terminal. If the dump routine query is not selected, then the next query will not appear.

WHAT IS THE OUTPUT CSR ADDRESS? [O]:

THE DEVICE ON WHICH THE FORMATTED DUMP APPEARS MUST BE A PAPER TAPE, TELETYPE, OR LINE PRINTER COMPATIBLE DEVICE; THAT IS, THE DEVICE MUST TRANSMIT A SINGLE BYTE AT A TIME. THE NORMAL CRASH DUMP DEVICE IS A LINE PRINTER WHICH HAS A CSR ADDRESS OF 177514.

**WHAT IS THE SIZE OF THE DYNAMIC STORAGE REGION IN WORDS? [D]:

A NON ZERO RESPONSE TO THIS QUERY IS REQUIRED. A MINIMUM OF 256 WORDS WILL BE ACCEPTED TO ENSURE MINIMUM OPERATIONS. 1024 WORDS IS A REASONABLE ESTIMATE FOR ADEQUATE PERFORMANCE OF A SET OF USER TASKS MAKING FULL USE OF THE BASELINE SYSTEM.

SYSGEN DIALOGUE DETAILS

RESPONSE LIMITS: 256.-16384. MINUS SIZE OF EXECUTIVE

Additional explanation:

The amount of dynamic memory needed depends on the configuration of the machine and the number of tasks installed. See Appendix C for a complete description.

DO YOU WANT ROTATING PATTERN IN DATA LIGHTS? [Y/N]:

IF SELECTED, THE SYSTEM WILL, WHEN IDLE, CAUSE THE DATA LIGHTS TO FLICKER IN A PRONOUNCED CIRCULAR ROTATION. THE OPTION FUNCTIONS PROPERLY ONLY ON PDP-11/45/50/70 SYSTEMS.

END EXECUTIVE SERVICE OPTIONS.

BEGIN PROCESSOR OPTIONS.

WHAT IS THE SIZE OF PHYSICAL MEMORY IN 1024 WORD BLOCKS? [D]:

THE MINIMUM MEMORY IS 16K FOR AN RSX-11M SYSTEM AND 8K FOR AN RSX-11S SYSTEM. THE MAXIMUM MEMORY SIZE IS 1024K FOR AN RSX-11M SYSTEM AND 124K FOR AN RSX-11S SYSTEM. IN ORDER TO UTILIZE MEMORY ABOVE 28K THE TARGET SYSTEM MUST CONTAIN A MEMORY MANAGEMENT UNIT.

RESPONSE LIMITS: 8.-1024.

IS THE TARGET PROCESSOR AN LSI-11? [Y/N]:

RSX-11S IS CAPABLE OF RUNNING ON ALL PDP-11 PROCESSORS. THE LSI-11 IS THE SMALLEST MEMBER OF THE PDP-11 FAMILY OF PROCESSORS AND IS CONSTRUCTED USING LARGE SCALE INTEGRATED CIRCUIT TECHNOLOGY.

Additional explanation:

This query is posed only if an RSX-11S system is being built and memory management was not selected. If answered affirmatively, the next question posed is that concerning FIS support.

DO YOU WANT EAE SUPPORT? [Y/N]:

THE EXTENDED ARITHMETIC ELEMENT (EAE) (K11-A/B) IS AN OPTION WHICH PERFORMS MULTIPLICATION, DIVISION, MULTIPLE POSITION SHIFTS AND NORMALIZATION SIGNIFICANTLY FASTER THAN SOFTWARE ROUTINES. IT CONNECTS DIRECTLY TO THE UNIBUS AND IS PROGRAMMED AS A PERIPHERAL, ALLOWING OVERLAP BETWEEN CPU AND EAE OPERATIONS.

Additional explanation:

If the generated system will contain memory management unit support, this query is not posed. If answered affirmatively, the next three queries are omitted.

SYSGEN DIALOGUE DETAILS

DO YOU WANT FLOATING POINT PROCESSOR SUPPORT? [Y/N]:

THE PDP-11 FLOATING POINT PROCESSOR IS AN OPTIONAL ARITHMETIC PROCESSOR. IT PERFORMS ALL FLOATING POINT ARITHMETIC OPERATIONS AND CONVERTS DATA BETWEEN INTEGER AND FLOATING POINT FORMATS.

Additional explanation:

If this query is answered affirmatively, the next query is posed, and the FIS query is omitted. Otherwise, the next query is skipped, and the FIS query is posed.

IS THE TARGET PROCESSOR A PDP-11/45/50/70? [Y/N]:

DO YOU WANT FIS SUPPORT? [Y/N]:

THE FIS OPTION (WHICH REQUIRES THE EIS OPTION) INCLUDES HARDWARE FLOATING POINT ADD, SUBTRACT, MULTIPLY, AND DIVIDE INSTRUCTIONS.

DO YOU HAVE A PROGRAMMABLE CLOCK? [Y/N]:

RSX-11M/S REQUIRES A REAL-TIME CLOCK FOR ITS OPERATION. EITHER THE KW11-P PROGRAMMABLE FREQUENCY CLOCK OR KW11-L LINE FREQUENCY CLOCK MAY BE USED.

Additional explanation:

This query and the next query are not posed if the target processor is an LSI-11. Otherwise, if the answer is affirmative, then the next query is posed.

WHAT IS THE NUMBER OF INTERRUPTS PER SECOND? [D]:

THE NUMBER OF INTERRUPTS SPECIFIED MUST BE EVENLY DIVISIBLE INTO 10000(10).

RESPONSE LIMITS:1.-1000.

Additional explanation:

If the programmable clock option was not selected, the previous query is replaced by the following query.

IS YOUR LINE FREQUENCY 50 CYCLE? [Y/N]:

LINE FREQUENCY IS EITHER 50 OR 60 CYCLE.

Additional explanation:

This query is posed if the target processor is an LSI-11 or does not contain a programmable clock. The line frequency must be either 50 or 60 cycles per second.

SYSGEN DIALOGUE DETAILS

DO YOU WANT KW11-Y WATCHDOG TIMER SUPPORT? [Y/N]:

THE KW11-Y IS A WATCHDOG TIMER THAT IS CONSTANTLY ATTEMPTING TO TIME OUT SYSTEM ACTIVITY. THE RSX-11M/S EXECUTIVE REFRESHES THE TIMER AT EVERY CLOCK INTERRUPT. IF THE SYSTEM FAULTS OR A HARDWARE FAILURE OCCURS AND THE TIMER ELAPSES AN EXTERNAL SIGNAL IS GENERATED.

Additional explanation:

If this option is selected, the generated system will only run on configurations that contain a KW11-Y.

DO YOU WANT PARITY MEMORY SUPPORT? [Y/N]:

PARITY MEMORY PROVIDES CIRCUITRY TO CHECK THE INTEGRITY OF STORED DATA. PARITY CHECKING BITS ARE GENERATED WHEN DATA WORDS ARE WRITTEN INTO MEMORY AND CHECKED WHEN THE DATA WORDS ARE SUBSEQUENTLY READ OUT OF MEMORY.

Additional explanation:

The parity memory option provides the system with detection of errors in the memory system. If this query is answered affirmatively, the next query is posed.

IS THE TARGET PROCESSOR A PDP-11/70? [Y/N]:

THE PDP-11/70 PROVIDES ADDITIONAL PARITY CHECKING CIRCUITRY. THE BUFFER MEMORY (CACHE) USED TO SPEED UP MAIN MEMORY OPERATIONS IS ALSO CAPABLE OF GENERATING AND CHECKING PARITY.

END PROCESSOR OPTIONS

BEGIN PERIPHERAL OPTIONS

HOW MANY AD01-D A/D CONVERTERS DO YOU HAVE? [D]:

THE AD01-D IS A MULTICHANNEL ANALOG DATA ACQUISITION OPTION WHICH INTERFACES DIRECTLY TO PDP-11 COMPUTERS.

THE STANDARD AD01-D CONSISTS OF AN EXPANDABLE SOLID-STATE INPUT MULTIPLEXER, PROGRAMMABLE INPUT RANGE SELECTOR, A/D CONVERTER, CONTROL, AND BUS INTERFACE. THE MULTIPLEXER CAN BE EXPANDED BY ADDING 4-CHANNEL MODULES UP TO 32 CHANNELS. AN EXPANSION MULTIPLEXER MAY BE ADDED TO PROVIDE A MAXIMUM CONFIGURATION OF 64 CHANNELS.

Additional explanation:

If the answer to this query is non-zero, then the next three queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this question are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT AD01-D? [O]:130

130 IS THE STANDARD VECTOR ADDRESS FOR THE AD01-D

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Additional explanation:

If the reply to the query for the number of AD01-Ds was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:176770

176770 IS THE STANDARD CSR ADDRESS FOR THE AD01-D

Additional explanation:

This query is repeated for each of the AD01-Ds after the first; the user supplies the CSR address.

HOW MANY A/D CHANNELS DOES IT HAVE? [D]:

RESPONSE LIMITS: 1.-64.

Additional explanation:

This query appears as many times as the number of AD01-Ds specified. Note that the queries for the interrupt vector, CSR, and the number of channels occur one after the other for each AD01-D. The repeat sequence repeats all three of the queries.

HOW MANY AFC11 A/D CONVERTERS DO YOU HAVE? [D]:

THE AFC11 IS A DIFFERENTIAL ANALOG INPUT SUB-SYSTEM FOR IDACS-11 INDUSTRIAL CONTROL SYSTEMS. THE AFC11 SYSTEM MULTIPLEXES UP TO 1024 DIFFERENTIAL INPUT ANALOG SIGNALS, SELECTS GAIN, AND PERFORMS A 13-BIT ANALOG-TO-DIGITAL CONVERSION AT A 200 CHANNEL PER SECOND RATE UNDER PROGRAM CONTROL.

Additional explanation:

If the answer to this query is non-zero, then the next three queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT AFC11? [O]:134

134 IS THE STANDARD VECTOR ADDRESS FOR THE AFC11.

Additional explanation:

If the reply to the query for the number of AFC11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

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WHAT IS ITS CSR ADDRESS? [O]:172570

172570 IS THE STANDARD CSR ADDRESS FOR THE AFC11.

Additional explanation:

This query is repeated for each of the AFC11s after the first; the user supplies the CSR address.

HOW MANY A/D CHANNELS DOES IT HAVE? [D]:

RESPONSE LIMITS: 1.-1024.

Additional explanation:

This query appears as many times as the number of AFC11s specified. Note that the queries for the interrupt vector, CSR, and the number of channels occur one after the other for each AFC11. The repeat sequence repeats all three of the queries.

HOW MANY AR11 LABORATORY PERIPHERAL SYSTEMS DO YOU HAVE? [D]:

THE AR11 LAB PERIPHERAL SYSTEM IS A LOW-COST REALTIME SUBSYSTEM WHICH INTERFACES TO THE PDP-11 FAMILY OF COMPUTERS. THE SYSTEM INCLUDES A 10-BIT A/D CONVERTOR, PROGRAMMABLE REALTIME CLOCK, AND DISPLAY CONTROL.

Additional explanation:

If the answer to this query is non-zero, then the next seven queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, then subsidiary queries for this query are not pre-answered.

WHAT IS THE CLOCK VECTOR ADDRESS OF THE NEXT AR11? [O]:

THE CLOCK VECTOR ADDRESS FOR THE AR11 IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE LOCATION IF UNKNOWN.

Additional explanation:

If the number of AR11s specified was greater than 1, this query is repeated by SGN for each AR11.

WHAT IS ITS CSR ADDRESS? [O]:170400

170400 IS THE STANDARD CSR ADDRESS FOR THE AR11.

Additional explanation:

If the number of AR11s specified was greater than 1, this query is repeated by SGN for each AR11. On the second and subsequent displays of this query however, the user is required to supply the CSR address.

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WHAT IS THE POLARITY MASK WORD? [O]:

THE POLARITY MASK WORD CORRESPONDS ONE-TO-ONE WITH THE 16 POSSIBLE CHANNELS. A 1-BIT DESIGNATES A UNI-POLAR CHANNEL. A 0-BIT DESIGNATES A BI-POLAR CHANNEL.

IS THE D/A OPTION PRESENT? [Y/N]:

WHAT IS THE MAXIMUM NUMBER OF SAMPLES PER SECOND? [D]:

THE QUERY RESPONSE VALUE MUST BE EVENLY DIVISIBLE INTO 10000.
RESPONSE LIMITS: 1.-2500.

IS THE DR11-K OPTION PRESENT? [Y/N]:

THE AR11 DOES NOT INCLUDE THE 16-BIT DIGITAL I/O OPTION THAT IS AVAILABLE WITH THE LPS11. THE SAME FUNCTIONALITY, HOWEVER, MAY BE ACHIEVED BY USING A DR11-K THAT IS JUMPER SELECTED TO USE THE 16 INDIVIDUAL INPUT LINES WITHOUT INTERRUPTS.

Additional explanation:

This query appears as many times as the number of AR11s specified. Note that the queries for interrupt vector, CSR, number of A/D channels, polarity mask word, D/A option, maximum sample rate, and DR11-K option occur one after the other for each AR11. The repeat sequence repeats all seven queries. If this query is answered affirmatively, then the next query is also posed.

WHAT IS ITS CSR ADDRESS? [O]:170420

170420 IS THE STANDARD CSR ADDRESS FOR THE DR11-K.

HOW MANY CM/CR11 CARD READERS DO YOU HAVE? [D]:

THE CR11 CARD READER READS EIA STANDARD 80-COLUMN PUNCHED DATA CARDS AT 300 CARDS PER MINUTE; THE CM11-F READS 80-COLUMN MARK-SENSE CARDS, WHICH CAN HAVE PUNCHED HOLES, AT 285 CARDS PER MINUTE.

Additional explanation:

If the answer to this query is non-zero, then the next two queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this question are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT CM/CR11? [O]:230

230 IS THE STANDARD VECTOR ADDRESS FOR THE CM/CR11.

Additional explanation:

If the reply to the query for the number of CM/CR11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

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WHAT IS ITS CSR ADDRESS? [O]:177160

177160 IS THE STANDARD CSR ADDRESS FOR THE CM/CR11.

Additional explanation:

This query appears as many times as the number of CM/CR11s specified. Note that the queries for the interrupt vector and CSR occur one after the other for each CM/CR11. The repeat sequence repeats both queries.

HOW MANY TALL DUAL CASSETTES DO YOU HAVE? [D]:

THE TALL MAGNETIC TAPE CASSETTE SYSTEM IS A DUAL-DRIVE, REEL-TO-REEL UNIT DESIGNED TO REPLACE PAPER TAPE. ITS TWO DRIVES RUN NON-SIMULTANEOUSLY USING PROPRIETARY DIGITAL EQUIPMENT CORPORATION PHILIPS-TYPE CASSETTES. THE TALL INCLUDES A CONTROL UNIT AND A DUAL TAPE TRANSPORT.

Additional explanation:

If the answer to this query is non-zero, then the next two queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT TALL? [O]:260

260 IS THE STANDARD VECTOR ADDRESS FOR THE TALL.

Additional explanation:

If the reply to the query for the number of TALLs was greater than 1, then this query is repeated by SGN. On the second and subsequent display of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:177500

177500 IS THE STANDARD CSR ADDRESS FOR THE TALL.

Additional explanation:

This query appears as many times as the number of TALLS specified. Note that the queries for the interrupt vector and CSR occur one after the other for each TALL. The repeat sequence repeats both queries.

HOW MANY RJ/RWP04 DISK PACK CONTROLLERS DO YOU HAVE? [D]:

THE RJ/RWP04 IS A 19 DATA SURFACE, REMOVABLE, RANDOM ACCESS BULK STORAGE SYSTEM WITH A STORAGE CAPACITY OF 43,980,288 WORDS PER PACK. THE RJ/RWP04 INCLUDES A CONTROL UNIT AND THE FIRST DISK PACK DRIVE. THE SYSTEM IS EXPANDABLE UP TO EIGHT DRIVES.

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Additional explanation:

If the answer to this query is non-zero, then the next six queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

DO YOU WANT OFFSET RECOVERY SUPPORT? [Y/N]:

OFFSET RECOVERY IS A TECHNIQUE FOR READING DATA IN INSTANCES WHERE IT CANNOT OTHERWISE BE RECOVERED. IT INVOLVES MOVING THE DISK READ HEAD IN SMALL INCREMENTS ABOUT CYLINDER CENTERLINE IN AN ATTEMPT TO PICK UP A STRONGER SIGNAL AND THUS ALLOW DATA TO BE RECOVERED.

Additional explanation:

Offset recovery is especially important in environments where disk packs are frequently moved from drive to drive. It is also recommended where a higher degree of data reliability is required.

WHAT IS THE VECTOR ADDRESS OF THE NEXT RJ/RWP04? [O]:254

254 IS THE STANDARD VECTOR ADDRESS FOR THE RJ/RWP04.

Additional explanation:

If the reply to the query for the number of RJ/RWP04s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS THE CSR ADDRESS? [O]:176700

176700 IS THE STANDARD CSR ADDRESS FOR THE RJ/RWP04.

Additional explanation:

This query is repeated for each of the RJ/RWP04s after the first; the user supplies the CSR address.

HOW MANY DRIVES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of RJ/RWP04 controllers specified.

WHAT IS THE PHYSICAL UNIT NUMBER OF THE FIRST DRIVE? [D]:

THE TYPICAL RESPONSE IS ZERO. A NON-ZERO REPLY SHOULD BE ARRIVED AT AFTER CONSULTATION WITH A DEC SOFTWARE REPRESENTATIVE.

Additional explanation:

This query appears as many times as the number of RJ/RWP04 controllers specified. Note that the queries for the interrupt vector, CSR, the number of

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drives, and physical unit number occur one after the other for each RJ/RWP04 controller. The repeat sequence repeats all three of the queries.

IS THE NEXT DRIVE AN RP04? [Y/N]:

Additional explanation:

This query is repeated as many times as the number of drives previously specified.

HOW MANY RF11 FIXED HEAD DISK CONTROLLERS DO YOU HAVE? [D]:

THE RF11-A IS A FAST, LOW-COST, RANDOM-ACCESS BULK-STORAGE SYSTEM THAT PROVIDES 262,144 17-BIT WORDS (16 DATA BITS AND 1 PARITY BIT) OF STORAGE. UP TO EIGHT RS11 DISKS CAN BE CONTROLLED BY ONE RF11 CONTROL FOR A TOTAL OF 2,047,102 WORDS OF STORAGE. AN RF11-A INCLUDES A CONTROL UNIT AND THE FIRST DISK DRIVE.

Additional explanation:

If the answer to this query is non-zero, then the next two queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT RF11? [O]:204

204 IS THE STANDARD VECTOR ADDRESS FOR THE RF11.

Additional explanation:

If the reply to the query for the number of RF11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:177460

177460 IS THE STANDARD CSR ADDRESS FOR THE RF11.

Additional explanation:

This query is repeated for each of the RF11s after the first; the user supplies the CSR address. Note that the queries for interrupt vector and CSR address occur one after the other for each RF11. The repeat sequence repeats both queries.

HOW MANY RK11 CARTRIDGE DISK CONTROLLERS DO YOU HAVE? [D]:

THE RK11-D CARTRIDGE DISK DRIVE AND CONTROL IS A COMPLETE MASS STORAGE SYSTEM FOR MEDIUM VOLUME, RANDOM ACCESS DATA STORAGE. THE SYSTEM INCLUDES A MODULAR MASS STORAGE DEVICE UTILIZING REMOVABLE DISK CARTRIDGES AND A COMPLETE EASY-TO-PROGRAM CONTROL. A DISK CARTRIDGE HOLDS OVER 1.2 MILLION WORDS. THE SYSTEM IS EXPANDABLE UP TO 9.6 MILLION WORDS PER CONTROL (8 DISKS). AN RK11-D INCLUDES A CONTROL UNIT AND THE FIRST DISK DRIVE.

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Additional explanation:

If the answer to this query is non-zero, then the next four queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

DO YOU WANT WRITE CHECK SUPPORT? [Y/N]:

WRITE CHECK INCREASES THE DATA RELIABILITY OF RK05 DISKS AT THE COST OF A DEGRADATION IN DISK THROUGHPUT. WRITE CHECK, IF SELECTED, MAY BE ENABLED/DISABLED DYNAMICALLY ON A PER DRIVE BASIS VIA THE MCR SET COMMAND.

Additional explanation:

Write check is the process whereby the driver performs a read after each write and checks that the data actually matches. If the data cannot be read or does not match the data written, the data is rewritten and another read attempt is performed.

WHAT IS THE VECTOR ADDRESS OF THE NEXT RK11? [0]:220

220 IS THE STANDARD VECTOR ADDRESS FOR THE RK11.

Additional explanation:

If the reply to the query for the number of RK11-Ds was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [0]:177404

177404 IS THE STANDARD CSR ADDRESS FOR THE RK11.

Additional explanation:

This query is repeated for each of the RK11s after the first; the user supplies the CSR address.

HOW MANY DRIVES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of RK11-Ds specified. Note that the queries for the interrupt vector, CSR, and the number of drives occur one after the other for each RK11-D controller. The repeat sequence repeats all three of the queries.

HOW MANY RP11C/E DISK CONTROLLERS DO YOU HAVE? [D]:

THE RP11-C/E IS A COMPLETE MASS STORAGE SYSTEM USING A MAGNETIC DISK PACK WITH 20 DATA SURFACES AND A MOVING READ/WRITE HEAD. THE RP11-C/E INCLUDES A CONTROL UNIT AND THE FIRST DISK PACK DRIVE. THE SYSTEM IS EXPANDABLE UP TO 8 DRIVES, EACH HAVING A CAPACITY OF 20,480,000 (RP03) OR 10,240,000 (RPR02) 16-BIT

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WORDS. ACCESS TIMES ARE 29 MSEC. AVERAGE LATERAL (CYLINDER TO CYLINDER) AND 12.5 MSEC. HALF ROTATIONAL.

Additional explanation:

If the answer to this query is non-zero, then the next four queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT RP11C/E? [O]:254

254 IS THE STANDARD VECTOR ADDRESS FOR THE RP11C/E.

Additional explanation:

If the reply to the query for the number of RP11C/Es was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:176714

176714 IS THE STANDARD CSR ADDRESS FOR THE RP11C/E.

Additional explanation:

This query is repeated for each of the RP11C/Es after the first; the user supplies the CSR address.

HOW MANY DRIVES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of RP11C/E controllers specified. Note that the queries for the interrupt vector, CSR, and the number of drives occur one after the other for each RP11C/E controller. The repeat sequence repeats all three of the queries.

IS THE NEXT DRIVE AN RPR02? [Y/N]:

Additional explanation:

This query is repeated as many times as the number of drives previously specified.

HOW MANY RJ/RWS03-04 FIXED HEAD DISK CONTROLLERS DO YOU HAVE?[D]:

THE RJ/RWS03-04 USES THE RH11 CONTROLLER. THE RJ/RWS03 HAS A CAPACITY OF 256K WORDS; THE RJ/RWS04 HAS A CAPACITY OF 512K WORDS. TRANSFER RATE IS 4 MICROSECONDS PER WORD WITH AN AVERAGE LATENCY OF 8 MILLISECONDS.

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Additional explanation:

If the answer to this query is non-zero, then the next five queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT RJ/RWS03-04? [O]:204

204 IS THE STANDARD VECTOR ADDRESS FOR THE RJ/RWS03-04.

Additional explanation:

If the reply to the query for the number of RJ/RWS03-04s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:172040

172040 IS THE STANDARD CSR ADDRESS FOR THE RJ/RWS03-04.

Additional explanation:

This query is repeated for each of the RJ/RWS03-04s after the first; the user supplies the CSR address.

HOW MANY DRIVES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of RJ/RWS03-04 controllers specified.

WHAT IS THE PHYSICAL UNIT NUMBER OF THE FIRST DRIVE? [D]:

THE TYPICAL RESPONSE IS ZERO; A NON-ZERO REPLY SHOULD BE ARRIVED AT AFTER CONSULTATION WITH A DEC SOFTWARE REPRESENTATIVE.

Additional explanation:

This query is repeated as many times as the number of RJ/RWS03-04 controllers specified. Note that the queries for the interrupt vector, CSR, number of drives, and the unit number of first drive occur one after the other for each RJ/RWS03-04 controller. The repeat sequence repeats all four of the queries.

IS THE NEXT DRIVE AN RS03? [Y/N]:

Additional explanation:

RS03s and RS04s can be mixed on the same controller. This query is repeated as many times as the number of drives previously specified.

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HOW MANY TC11 DECTAPE CONTROLLERS DO YOU HAVE? [D]:

THE TC11-G IS A DUAL-UNIT BIDIRECTIONAL MAGNETIC-TAPE TRANSPORT SYSTEM FOR AUXILIARY DATA STORAGE.

THE SYSTEM STORES INFORMATION AT FIXED POSITIONS ON MAGNETIC TAPE AS IN MAGNETIC DISK OR DRUM STORAGE DEVICES, RATHER THAN AT UNKNOWN OR VARIABLE POSITIONS AS IN CONVENTIONAL MAGNETIC TAPE SYSTEMS.

A DECTAPE SYSTEM CONSISTS OF UP TO 4 DUAL TRANSPORTS, AND A CONTROL UNIT (WHICH WILL BUFFER AND CONTROL INFORMATION FOR UP TO FOUR DUAL TRANSPORTS). A TC11-G INCLUDES A CONTROL UNIT AND THE FIRST DUAL TAPE TRANSPORT.

Additional explanation:

If the answer to this query is non-zero, then the next three queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query will not be pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT TC11? [O]:214

214 IS THE STANDARD VECTOR ADDRESS FOR THE TC11.

Additional explanation:

If the reply to the query for the number of TC11-Gs was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS COMMAND REGISTER ADDRESS? [O]:177342

177342 IS THE STANDARD COMMAND REGISTER ADDRESS FOR THE TC11.

Additional explanation:

This query is repeated for each of the TC11-Gs after the first; the user supplies the command register address.

HOW MANY DRIVES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of TC11-G controllers specified. Note that the queries for the interrupt vector, command register, and the number of drives occur one after the other for each TC11 controller. The repeat sequence repeats all three of the queries.

HOW MANY RX11 FLEXIBLE DISK CONTROLLERS DO YOU HAVE? [D]:

THE RX11 IS AN INDUSTRY-COMPATIBLE DISK STORAGE SYSTEM FOR FLEXIBLE (FLOPPY) DISKS. AN RX11 IS CAPABLE OF CONTROLLING TWO FLEXIBLE DISK DRIVES EACH HAVING A CAPACITY OF 124,128 16-BIT WORDS.

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Additional explanation:

If the answer to this query is non-zero, then the next three queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query will not be pre-answered.

WHAT IS THE VECTOR OF THEN NEXT RX11? [O]:264

264 IS THE STANDARD VECTOR ADDRESS FOR THE RX11.

Additional explanation:

If the reply to the query for the number of RX11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:177170

177170 IS THE STANDARD CSR ADDRESS FOR THE RX11.

Additional explanation:

This query is repeated for each of the RX11s after the first; the user supplies the CSR address.

HOW MANY DRIVES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of RX11 controllers specified. Note that the queries for the interrupt vector, CSR, and the number of drives occur one after the other for each RX11 controller. The repeat sequence repeats all three of the queries.

HOW MANY LP/LS/LV11 LINE PRINTERS DO YOU HAVE? [D]:

THE LP11 HIGH SPEED LINE PRINTER IS AVAILABLE IN SIX MODELS.

| | |
|--------|---|
| LP11-F | 80 COLUMN, 64 CHARACTER |
| LP11-H | 80 COLUMN, 96 CHARACTER |
| LP11-J | 132 COLUMN, 64 CHARACTER |
| LP11-K | 132 COLUMN, 96 CHARACTER |
| LP11-R | 132 COLUMN, 64 CHARACTER (HEAVY DUTY, HIGH SPEED) |
| LP11-S | 132 COLUMN, 96 CHARACTER (HEAVY DUTY, HIGH SPEED) |
| LP11-V | 132 COLUMN, 64 CHARACTER |
| LP11-W | 132 COLUMN, 96 CHARACTER |

THE LS11 LINE PRINTER IS A MEDIUM-SPEED IMPACT DOT-MATRIX LINE PRINTER FOR THE PDP-11 FAMILY. THE LINE PRINTER PRINTS AT A RATE OF 165 CHARACTERS PER SECOND AT 10 CHARACTERS PER INCH WITH UP TO 132 CHARACTERS PER LINE.

THE LV11 IS A HIGH-SPEED ELECTROSTATIC PRINTER-PLOTTER. ONLY THE PRINT OPTION IS SUPPORTED UNDER RSX-11M/S.

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Additional explanation:

If the answer to this query is non-zero, then the next five queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

DO YOU WANT FAST PRINTER SUPPORT? [Y/N]:

TO ENSURE MAXIMUM PRINT THROUGHPUT ON THE LP11-R OR LP11-S, SELECT THIS OPTION.

WHAT IS THE VECTOR ADDRESS OF THE NEXT LP/LS/LV11? [O]:200

200 IS THE STANDARD VECTOR ADDRESS FOR THE LP/LS/LP11.

Additional explanation:

If the reply to the query for the number of LP/LS/LV11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:177514

177514 IS THE STANDARD CSR ADDRESS FOR THE LP/LS/LV11.

Additional explanation:

This query is repeated for each of the LP/LS/LV11s after the first; the user supplies the CSR address.

IS IT AN LS11 OR LP11-V/W? [Y/N]:

FAILURE TO PROPERLY SPECIFY PRINTER TYPE MAY CAUSE OUTPUT FAILURES.

Additional explanation:

This query is repeated for each LP/LS/LV11 specified.

IS IT A 132 COLUMN PRINTER? [Y/N]:

FAILURE TO PROPERLY SPECIFY LINE WIDTH WILL CAUSE BUFFER TRUNCATION. A NO ANSWER DEFAULTS TO 80 COLUMNS.

Additional explanation:

This query appears as many times as the number of printers specified. Note that the queries for the interrupt vector, CSR, LS11, and line width, occur one after the other for each printer specified. The repeat sequence repeats all four of the queries.

HOW MANY LPS11 LABORATORY PERIPHERAL SYSTEMS DO YOU HAVE? [D]:

THE LPS11 LABORATORY PERIPHERAL SYSTEM IS A REAL-TIME SUBSYSTEM WHICH INTERFACES TO THE PDP-11 FAMILY OF COMPUTERS. THE SYSTEM

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HOUSES A 12-BIT A/D CONVERTER, PROGRAMMABLE REAL-TIME CLOCK, DISPLAY CONTROLLER AND A 16-BIT DIGITAL I/O OPTION.

Additional explanation:

If the answer to this query is non-zero, then the next eight queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE CLOCK VECTOR ADDRESS OF THE NEXT LPS11? [O]:

THE CLOCK VECTOR ADDRESS FOR THE LPS11 IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the number of LPS11s specified was greater than 1, this query is repeated by SGN for each LPS11.

WHAT IS ITS CSR ADDRESS? [O]:170400

170400 IS THE STANDARD CSR ADDRESS FOR THE LPS11.

Additional explanation:

This query is repeated for each of the LPS11s after the first; the user supplies the CSR address.

HOW MANY A/D CHANNELS DOES IT HAVE? [D]:

RESPONSE LIMITS: 1.-64.

Additional explanation:

If the number of A/D channels is 16 or less, the following query is posed; otherwise it is omitted.

IS THE GAIN RANGING OPTION PRESENT? [Y/N]:

Additional explanation:

If the gain ranging option is present, then the following query is posed; otherwise it is omitted.

WHAT IS THE POLARITY MASK WORD? [O]:

THE POLARITY MASK WORD CORRESPONDS ONE-TO-ONE WITH THE 16 POSSIBLE CHANNELS. A 1-BIT DESIGNATES A UNI-POLAR CHANNEL. A 0-BIT DESIGNATES A BI-POLAR CHANNEL.

IS THE D/A OPTION PRESENT? [Y/N]:

Additional explanation:

If the D/A option is present, then the following query is posed; otherwise it is omitted.

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HOW MANY D/A CHANNELS DOES IT HAVE? [D]:

RESPONSE LIMITS: 1.-10.

Additional explanation:

The first two D/A channels correspond to the X and Y registers of the display controller. Up to eight additional D/A channels may be specified if the external D/A option is present.

WHAT IS THE MAXIMUM NUMBER OF SAMPLES PER SECOND? [D]:

THE QUERY RESPONSE VALUE MUST BE EVENLY DIVISIBLE INTO 10000.

RESPONSE LIMITS: 1.-2500.

Additional explanation:

This query appears as many times as the number of LPS11s specified. Note that the queries for interrupt vector, CSR, number of A/D channels, gain ranging, D/A option, and maximum sample rate occur one after the other for each LPS11. The repeat sequence repeats all six of the queries.

HOW MANY TJ/TWU16 MAGTAPE CONTROLLERS DO YOU HAVE? [D]:

THE TJ/TWU16 IS A MAGNETIC TAPE SYSTEM IDEALLY SUITED FOR WRITING, READING, AND STORING LARGE VOLUMES OF DATA AND PROGRAMS IN A SERIAL MANNER. THE 10 1/2-INCH TAPE REELS CONTAIN UP TO 2400 FEET OF TAPE. THE TAPE IS 9-TRACK, RECORDED EITHER NRZI OR PHASE ENCODED WITH RECORDING DENSITIES OF 800 OR 1600 BPI.

Additional explanation:

If the response to this query is non-zero, then the next four queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT TJ/TWU16? [O]:224

224 IS THE STANDARD VECTOR ADDRESS FOR THE TJ/TWU16.

Additional explanation:

If the reply to the number of TJ/TWU16s was greater than 1, this query is repeated by SGN for each TJ/TWU16. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:172440

172440 IS THE STANDARD CSR ADDRESS FOR THE TJ/TWU16.

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Additional explanation:

This query is repeated for each of the TJ/TWU16s after the first; the user supplies the CSR address.

HOW MANY DRIVES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of TJ/TWU16 controllers specified.

WHAT IS THE PHYSICAL UNIT NUMBER OF THE TM02 FORMATTER? [D]:

A TYPICAL RESPONSE IS ZERO; A NON-ZERO RESPONSE SHOULD BE ARRIVED AT AFTER CONSULTATION WITH A DEC SOFTWARE REPRESENTATIVE.

Additional explanation:

This query appears as many times as the number of TJ/TWU16s specified. Note that the queries for the interrupt vector, CSR, the number of drives, and the physical unit number occur one after the other for each TJ/TWU16. The repeat sequence repeats all four of the queries.

HOW MANY TM/TMall MAGTAPE CONTROLLERS DO YOU HAVE? [D]:

THE TM/TMall IS A MAGNETIC TAPE SYSTEM IDEALLY SUITED FOR WRITING, READING, AND STORING LARGE VOLUMES OF DATA AND PROGRAMS IN A SERIAL MANNER. THE SYSTEM READS AND WRITES IN INDUSTRY-COMPATIBLE FORMAT. TU10 DRIVES SUPPORT 10 1/2-INCH REELS CONTAINING UP TO 2400 FEET OF TAPE UPON WHICH OVER 180 MILLION BITS OF DATA CAN BE STORED ON HIGH DENSITY 9-TRACK TAPE OR OVER 140 MILLION BITS CAN BE STORED ON HIGH DENSITY 7-TRACK TAPE. TS03 DRIVES SUPPORT 7-INCH REELS CONTAINING UP TO 600 FEET OF TAPE IN HIGH DENSITY 9-TRACK FORMAT.

Additional explanation:

If the response to this query is non-zero, then the next three queries appear; otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT TM/TMall? [O]:224

224 IS THE STANDARD VECTOR ADDRESS FOR THE TM/TMall.

Additional explanation:

If the reply to the query for the number of TM/TMalls was greater than 1, this query is repeated by SGN for each TM/TMall. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS COMMAND REGISTER ADDRESS? [O]:172522

SYSGEN DIALOGUE DETAILS

172522 IS THE STANDARD COMMAND REGISTER ADDRESS FOR THE TM/TMAll.

Additional explanation:

This query is repeated for each of the TM/TMAlls after the first; the user supplies the command register address.

HOW MANY DRIVES DOES IT HAVE?[D]:

Additional explanation:

This query appears as many times as the number of TM/TMAlls specified. Note that the queries for the interrupt vector, command register, and the number of drives occur one after the other for each TM/TMAll. The repeat sequence repeats all three of the queries.

HOW MANY PC11 PAPER TAPE READER/PUNCHES DO YOU HAVE? [D]:

THE PC11 IS A HIGH SPEED PAPER TAPE READER/PUNCH THAT IS CAPABLE OF READING EIGHT-HOLE UNOILED PERFORATED PAPER TAPE AT 300 CHARACTERS PER SECOND, AND PUNCHING TAPE AT 50 CHARACTERS PER SECOND.

Additional explanation:

If the answer to this query is non-zero, then the next two queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query will not be pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT PC11? [O]70

70 IS THE STANDARD VECTOR ADDRESS FOR THE PC11.

Additional explanation:

If the reply to the query for the number of PC11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:177550

177550 IS THE STANDARD CSR ADDRESS FOR THE PC11.

Additional explanation:

This query is repeated for each of the PC11s after the first; the user supplies the CSR address. Note that queries for interrupt vector and CSR occur one after the other for each PC11. The repeat sequence repeats both queries.

HOW MANY PR11 PAPER TAPE READERS DO YOU HAVE (EXCLUDING PC11S)? [D]:

SYSGEN DIALOGUE DETAILS

THE PR11 IS A HIGH SPEED PAPER TAPE READER THAT IS CAPABLE OF READING EIGHT-HOLE UNOILED PERFORATED PAPER TAPE AT 300 CHARACTERS PER SECOND.

Additional explanation:

If the answer to this query is non-zero, then the next two queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query will not be pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT PR11? [O]:70

70 IS THE STANDARD VECTOR ADDRESS FOR THE PR11.

Additional explanation:

If the reply to the query for the number of PR11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:177550

177550 IS THE STANDARD CSR ADDRESS FOR THE PR11.

Additional explanation:

This query is repeated for each of the PR11s after the first; the user supplies the CSR address. Note that queries for interrupt vector and CSR occur one after the for each PR11. The repeat sequence repeats both queries.

HOW MANY DL11 LINE INTERFACES DO YOU HAVE (INCLUDING CONSOLE)? [D]:

NOTE

THE OPERATOR CONSOLE MUST BE ATTACHED VIA A DL11.

THE DL11 SERIES OF ASYNCHRONOUS SINGLE LINE INTERFACES HANDLE FULL OR HALF DUPLEX COMMUNICATION BETWEEN A WIDE VARIETY OF SERIAL COMMUNICATION CHANNELS AND A PDP-11 COMPUTER.

WITH A DL11 INTERFACE, A PDP-11 COMPUTER CAN COMMUNICATE WITH A LOCAL TERMINAL SUCH AS A CONSOLE DECWRITER.

Additional explanation:

If the answer to this query is non-zero, then the next two queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query will not be pre-answered.

SYSGEN DIALOGUE DETAILS

WHAT IS THE VECTOR ADDRESS OF THE NEXT DL11? [O]:60

60 IS THE STANDARD VECTOR ADDRESS FOR THE FIRST DL11. ADDITIONAL VECTORS ARE ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE LOCATIONS IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DL11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [O]:177560

177560 IS THE STANDARD CSR ADDRESS FOR THE FIRST DL11. ADDITIONAL DL11 CSR ADDRESSES ARE ASSIGNED IN THE RANGE 176000 TO 176770. CONSULT FIELD SERVICE TO DETERMINE LOCATIONS IF UNKNOWN.

Additional explanation:

This query is repeated for each of the DL11s after the first; the user supplies the CSR address. Note that queries for interrupt vector and CSR occur one after the other for each DL11. The repeat sequence repeats both of the queries.

HOW MANY DH11 ASYNCHRONOUS LINE MULTIPLEXERS DO YOU HAVE? [D]:

THE DH11 MULTIPLEXER CONNECTS THE PDP-11 WITH 16 ASYNCHRONOUS SERIAL COMMUNICATIONS LINES OPERATING WITH INDIVIDUALLY PROGRAMMABLE PARAMETERS. THESE PARAMETERS ARE:

NUMBER OF STOP BITS
TRANSMITTER SPEED (BAUD)
RECEIVER SPEED (BAUD)

Additional explanation:

If the answer to the this query is non-zero, then the next six queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE TOTAL NUMBER OF REMOTE DIAL-UP LINES? [D]:

REMOTE LINES WILL OCCUPY CONSECUTIVE LINE LOCATIONS, AND IF MORE THAN 16 REMOTE LINES ARE SPECIFIED THEY MUST ALSO OCCUPY CONSECUTIVE DH11'S. ASSIGNMENT OF LINES IS BY GROUPS OF 4.

WHAT IS THE TOTAL NUMBER OF LOCAL LINES? [D]:

LOCAL LINES WILL ALSO OCCUPY CONSECUTIVE LINE AND DH11'S. THEIR ASSIGNMENT FOLLOWS THE ASSIGNMENT OF ANY REMOTE LINES SPECIFIED.

SYSGEN DIALOGUE DETAILS

LOCAL LINES CAN BE EITHER EIA OR 20 MILLIAMP. EACH TYPE MUST HAVE AN APPROPRIATE INTERFACE, AND THE INTERFACE SERVICES A GROUP OF FOUR LINES OF THE SAME TYPE. THE RESPONSE TO THE LOCAL LINE QUERY MAY BE LARGER THAN THE ACTUAL NUMBER OF LOCAL LINES, SINCE ALLOCATION IS BY GROUPS OF FOUR. HENCE IF SIX EIA LINES ARE INSTALLED, TWO LINE GROUP SLOTS, WHICH CONTAIN EIGHT LINES, ARE NEEDED.

THE REQUIRED RESPONSE TO THE LOCAL LINE QUERY CAN BE CALCULATED BY SUMMING THE NUMBER OF EIA AND 20 MILLIAMP LINE GROUPS (EACH LINE GROUP CONTAINS SLOTS FOR FOUR LINES) AND MULTIPLYING BY FOUR.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DH11? [0]:

THE VECTOR ADDRESS FOR THE DH11 IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DH11s was greater than 1, then this query is repeated by SGN for each DH11.

WHAT IS ITS CSR ADDRESS? [0]:

THE CSR ADDRESS FOR THE DH11 IS ASSIGNED FROM THE FLOATING ADDRESS SPACE STARTING AT 160010. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DH11s was greater than 1, then this query is repeated by SGN for each DH11.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DM11-BB? [0]:

THE VECTOR ADDRESS FOR THE DM11-BB IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN. IF A USER HAS SPECIFIED THE EXISTENCE OF REMOTE DIAL-UP LINES THE DM11-BB INTERFACE IS REQUIRED. ONE DM11-BB CAN SERVICE UP TO 16 REMOTE DIAL-UP LINES.

Additional explanation:

If the reply to the query for the number of remote lines was non-zero, this query is repeated by SGN for each DM11-BB that is required.

WHAT IS ITS CSR ADDRESS? [0]:170500

170500 IS THE STANDARD CSR ADDRESS FOR THE DM11-BB.

SYSGEN DIALOGUE DETAILS

Additional explanation:

If the reply to the query for the number of remote lines was non-zero, this query is repeated by SGN for each DM11-BB that is required. Note that the queries for remote dial-up lines, local lines, DH11 interrupt vector, DH11 CSR, DM11-BB interrupt vector, and DM11-BB CSR occur one after the other for each DH11. The repeat sequence repeats all six of the queries.

HOW MANY DJ11 ASYNCHRONOUS LINE MULTIPLEXERS DO YOU HAVE? [D]:

THE DJ11 IS A MULTIPLEXER INTERFACE BETWEEN 16 ASYNCHRONOUS SERIAL DATA-COMMUNICATION CHANNELS AND THE PDP-11 UNIBUS. THE DJ11 IS A UNIT WHOSE CHARACTER FORMATS AND OPERATING SPEEDS ARE JUMPER OR STRAP SELECTABLE IN GROUPS OF FOUR LINES.

Additional explanation:

If the answer to this query is non-zero, then the next three queries appear; otherwise they are not displayed.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DJ11? [O]:

THE VECTOR ADDRESS FOR THE DJ11 IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DJ11s was non-zero, this query is repeated by SGN for each DJ11.

WHAT IS ITS CSR ADDRESS? [O]:

THE CSR ADDRESS FOR THE DJ11 IS ASSIGNED FROM THE FLOATING ADDRESS SPACE STARTING AT 160010. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DJ11s was non-zero, this query is repeated by SGN for each DJ11.

HOW MANY LINES DOES IT HAVE? [D]:

Additional explanation:

This query appears as many times as the number of DJ11s specified. Note that the queries for the interrupt vector, CSR, and the number of lines occur one after the other for each DJ11. The repeat sequence repeats all three of the queries.

SYSGEN DIALOGUE DETAILS

HOW MANY ICS/ICR-11 INDUSTRIAL SUBSYSTEMS DO YOU HAVE? [D]:

THE ICS-11 AND ICR-11 ARE PROCESS I/O SUBSYSTEMS WHICH PROVIDE ANALOG AND DIGITAL INTERFACE CAPABILITIES BETWEEN THE PDP-11 COMPUTER SYSTEMS AND TYPICAL INDUSTRIAL INSTRUMENTATION AND TRANSDUCERS. THE ICS-11 IS A LOCAL SUBSYSTEM FOR DIRECT CONNECTION TO THE PDP-11 UNIBUS. THE ICR-11 MAY BE REMOTELY LOCATED FROM THE PDP-11 UP TO A MAXIMUM OF 6000 FEET (1830 METERS) AND CONNECTED VIA A HIGH SPEED SERIAL LINE INTERFACE.

EACH ICS/ICR-11 CAN ACCOMMODATE UP TO 16 FUNCTIONAL I/O MODULES. RSX-11M/S SUPPORTS ANY MIXTURE OF ICS-11 AND ICR-11 SUBSYSTEMS TO A MAXIMUM OF 12.

Additional explanation:

If the answer to this query is non-zero, then the next 20 queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

DO YOU WANT TASK ACTIVATION FROM UNSOLICITED INTERRUPTS? [Y/N]:

THE RSX-11M/S ICS/ICR-11 DRIVER PROVIDES THE CAPABILITY TO INITIATE A TASK AS THE RESULT OF AN UNSOLICITED (EXTERNAL) INTERRUPT. IF THIS OPTION IS SELECTED, SUPPORT IS PROVIDED TO ALLOW TASKS TO BE LINKED TO INTERRUPTS AND TO OBTAIN ACTIVATION DATA WHEN INITIATED.

WHAT IS THE VECTOR ADDRESS OF THE NEXT ICS/ICR-11? 10]:234

234 IS THE STANDARD VECTOR ADDRESS FOR THE FIRST ICS/ICR-11. ADDITIONAL VECTORS ARE ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE LOCATIONS IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of ICS/ICR-11s was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of the query, however, the user is required to supply an interrupt vector address.

WHAT IS ITS CSR ADDRESS? [0]:171776

171776 IS THE STANDARD CSR ADDRESS FOR THE FIRST ICS/ICR-11. ADDITIONAL ICS/ICR-11 CSR ADDRESSES ARE ASSIGNED STARTING AT 171776 AND PROCEED DOWNWARD AT EIGHT BYTE INTERVALS (E.G. 171766, 171756, 171746, ETC.).

Additional explanation:

This query is repeated for each of the ICS/ICR-11s after the first; the user supplies the CSR address.

IS IT AN ICR-11? [Y/N]:

SYSGEN DIALOGUE DETAILS

Additional explanation:

If the reply to the query for the number of ICS/ICR-11s was non-zero, this query is repeated by SGN for each ICS/ICR-11.

HOW MANY A/D CONVERTOR MODULES DOES THIS SUBSYSTEM HAVE? [D]:

THE IAD-IA IS A MERCURY WETTED FLYING CAPACITOR ANALOG TO DIGITAL CONVERTOR WITH 8 CHANNELS OF WIDE RANGE DIFFERENTIAL INPUT.

NOTE

MODULE NUMBERS REPRESENT THE RELATIVE POSITION WITHIN AN ICS/ICR-11 AND START AT ZERO AND PROCEED TO 15.

Additional explanation:

This query appears as many times as the number of ICS/ICR-11s specified. If this query is answered with a non-zero value, then the next two queries are posed.

WHAT IS THE MODULE NUMBER OF THE NEXT A/D CONVERTOR? [D]:

Additional explanation:

This query is repeated as many times as the number of A/D convertors specified.

HOW MANY MULTIPLEXERS ARE ASSOCIATED WITH IT? [D]:

THE IMX-IA IS A 16 CHANNEL EXPANDER MULTIPLEXER FOR THE IAD-IA A/D CONVERTOR. UP TO 7 IMX-IA MODULES MAY BE ADDED TO EACH IAD-IA A/D CONVERTOR. ALL IMX-IA MODULES MUST BE PHYSICALLY ADJACENT TO THEIR ASSOCIATED IAD-IA A/D CONVERTOR.

Additional explanation:

This query is repeated as many times as the number of A/D convertors specified. Note that the queries for module number and number of multiplexers occur one after the other for each A/D convertor. The repeat sequence repeats both queries.

HOW MANY D/A CONVERTOR MODULES DOES THIS SUBSYSTEM HAVE? [D]:

THE IDA-OA IS A 4 CHANNEL DIGITAL TO ANALOG CONVERTOR CAPABLE OF DRIVING 0 TO 10 VOLTS OR 0 TO 50 MILLIAMPS.

Additional explanation:

This query appears as many times as the number of ICS/ICR-11s specified. If this query is answered with a non-zero value, then the next query is posed.

SYSGEN DIALOGUE DETAILS

WHAT IS THE MODULE NUMBER OF THE NEXT D/A CONVERTOR? [D]:

Additional explanation:

This query is repeated as many times as the number of D/A convertors specified.

HOW MANY SINGLE-SHOT OUTPUT MODULES DOES THIS SUBSYSTEM HAVE? [D]:

THE SINGLE-SHOT OUTPUTS AVAILABLE FOR THE ICS/ICR-11 INCLUDE THE IDC-OB DC VOLTAGE OUTPUT AND THE IAC-OB AC VOLTAGE OUTPUT MODULES.

Additional explanation:

This query appears as many times as the number of ICS/ICR-11s specified. If this query is answered with a non-zero value, then the next query is posed.

WHAT IS THE MODULE NUMBER OF THE NEXT SINGLE-SHOT OUTPUT MODULE? [D]:

Additional explanation:

This query is repeated as many times as the number of single-shot output modules specified.

HOW MANY BI-STABLE OUTPUT MODULES DOES THIS SUBSYSTEM HAVE? [D]:

THE BI-STABLE DIGITAL OUTPUT MODULES FOR THE ICS/ICR-11 INCLUDE THE IRL-OA AND IRL-OB RELAY OUTPUTS, AND THE IAC-OA AC VOLTAGE OUTPUTS.

Additional explanation:

This query appears as many times as the number of ICS/ICR-11s specified. If this query is answered with a non-zero value, then the next query is posed.

WHAT IS THE MODULE NUMBER OF THE NEXT BI-STABLE OUTPUT MODULE? [D]:

Additional explanation:

This query is repeated as many times as the number of bi-stable output modules specified.

HOW MANY DIGITAL SENSE MODULES DOES THIS SUBSYSTEM HAVE? [D]:

THE DIGITAL SENSE MODULES FOR THE ICS/ICR-11 INCLUDE THE IDC-IA ISOLATED DC INPUT, THE IDC-ID NON-ISOLATED INPUT, AND THE IAC-IA AC INPUT.

Additional explanation:

This query appears as many times as the number of ICS/ICR-11s specified. If this query is answered with a non-zero value, then the next query is posed.

WHAT IS THE MODULE NUMBER OF THE NEXT DIGITAL SENSE MODULE? [D]:

SYSGEN DIALOGUE DETAILS

Additional explanation:

This query is repeated as many times as the number of digital sense modules specified.

HOW MANY DIGITAL INTERRUPT MODULES DOES THIS SUBSYSTEM HAVE? [D]:

THE DIGITAL INTERRUPT MODULES FOR THE ICS/ICR-11 INCLUDE THE IDC-IB ISOLATED DC INTERRUPT, THE IDC-IE NON-ISOLATED DC INTERRUPT, AND THE IAC-IB AC INTERRUPT.

Additional explanation:

This query appears as many times as the number of ICS/ICR-11s specified. If this query is answered with a non-zero value, then the next query is posed.

WHAT IS THE MODULE NUMBER OF THE NEXT DIGITAL INTERRUPT MODULE? [D]:

Additional explanation:

This query is repeated as many times as the number of digital interrupt modules specified.

HOW MANY I/O COUNTER MODULES DOES THIS SUBSYSTEM HAVE? [D]:

THE IDC-IC IS A 16 BIT BINARY UP-COUNTER WITH PRESCALAR INPUT AND BOTH EXTERNAL TRIGGER AND OVERFLOW OUTPUTS.

Additional explanation:

This query appears as many times as the number of ICS/ICR-11s specified. Note that the queries for interrupt vector, CSR, and ICS/ICR-11 and the key queries for A/D convertors, D/A convertors, single-shot outputs, bi-stable outputs, digital sense, digital interrupt, and I/O counters occur one after the other for each ICS/ICR-11. The repeat sequence repeats all ten queries. If the answer to this query is non-zero, then the next query is posed.

WHAT IS THE MODULE NUMBER OF THE NEXT I/O COUNTER MODULE? [D]:

Additional explanation:

This query is repeated as many times as the number of I/O counter modules specified.

DO YOU WANT MODULE STATUS RESTORED ON POWER AND ERROR RECOVERY? [Y/N]:

THE RSX-11M/S ICS/ICR-11 DRIVER WILL OPTIONALLY RESTORE THE STATE OF ALL BI-STABLE DIGITAL OUTPUTS, ANALOG OUTPUTS, AND I/O PRESCALAR VALUES ON POWER RECOVERY AND RECOVERY FROM SUSTAINED ICR-11 SERIAL TRANSMISSION ERRORS.

Additional explanation:

This query is posed only if the target system contains any bistable output, D/A convertor, or I/O counter modules.

SYSGEN DIALOGUE DETAILS

HOW MANY SERIAL LINE ERRORS ARE ACCEPTABLE IN ONE SECOND? [D]:

THE RSX-11M/S ICS/ICR-11 DRIVER WILL PLACE AN ICR-11 SUBSYSTEM OFFLINE IF THE SERIAL LINE ERRORS EXCEED A PREDEFINED LIMIT DURING ONE SECOND OF ELAPSED TIME. THE SUBSYSTEM WILL AUTOMATICALLY BE PLACED ONLINE WHEN SERIAL LINE ERRORS HAVE STOPPED.

RESPONSE LIMITS: 1.-5000.

Additional explanation:

This query is posed only if the target system contains an ICR-11 subsystem.

HOW MANY UDC11 UNIVERSAL DIGITAL CONTROLLERS DO YOU HAVE? [D]:

THE UDC11 IS AN INPUT/OUTPUT OPTION FOR INDUSTRIAL AND PROCESS CONTROL APPLICATIONS THAT USE THE PDP-11 COMPUTER. THE UDC11 INTERROGATES OR DRIVES UP TO 252 DIRECTLY ADDRESSABLE DIGITAL SENSE AND CONTROL FUNCTIONAL I/O MODULES OR UP TO 4032 INDIVIDUAL DIGITAL POINTS.

RSX-11M/S SUPPORTS ONLY ONE UDC11 CONTROLLER. THE ONLY VALID ANSWERS TO THIS QUERY ARE 0 AND 1.

Additional explanation:

If the answer to this query is non-zero, then the next 17 queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS FOR THE UDC11? [O]:234

234 IS THE STANDARD VECTOR ADDRESS FOR THE UDC11.

WHAT IS ITS CSR ADDRESS? [O]:171776

171776 IS THE STANDARD CSR ADDRESS FOR THE UDC11.

Additional explanation:

The UDC11 can support up to 252 modules, which can be classified into seven types:

1. Analog input;
2. Analog output;
3. Digital interrupt;
4. Digital sense;
5. Bistable output;
6. Single-shot output, and
7. I/O counters.

RSX-11M/RSX-11S requires that modules of the same type occupy consecutive locations within the UDC11. Thus, if there are seven analog input modules and the first module starts at slot 0, then the last must be at slot 6. Obviously, module types cannot overlap, though unassigned slots are permitted.

SYSGEN DIALOGUE DETAILS

The queries which follow establish the module boundaries.

HOW MANY ADU01 ANALOG INPUT MODULES DO YOU HAVE?

WHAT IS THE MODULE NUMBER OF THE FIRST ANALOG INPUT? [D]:

HOW MANY IAD-IA ANALOG INPUT MODULES DO YOU HAVE? [D]:

WHAT IS THE MODULE NUMBER OF THE FIRST ANALOG INPUT? [D]:

HOW MANY ANALOG OUTPUT MODULES DO YOU HAVE? [D]:

WHAT IS THE MODULE NUMBER OF THE FIRST ANALOG OUTPUT? [D]:

HOW MANY DIGITAL INTERRUPT MODULES DO YOU HAVE? [D]:

WHAT IS THE MODULE NUMBER OF THE FIRST DIGITAL INTERRUPT? [D]:

HOW MAY DIGITAL SENSE MODULES DO YOU HAVE? [D]:

WHAT IS THE MODULE NUMBER OF THE FIRST DIGITAL SENSE INPUT? [D]:

HOW MANY BISTABLE OUTPUT MODULES DO YOU HAVE? [D]:

WHAT IS THE MODULE NUMBER OF THE FIRST BISTABLE OUTPUT? [D]:

HOW MANY SINGLE-SHOT OUTPUT MODULES DO YOU HAVE? [D]:

WHAT IS THE MODULE NUMBER OF THE FIRST SINGLE-SHOT OUTPUT? [D]:

HOW MANY I/O COUNTER MODULES DO YOU HAVE? [D]:

WHAT IS THE MODULE NUMBER OF THE FIRST I/O COUNTER? [D]:

HOW MANY DAll-B PARALLEL LINE INTERFACES DO YOU HAVE? [D]:

THE DAll-B UNIBUS LINK IS A HIGH-SPEED, HALF-DUPLEX CHANNEL FOR CONNECTING TWO PDP-11 COMPUTERS OVER A DISTANCE OF UP TO 100 FEET (30 METERS). USING THE DIRECT-MEMORY-ACCESS FACILITIES OF EACH COMPUTER, IT IS CAPABLE OF TRANSFERRING BLOCKS OF DATA AT HIGH DATA RATES WITH MINIMAL PROCESSOR OVERHEAD.

Additional explanation:

If the answer to this query is non-zero, then the next two queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query will not be pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DAll-B? [O]:124

124 IS THE STANDARD VECTOR ADDRESS FOR THE DAll-B.

Additional explanation:

If the reply to the query for the number of DAll-Bs was greater than 1, then this query is repeated by SGN. On the second and subsequent displays of this query, however, the user is required to supply an interrupt vector address.

SYSGEN DIALOGUE DETAILS

WHAT IS ITS CSR ADDRESS? [O]:172414

172414 IS THE STANDARD CSR ADDRESS FOR THE DA-11B.

Additional explanation:

This query is repeated for each of the DAll-Bs after the first; the user supplies the CSR address. Note that queries for interrupt vector and CSR occur one after the other for each DAll-B. The repeat sequence repeats both queries.

HOW MANY DL11-E ASYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:

THE DL11 SERIES OF ASYNCHRONOUS SINGLE LINE INTERFACES HANDLE FULL OR HALF DUPLEX COMMUNICATION BETWEEN A WIDE VARIETY OF SERIAL COMMUNICATION CHANNELS AND A PDP-11 COMPUTER.

Additional explanation:

If the answer to this query is non-zero, then the next four queries appear. Otherwise they are not displayed.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DL11-E? [O]:

THE VECTOR ADDRESS FOR THE DL11-E IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DL11-Es was greater than 1, this query is repeated by SGN for each DL11-E.

WHAT IS ITS CSR ADDRESS? [O]:

THE CSR ADDRESS FOR THE DL11-E IS ASSIGNED FROM THE ADDRESS SPACE STARTING AT 175610. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DL11-Es was greater than 1, this query is repeated for each DL11-E.

IS IT A HALF DUPLEX LINE? [Y/N]:

Additional explanation:

If the reply to the query for the number of DL11-Es was greater than 1, this query is repeated for each DL11-E.

SYSGEN DIALOGUE DETAILS

HOW MANY SYNC CHARACTERS ARE REQUIRED IN A SYNC LEADER? [D]:

RESPONSE LIMITS: 3.-14.

Additional explanation:

If the reply to the query for the number of DL11-Es was greater than 1, this query is repeated for each DL11-E. Note that the queries for interrupt vector, CSR, half duplex, and sync leader occur one after the other for each DL11-E. The repeat sequence repeats all four queries.

HOW MANY DP11 SYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:

THE DP11 PROVIDES A DOUBLE-BUFFERED PROGRAM INTERRUPT INTERFACE BETWEEN A PDP-11 AND A SERIAL SYNCHRONOUS LINE.

THE DP11 INTERFACE HANDLES A WIDE VARIETY OF TERMINAL AND LINE DISCIPLINES (I.E., LINE CONTROL PROCEDURES AND ERROR CONTROL TECHNIQUES). A PROGRAMMER CAN VARY SYNC CHARACTER, CHARACTER SIZE, AND CAN ACCESS MODEM CONTROL LEADS. AUTOMATIC SYNC CHARACTER STRIPPING AND AUTOMATIC IDLING ARE ALSO PROGRAM SELECTABLE. WHILE IDLING, THE DP11 TRANSMITS THE CONTENTS OF THE SYNC BUFFER.

Additional explanation:

If the answer to this query is non-zero, then the next four queries appear. Otherwise they are not displayed. If the reply is terminated with ALTMODE, the subsidiary queries for this query are not pre-answered.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DP11? [O]:

THE VECTOR ADDRESS FOR THE DP11 IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DP11s was greater than 1, this query is repeated by SGN for each DP11.

WHAT IS ITS CSR ADDRESS? [O]:174770

174770 IS THE STANDARD CSR ADDRESS FOR THE DP11.

Additional explanation:

This query is repeated for each of the DP11s after the first; the user supplies the CSR address.

IS IT A HALF DUPLEX LINE? [Y/N]:

Additional explanation:

If the reply to the query for the number of DP11s was greater than 1, this query is repeated by SGN for each DP11.

SYSGEN DIALOGUE DETAILS

HOW MANY SYNC CHARACTERS ARE REQUIRED IN A SYNC LEADER? [D]:

RESPONSE LIMITS: 3.-14.

Additional explanation:

If the reply to the query for the number of DP11s was greater than 1, this query is repeated for each DP11. Note that the queries for interrupt vector, CSR, half duplex, and sync leader occur one after the other for each DP11. The repeat sequence repeats all four queries.

HOW MANY DQ11 SYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:

THE DQ11 IS A HIGH-SPEED, DOUBLE BUFFERED COMMUNICATIONS DEVICE DESIGNED TO INTERFACE THE PDP-11 PROCESSOR TO A SERIAL SYNCHRONOUS COMMUNICATION LINE. USING THE DIRECT-MEMORY-ACCESS FACILITIES OF THE PDP-11, IT IS CAPABLE OF TRANSFERRING BLOCKS OF DATA AT HIGH DATA RATES WITH MINIMAL PROCESSOR OVERHEAD.

Additional explanation:

If the answer to this query is non-zero, then the next six queries appear. Otherwise they are not displayed.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DQ11? [O]:

THE VECTOR ADDRESS FOR THE DQ11 IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DQ11s was greater than 1, this query is repeated by SGN for each DQ11.

WHAT IS ITS CSR ADDRESS? [O]:

THE CSR ADDRESS FOR THE DQ11 IS ASSIGNED FROM THE FLOATING ADDRESS SPACE STARTING AT 160010. CONSULT FIELD SERVICE TO DETERMINE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DQ11s was greater than 1, this query is repeated by SGN for each DQ11.

IS IT A HALF DUPLEX LINE? [Y/N]:

Additional explanation:

If the reply to the query for the number of DQ11s was greater than 1, this query is repeated by SGN for each DQ11.

SYSGEN DIALOGUE DETAILS

DOES IT HAVE THE ERROR DETECTION EXPANDER UNIT? [Y/N]:

DOES IT HAVE THE CHARACTER DETECTION EXPANDER UNIT? [Y/N]:

HOW MANY SYNC CHARACTERS ARE REQUIRED IN A SYNC LEADER? [Y/N]:

RESPONSE LIMITS: 3.-14.

Additional explanation:

If the reply to the query for the number of DQ11s was greater than 1, this query is repeated for each DQ11. Note that the queries for interrupt vector, CSR, half duplex, error detection, character detection, and sync leader occur one after the other for each DQ11. The repeat sequence repeats all six queries.

HOW MANY DULL ASYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:

THE DULL PROVIDES A DOUBLE-BUFFERED PROGRAM INTERFACE BETWEEN A PDP-11 AND A SERIAL SYNCHRONOUS LINE.

THE DULL PROVIDES A FLEXIBLE INTERFACE IN THAT THE PROGRAMMER CAN SPECIFY THE SYNC AND CHARACTER SIZE. MODEM CONTROL CAPABILITY ALLOWS THE USE OF THE DULL IN SWITCHED OR DEDICATED APPLICATIONS. THE INTERFACE PROVIDES STRIP SYNC AND IDLE SYNC FEATURES TO SIMPLIFY PROGRAMMING AND REMOVE PROCESSOR OVERHEAD.

Additional explanation:

If the answer to this query is non-zero, then the next four queries appear; otherwise they are not displayed.

WHAT IS THE VECTOR ADDRESS OF THE NEXT DULL? [0]:

THE VECTOR ADDRESS FOR THE DULL IS ASSIGNED FROM THE FLOATING VECTOR SPACE STARTING AT 300. CONSULT FIELD SERVICE TO DETERMINE THE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DULLs was greater than 1, this query is repeated by SGN for each DULL.

WHAT IS ITS CSR ADDRESS? [0]:

THE CSR ADDRESS FOR THE DULL IS ASSIGNED FROM THE FLOATING ADDRESS SPACE STARTING AT 160010. CONSULT FIELD SERVICE TO DETERMINE LOCATION IF UNKNOWN.

Additional explanation:

If the reply to the query for the number of DULLs was greater than 1, this query is repeated for each DULL.

SYSGEN DIALOGUE DETAILS

IS IT A HALF DUPLEX LINE? [Y/N]:

Additional explanation:

If the reply to the query for the number of DULLs was greater than 1, this query is repeated by SGN for each DULL.

HOW MANY SYNC CHARACTERS ARE REQUIRED IN A SYNC LEADER? [D]:

RESPONSE LIMITS: 3.-14.

Additional explanation:

If the reply to the query for the number of DULLs was greater than 1, this query is repeated for each DULL. Note that the queries for interrupt vector, CSR, half duplex, and sync leader occur one after the other for each DULL. The repeat sequence repeats all four queries.

3.4 SYSGEN2.CMD FILE DETAILS

The user-tailored Executive is built under the direction of the indirect file SYSGEN2.CMD. At the completion of the assembly and configuration phases, directions were given to bootstrap from the proper object disk, set the time, and initiate the indirect file SYSGEN2.CMD. The narrative which follows is an examination of the SYSGEN2.CMD file. The conventions used in describing the SYSGEN.CMD file apply.

```
;
; SYSGEN PART 2      <VERSION 02>
;
; COPYRIGHT (C) 1975, DIGITAL EQUIPMENT CORP., MAYNARD MASS. 01754

;      BUILD THE EXEC AND ALL REQUIRED SYSTEM TASKS
;
; THIS COMMAND FILE WILL PRODUCE THE TARGET SYSTEM ON THE DISK
; PACK CURRENTLY MOUNTED AS SY:. IT WILL REPLACE THE BASELINE
; SYSTEM THAT YOU ARE CURRENTLY RUNNING. YOU MUST PRESERVE
; THIS DISK BEFORE PROCEEDING ANY FURTHER IF YOU HAVEN'T
; DONE SO ALREADY.
;
* DO YOU WANT TO CONTINUE WITH SYSGEN PART 2? [Y/N]:
```

This question allows the user to exit so that he can preserve the disk before modifying it in building his target system.

SYSGEN DIALOGUE DETAILS

;
; LONG DIALOGUE PRINTS A DESCRIPTION OF EVERY STOP IN THIS
; SYSGEN 2 COMMAND FILE. ON THE OTHER HAND, SHORT DIALOGUE
; PROVIDES VIRTUALLY NO EXPLANTORY TEXT.
;
* DO YOU WANT LONG DIALOGUE? [Y/N]:

As in SYSGEN Phase 1, long dialogue displays much descriptive text which the experienced user may wish to dispense with.

;
; LONG DIALOGUE PRINTS A DESCRIPTION OF EVERY STEP IN THIS
; SYSGEN 2 COMMAND FILE. ON THE OTHER HAND, SHORT DIALOGUE
; PROVIDES VIRTUALLY NO EXPLANATORY TEXT.
;

* ARE YOU BUILDING A MAPPED SYSTEM? [Y/N]:

The answer supplied to this query determines the defaults which will be used for accessing and storing files. See Appendix B for UIC conventions.

* ARE YOU RUNNING ON A MACHINE WITH A LINE PRINTER? [Y/N]:

ASN TT0:=LI:
ASN LP:=LI:

Later, the user is asked if Task Builder maps are desired. These maps are displayed on the line printer if this query is answered affirmatively. Otherwise they will be displayed on the operator's console. The correct Assign (ASN) command is issued to assign the logical device LI: to the selected listing device.

* ARE YOU RUNNING ON A MACHINE WITH AT LEAST 24K WORDS? [Y/N]:

This question is used to determine which Task Builder to use. For 16K systems, the 8K Task Builder is used. For larger systems, the 14K Task Builder is used, which results in a significant speed improvement in the building of all tasks. In addition, it is not possible to build the non-privileged tasks with the 8K Task Builder. Thus, if this question is answered negatively, no questions concerning the non-privileged tasks will be asked.

* ARE YOU RUNNING AN RP02, RP03, OR RP04 AS THE SYSTEM DISK? [Y/N]:

For RK system disks, space is at a premium, and many files are deleted immediately after use. RP disks, on the other hand, have from 8 to 36 times as much space available. This question controls the deletion of task images and object module libraries during the SYSGEN phase 2 process.

* DO YOU WANT SUPPORT FOR DIRECT ACCESS TO ICS/ICR-11 MODULES? [Y/N]:

* DO YOU WANT SUPPORT FOR DIRECT ACCESS TO UDC11 MODULES? [Y/N]:

These two questions are used to determine if the modules UDCOM.UDC, ICTAB.ICR, and ICOM.ICR must be copied off the backup media. If either of these questions is answered affirmatively, the next question is displayed.

SYSGEN DIALOGUE DETAILS

* DO YOU WANT TO BUILD THE UDC OR ICS/ICR DEVICE COMMON BLOCK? [Y/N]:

This question is used to determine whether the common block should be built.

```
SET /UIC=[1,50]
```

```
SET /UIC=[1,54]
```

```
;
```

```
; INSTALL TASKS NEEDED TO DO THE WORK
```

```
;
```

```
INS PIP ! INSTALL PIP
```

```
INS PIP/PAR=PAR14K ! INSTALL PIP
```

```
INS LBR ! INSTALL LIBRARIAN
```

```
INS LBR/PAR=PAR14K ! INSTALL LIBRARIAN
```

```
INS EDI ! INSTALL EDITOR
```

```
INS FLX ! INSTALL FILEX
```

System tasks are stored under UIC [1,50] for an unmapped system and [1,54] for a mapped system. The correct UIC is established as the default UIC, and the specified tasks are installed because they will be needed by SYSGEN2.CMD as it proceeds. Each of these tasks will be installed here and later removed only if they are not already installed in the host system.

* HAVE YOU ALREADY BUILT THE EXEC? [Y/N]:

This question asks whether or not the Executive has been linked together by the Task builder. SYSGEN phase 1 does not link the Executive, it only assembles it. Therefore, the first time you encounter this question, it should be answered negatively.

Typically, before a partition can be laid out, the user needs a Task Builder map of the newly built user-tailored Executive. This occurs later in SYSGEN2.CMD and may require a lengthy off-line analysis of partition layout for the target system. After analyzing the partition layout, SYSGEN2.CMD can be re-initiated. If, at this point, an affirmative answer is typed, the process of building the user-tailored Executive is skipped, and SYSGEN2.CMD advances to the dialogue for the partitioning phase of system generation.

```
;
```

```
; AS DISTRIBUTED ON THIS OBJECT DISK, THE SYSTEM OBJECT
```

```
; LIBRARY (SYSLIB) DOES NOT CONTAIN THE FORTRAN RUN TIME
```

```
; SYSTEM MODULES, LPS-11 MODULES OR THE PURDUE ISA MODULES
```

```
; FOR THE UDC11 OR ICR/ICS-11 SUBSYSTEMS. THEY MUST BE
```

```
; ADDED IF YOU PLAN TO USE THESE ROUTINES IN YOUR TARGET SYSTEM.
```

```
;
```

```
SET /UIC=[1,1]
```

* DO YOU WANT TO ADD THE FORTRAN RUNTIME MODULES TO SYSLIB? [Y/N]:

```
LBR SYSLIB/FP=FOROTS
```

As delivered, the system object library (SYSLIB) does not contain the FORTRAN run-time modules. They exist on the disk as a set of concatenated object modules ready to add to SYSLIB.

SYSGEN DIALOGUE DETAILS

* DOES YOUR TARGET SYSTEM HAVE THE FLOATING POINT UNIT? [Y/N]:
 LBR SYSLIB/RP=FORFPU
 * DOES YOUR TARGET SYSTEM HAVE THE FLOATING INSTRUCTION SET? [Y/N]:
 LBR SYSLIB/RP=FORFIS
 * DOES YOUR TARGET SYSTEM HAVE THE EXTENDED INSTRUCTION SET? [Y/N]:
 LBR SYSLIB/RP=FOREIS
 * DOES YOUR TARGET SYSTEM HAVE THE EXTENDED ARITHMETIC ELEMENT? [Y/N]:
 LBR SYSLIB/RP=FOREAE
 LBR SYSLIB/RP=FORNHD

The FORTRAN run-time system supports five different types of arithmetic routines. The one used depends on the hardware present in the target machine. The floating point unit provides the fastest subroutines, the FIS is next, then EIS, EAE, and slowest is the non-hardware assisted subroutines. The use of one of the subroutine options precludes the use of the other options.

>PIP FOROTS.OBJ;*/DE,FORFPU;*,FORFIS;*,FOREIS;*,FOREAE;*,FORNHD;*

Since space on the RK object disk is limited, once the FORTRAN library is added to SYSLIB, all of the concatenated object modules are deleted. This occurs even if no FORTRAN modules are added to SYSLIB. They are not deleted on RP host systems.

* DO YOU WANT TO ADD THE PURDUE ISA ROUTINES TO SYSLIB? [Y/N]:
 LBR SYSLIB/RP=PURISA
 * DOES YOUR TARGET SYSTEM HAVE THE UDC11 SUBSYSTEM? [Y/N]:
 LBR SYSLIB/RP=PURUDC
 * DOES YOUR TARGET SYSTEM HAVE THE ICR/ICS-11 SUBSYSTEM? [Y/N]:
 LBR SYSLIB/RP=PURICR
 PIP PURISA.OBJ;*/DE,PURUDC;*,PURICR;*
 * DOES YOUR TARGET SYSTEM HAVE THE LPS-11 SUBSYSTEM? [Y/N]:
 LBR SYSLIB/RP=LPS
 PIP LPS.OBJ;*/DE

By answering the above questions for the target system, the appropriate modules are added to SYSLIB. The files are then deleted to make space for the new Executive and privileged tasks. They are not deleted on RP host systems.

SET /UIC=[1,20]
 SET /UIC=[1,24]

```

;
; NOW WE COPY THE EXEC BUILD FILE, THE ASSEMBLY PREFIX FILE, THE
; UDC OR ICS/ICR FILES AND THE CONCATENATED EXECUTIVE OBJECT
; MODULES FROM THE SECONDARY STORAGE MEDIUM TO THE SYSTEM DISK.
; IF DURING SYSGEN PART 1 YOU ANSWERED THAT YOUR SECONDARY
; STORAGE MEDIUM WAS AN RK DISK CARTRIDGE, THESE FILES
; WERE COPIED TO THE SYSTEM DISK AT THAT TIME.
;
;
* ARE THE FILES ALREADY ON THIS DISK? [Y/N]:
  
```

Three files, RSXBLD.CMD, RSX11M.OBJ, and RSXMC.MAC must be on the system disk to complete SYSGEN phase 2. In addition, the files for the UDC or ICR/ICS-11 common blocks must also be on the system disk if user tasks are going to access the device registers. For RK-RK and RP host systems, these files are already on the disk and need not be copied. For other configurations, they must be transferred to the system

SYSGEN DIALOGUE DETAILS

disk. RSXBLD.CMD is the command file that directs the Task Builder in constructing the user-tailored Executive. It was built by SGN. RSX11M.OBJ is the concatenated object module file produced by PIP from the user-tailored Executive object modules during the assembly run following the completion of the dialogue program. RSXMC.MAC is the assembly prefix file produced by SGN. It is used to control the assembly of options selected during the running of SGN. They were saved on the backup medium and now must be copied onto the object disk where they will be used to build the user-tailored Executive. For RP system disks, this question will not be issued; instead, control will pass immediately to the point where the three files are purged and the Executive library is created.

* IS YOUR SECONDARY STORAGE DEVICE A CASSETTE TAPE? [Y/N]:

If the host system is an RK-cassette system, the following commands will copy the required files from cassette to the system disk.

```
;
; MOUNT THE CASSETTE FROM SYSGEN PART 1 IN DRIVE 0
;
* IS THE CASSETTE IN DRIVE 0 READY? [Y/N]:
LOA CT:
FLX SY:=CT0:RSXBLD.CMD,RSX11M.OBJ
FLX SY:/FB=CT0:ICTAB.ICR,ICOM.ICR
FLX SY:/FB=CT0:UDCOM.UDC
FLX SY:[200,200]=CT0:RSXMC.MAC
```

End of RK-cassette commands. Control passes to the point where the files are purged.

* IS YOUR SECONDARY STORAGE DEVICE A DECTAPE? [Y/N]:

If the host system is an RK-DEctape system, the following commands will copy the specified files from DEctape to the system disk.

```
;
; MOUNT THE DECTAPE FROM SYSGEN PART 1 IN DRIVE 0
;
* IS THE DECTAPE IN DRIVE 0 READY? [Y/N]:
LOA DT:
FLX SY:=DT0:RSXBLD.CMD,RSX11M.OBJ
FLX SY:/FB=DT0:ICTAB.ICR,ICOM.ICR
FLX SY:/FB=DT0:UDCOM.UDC
FLX SY:[200,200]=DT0:RSXMC.MAC
```

End of RK-DEctape commands. Control passes to the point where the files are purged.

* IS YOUR SECONDARY STORAGE DEVICE A MAGTAPE? [Y/N]:

If the host system is an RK-magtape system, the following commands will copy the specified files from magtape to the system disk.

SYSGEN DIALOGUE DETAILS

```
;  
; MOUNT THE MAGTAPE FROM SYSGEN PART 1 IN DRIVE 0  
;  
* IS THE MAGTAPE IN DRIVE 0 READY? [Y/N]:  
* IS THE MAGTAPE DRIVE A TU16? [Y/N]:
```

If the magtape is a TU16, the following commands are issued:

```
LOA MM:  
FLX SY:=MM0:RSXBLD.CMD,RSX11M.OBJ  
FLX SY:/FB=MM0:ICTAB.ICR,ICOM.ICR  
FLX SY:/FB=MM0:UDCOM.UDC  
FLX SY:[200,200]=MM0:RSXMC.MAC
```

If the magtape is a TU10 or TS03, the following commands are issued:

```
LOA MT:  
FLX SY:=MT0:RSXBLD.CMD,RSX11M.OBJ  
FLX SY:/FB=MT0:ICTAB.ICR,ICOM.ICR  
FLX SY:/FB=MT0:UDCOM.UDC  
FLX SY:[200,200]=MT0:RSXMC.MAC
```

End of RK magtape commands. Control passes to the point where the files are purged.

```
* IS YOUR SECONDARY STORAGE DEVICE AN RX01 FLEXIBLE DISK? [Y/N]:
```

If the host system is an RK floppy disk system, the following commands will copy the specified files from floppy disk to the system disk.

```
LOA DX:  
;  
; MOUNT THE FLEXIBLE DISK FROM SYSGEN PART 1 IN DRIVE 0  
;  
* IS THE FLEXIBLE DISK IN DRIVE 0 READY? [Y/N]:  
MOU DX0:  
PIP SY:/NV=DX0:RSX11M.OBJ,RSXBLD.CMD  
PIP SY:/NV=DX0:ICTAB.ICR,ICOM.ICR  
PIP SY:/NV=DX0:UDCOM.UDC  
PIP SY:[200,200]/NV=DX0:RSXMC.MAC  
DMO DX0:
```

End of RK floppy disk commands. Control passes to the point where the files are purged.

If none of the supported configurations is specified, the following error message is issued and the questions are repeated to determine the secondary storage medium used during SYSGEN phase 1.

```
;  
; *** ERROR ***  
;  
; YOU HAVE NOT CHOSEN ONE OF THE STANDARD SYSGEN SECONDARY  
; STORAGE DEVICES. WE WILL REPEAT THE QUESTIONS.  
;
```

SYSGEN DIALOGUE DETAILS

Control passes to this location after the files RSXBLD.CMD, RSX11M.OBJ, RSXMC.MAC and, optionally, ICTAB.ICR, ICOM.ICR, and UDCOM.UDC, are copied to the system disk. Or, in the case of RP systems or 2-RK disk systems, control passes to this location immediately on determining the system type.

```
REM ...FLX
REM LOA
```

The following commands are issued to delete the drivers which are no longer needed.

```
PIP [1,54]CTDRV.*;*/DE,DTDRV.*;*,DXDRV.*;*
PIP [1,54]MMDRV.*;*/DE,MTDRV.*;*,LOA.*;*
PIP [1,50]CTDRV.*;*/DE,DTDRV.*;*,DXDRV.*;*
PIP [1,50]MMDRV.*;*/DE,MTDRV.*;*,LOA.*;*
;
; DELETE ALL BUT LATEST VERSION OF EXEC BUILD COMMAND FILE,
; ASSEMBLY PREFIX FILE, AND ALL EXEC OBJECT LIBRARIES IF ANY.
;
PIP RSXBLD.CMD/PU
PIP RSX11M.OLB;*/DE
PIP [200,200]RSXMC.MAC/PU
```

If a previous SYSGEN was not done on this disk, the file RSX11M.OLB will not exist. PIP will issue a warning message to this effect.

```
;
; NOW WE BUILD THE EXEC LIBRARY
;
```

Following the assembly of the user-tailored Executive, the individual object modules were concatenated into a single file named RSX11M.OBJ. Concatenation was performed to save space on the secondary medium. This file must be transformed into a library file for processing by the Task Builder (TKB).

```
LBR RSX11M/CR:80.=RSX11M.OBJ
PIP RSX11M.OBJ;*/DE !DELETE OBJECT MODULE FILE
```

The preceding two commands create a library file named RSX11M.OLB from the concatenated object file and delete the no-longer-needed concatenated object file, thus freeing disk space.

* DO YOU WISH TO ADD USER WRITTEN DRIVER(S) TO THE EXEC? [Y/N]:

As part of the SYSGEN process, the user may include his own specialized drivers in the Executive. If the user answers affirmatively to this question, the command file will lead him along in the steps required to assemble the driver and device table modules, insert them into the Executive object library, and modify the Executive build command file to include the driver when the Executive is built. See the RSX-11M Guide to Writing an I/O Driver for additional information on writing drivers and including them in the system.

SYSGEN DIALOGUE DETAILS

```

SET /UIC=[200,200]
;
; WE WILL PAUSE WHILE YOU ASSEMBLE YOUR DRIVER(S) AND USRTB
; MODULE. THE EXEC ASSEMBLY PREFIX FILE RSXMC.MAC IS ALREADY
; LOCATED UNDER UIC [200,200]. ASSUMING YOUR DRIVER(S) NAME IS
; XXDRV, WHERE XX IS THE DEVICE NAME (E.G., DK), THE FOLLOWING
; COMMANDS WILL ASSEMBLE THE DRIVER(S) AND THE USRTB MODULE.
;
; >RUN $MAC
; >RUN $BIGMAC
; MAC>XXDRV=[1,1]EXEMC/ML,[200,200]RSXMC,XXDRV
; MAC>USRTB=[1,1]EXEMC/ML,[200,200]RSXMC,USRTB
; MAC>^Z
;

```

At this point, the indirect file will pause while the user assembles his drivers and user device tables.

```

;
; NOW YOU MUST ADD YOUR DRIVER(S) AND USRTB MODULE
; TO THE EXEC OBJECT MODULE LIBRARY. THE FOLLOWING IS AN EXAMPLE:
;
; LBR>RSX11M/RP=[200,200]XXDRV,USRTB
; LBR>^Z
;
SET /UIC=[1,20]
SET /UIC=[1,24]
LBR

```

When the Librarian prompts for input, the user should type in a command to include his drivers and device table.

```

;
; YOU MUST NOW ADD COMMANDS TO INCLUDE YOUR DRIVER(S) AND USRTB
; MODULE INTO THE EXEC BY EDITING THE EXEC TASK BUILD COMMAND FILE.
; TO ADD DRIVER(S) INSERT COMMANDS OF THE FORM:
;
; RSX11M/LB:XXDRV
;
; INTO THE COMMAND FILE IN THE PLACE WHERE THE
; OTHER DRIVERS ARE REFERENCED. XXDRV REPRESENTS THE NAME OF
; YOUR DRIVER(S). IN ADDITION, LOCATE THE LINE IN WHICH THE
; MODULE SYSTB IS REFERENCED AND ADD A REFERENCE TO YOUR
; USRTB MODULE IMMEDIATELY AFTER IT. E.G.,
;
; [1,20]RSX11M/LB:LOADR:NULTK:SYSTB:USRTB:SYTAB:INITL
; [1,24]RSX11M/LB:LOADR:NULTK:SYSTB:USRTB:SYTAB:INITL
;
; THEN LOCATE THE LINE:
;
; GBLDEF=$USRTB:0
;
; AND DELETE IT.
;
EDI RSXBLD.CMD

```

When the Line Text Editor (EDI) prompts, the user should perform the required edits.

SYSGEN DIALOGUE DETAILS

```
;
; YOUR DRIVERS WILL AUTOMATICALLY BE LINKED WITH THE EXECUTIVE
; YOU ARE BUILDING.
;
```

Whether or not the user is adding a driver to the Executive, processing continues at this point.

```
SET /UIC=[1,50]
SET /UIC=[1,54]
INS TKB
INS BIGTKB
SET /UIC=[1,20]
SET /UIC=[1,24]
;
; NOW WE BUILD THE EXECUTIVE
;
TKB @RSXBLD
```

The correct version of the Task Builder is installed and used to guide the Executive. The Task Builder (TKB) is controlled by the command file RSXBLD.CMD, which is created during the running of SGN (and possibly modified to include other drivers).

The following text is only displayed when the UDC11 or ICS/ICR-11 is being included in the user's target system and the device common block is to be built.

```
;
; NOW WE BUILD THE UDC OR ICS/ICR DEVICE
; COMMON BLOCK. THE DEVICE COMMON BLOCK RESIDES
; ON THE I/O PAGE AND IS REFERENCED WHENEVER A TASK
; DIRECTLY ACCESSES ANY I/O MODULES.
;
SET /UIC=[1,24]
SET /UIC=[1,20]
TKB @UDCBLD
TKB @ICBLD
SET /UIC=[1,1]
```

```
LBR SYSLIB/RP=[1,20] ICOM.ICR
LBR SYSLIB.RP=[1,20] IDCOM.UDC
LBR SYSLIB/RP=[1,24] ICTAB.ICR
LBR SYSLIB/RP=[1,20] ICTAB.ICR
PIP [1,24]*.ICR;*/DE,ICBLD.CMD;*
PIP [1,20]*.ICR;*/DE,ICBLD.CMD;*
PIP [1,24]*.UDC;*/DE,UDCBLD.CMD;*
PIP [1,20]*.UDC;*/DE,UDCBLD.CMD;*
```

Whether or not the UDC or ICS/ICR is being included in the target system, processing continues at this point.

```
REM ...LBR
;
; YOU NOW NEED THE MAP OF THE EXECUTIVE TO LAYOUT
; THE PARTITIONS IN YOUR NEW SYSTEM.
;
* DO YOU HAVE THE MAP ALREADY? [Y/N]:
PIP LI:=[1,30]RSX11M.MAP
PIP LI:=[1,34]RSX11M.MAP
;
```

SYSGEN DIALOGUE DETAILS

At this point, the user must find the symbol \$SYTOP in the module INITL in the map. The symbol \$SYTOP provides the value of the highest memory location occupied by the user-tailored Executive and is used for partition layouts. In an unmapped system, tasks are linked to the physical base address of the partition in which they run. To create an unmapped user-tailored system, the task build command files for FCP, MCR and TKTN must be edited if \$SYTOP is above 30100(8). If \$SYTOP is above 40000(8), all other task build command files must be edited, and the associated tasks must be rebuilt. In a mapped system, tasks are linked to a virtual base address rather than a physical base address and, thus, do not depend on the physical base address of the partition.

```
;  
; LOOK IN THE MAP OF THE EXEC FOR THE MODULE INITL WHICH IS  
; LOCATED AT THE END OF THE MAP. THE SYMBOL $SYTOP  
; INDICATES THE LAST ADDRESS ALLOCATED TO THE EXEC. USER  
; PARTITIONS MAY START AT ANY LOCATION BEYOND THIS ADDRESS  
; AS LONG AS THEY FALL ON A 64 BYTE BOUNDARY. SEE THE  
; SYSGEN MANUAL FOR A DESCRIPTION OF HOW TO SET UP PARTITIONS.  
; YOU MAY WISH TO STOP AT THIS TIME TO LAY OUT YOUR PARTITIONS.  
;  
* DO YOU WANT TO CONTINUE AND BUILD THE TASKS NOW? [Y/N]:
```

If the user wishes to ponder his partition layout, it is possible at this point to interrupt the SYSGEN phase 2 process. See Chapter 4 for information on laying out partitions. At a later time, the user may restart SYSGEN2.CMD by answering the question:

```
* HAVE YOU ALREADY BUILT THE EXECUTIVE? [Y/N]:
```

If the answer is affirmative, control will pass directly to the point where the system tasks are built. If the user specifies an exit from SYSGEN phase 2 at this time, the following text is displayed.

```
;  
; WE WILL EXIT NOW. WHEN YOU ARE READY TO RESUME  
; THE BUILDING OF THE SYSTEM, EXECUTE THIS INDIRECT COMMAND FILE  
; AND ANSWER Y TO THE FOLLOWING QUESTION:  
; >* HAVE YOU ALREADY BUILT THE EXEC? [Y/N]:  
;
```

The SYSGEN process will shut down, allowing the user to lay out the partitions. After laying out partitions, he can resume the SYSGEN process by rebootstraping the system and starting SYSGEN2.CMD again.

If the user elects to continue with the SYSGEN process, processing continues at this point.

SYSGEN DIALOGUE DETAILS

```
;
; WE WILL NOW EDIT THE TASK BUILD COMMAND FILES
; AND BUILD THE REQUIRED TASKS.
;
; THE TASKS MCR, F11ACP, AND TKTN NORMALLY RUN IN PARTITION
; SYSPAR WHICH IS 10000(8) BYTES LONG. IF YOU
; WISH TO CHANGE THE PARTITION NAME OR PUT ANY OF THESE TASKS
; IN OTHER PARTITIONS, YOU MUST EDIT THE CORRECT COMMAND FILE.
; IN ADDITION, FOR UNMAPPED SYSTEMS, PARTITION
; SYSPAR IS ASSUMED TO START AT 30100. IF IN YOUR
; TARGET SYSTEM, SYSPAR'S BASE ADDRESS HAS CHANGED,
; YOU MUST EDIT THESE TASK BUILD FILES.
;
```

The privileged tasks must always be rebuilt when the Executive has been rebuilt. The privileged tasks are linked to the Executive symbol table file and map into the Executive address space so that they may access various system lists and data structures. If the Executive is changed, these addresses change; thus, the tasks have to be rebuilt.

The Line Text Editor (EDI) may be used to examine the PAR command line in each file that may require modification. Every file in question must be checked, since a Partitions command which does not reflect the requirements of the user-tailored system can produce tasks which will not run. A typical sequence as it would appear on the console is:

```
>EDI BOOBLD.CMD
[PAGE 1]
*L PAR=
PAR=GEN:40000:40000
*KILL
EDI>^Z
[EXIT]
```

For an unmapped system, tasks built to run in SYSPAR have the Task Builder command:

```
PAR=SYSPAR:30100:7700
```

Those built to run in the GEN subpartition specify:

```
PAR=GEN:40000:40000
```

For mapped systems, the Partitions commands are:

```
PAR=SYSPAR:0:10000
PAR=GEN:0:40000
```

If alteration is necessary, the change may be accomplished as shown below. Suppose, for example, the GEN subpartition is to be 50000(8) words in length. The above sequence would be changed to:

```
>EDI BOOBLD.CMD
[PAGE 1]
*L PAR
PAR=GEN:40000:40000
```

SYSGEN DIALOGUE DETAILS

*C/0:4/0:5
PAR=GEN:40000:50000
*EX
[EXIT]

SET /UIC=[1,20]
SET /UIC=[1,24]

* DO YOU WISH TO BUILD THE BIG (4.5K) AND FASTER FILE SYSTEM? [Y/N]:

It is possible to build different file systems: one 2K in size, and relatively heavily overlaid, and one a minimum of 4K in size, which is less overlaid and provides faster processing of file access requests. As a result of the answer to this question, one of the following two questions is asked.

* DO YOU HAVE TO EDIT THE 2K FCP TASK BUILD COMMAND FILE? [Y/N]:

The default partition for the 2K FCP is SYSPAR. For unmapped systems, it is assumed to begin at 30100(8) and is 7700(8) words long. For mapped systems, SYSPAR is 10000(8) words long.

;
; BIGFCP'S BUILD FILE SELECTS PARTITION FCPPAR
; WHICH STARTS AT 100000(8) AND IS
; 22000(8) LONG. IN MOST CASES, THESE LIMITS WILL
; HAVE BE TO ALTERED FOR YOUR SYSTEM.
;

* DO YOU HAVE TO EDIT THE 4.5K FCP TASK BUILD COMMAND FILE? [Y/N]:

The default partition for the big FCP is FCPPAR. Its size is specified as 22000(8) words; for unmapped systems, it is based at 100000(8). The size of BIGFCP may be altered, as described in section 4.4.1. Depending on the answer to the appropriate preceding question, one of the following two commands may be issued to allow editing of the correct task build command file.

EDI FCPBLD.CMD
EDI BIGFCPBLD.CMD

* DO YOU HAVE TO EDIT THE TASK BUILD FILES FOR MCR AND TKTN? [Y/N]:

If the preceding question is answered affirmatively, the following two commands are issued.

EDI MCRBLD.CMD
EDI TKNBLD.CMD

;
; THE FOLLOWING TASKS PROCESS ADDITIONAL MCR COMMANDS.
; BOO, DMO, AT., INI, INS, MOU AND SAV.
; THEY ARE BUILT TO RUN IN PARTITION GEN WHICH IS 8K
; WORDS (40000 BASE 8 BYTES) LONG. IF YOU WISH TO CHANGE THE
; PARTITION IN WHICH ANY OF THEM RUN, YOU MUST EDIT THE
; APPROPRIATE BUILD COMMAND FILE.
; IN ADDITION, FOR UNMAPPED SYSTEMS PARTITION GEN
; IS ASSUMED TO START AT 40000. IF IN YOUR TARGET

SYSGEN DIALOGUE DETAILS

```
; SYSTEM GEN'S BASE ADDRESS HAS CHANGED, YOU MUST
; EDIT THE BUILD COMMAND FILES FOR ALL OF THESE TASKS.
;
* DO YOU HAVE TO EDIT ANY FILES FOR MCR TASKS? [Y/N]:
```

If the previous question is answered affirmatively, the following questions are issued; depending on the user's response, the EDI command may or may not be issued.

```
* DO YOU WANT TO EDIT TASK BOO'S BUILD COMMAND FILE? [Y/N]:
EDI BOOBLD.CMD
* DO YOU WANT TO EDIT TASK DMO'S BUILD COMMAND FILE? [Y/N]:
EDI DMOBLD.CMD
* DO YOU WANT TO EDIT TASK AT.'S BUILD COMMAND FILE? [Y/N]:
EDI INDBLD.CMD
* DO YOU WANT TO EDIT TASK INI'S BUILD COMMAND FILE? [Y/N]:
EDI INIBLD.CMD
* DO YOU WANT TO EDIT TASK INS'S BUILD COMMAND FILE? [Y/N]:
EDI INSBLD.CMD
* DO YOU WANT TO EDIT TASK MOU'S BUILD COMMAND FILE? [Y/N]:
EDI MOUBLD.CMD
* DO YOU WANT TO EDIT TASK SAV'S BUILD COMMAND FILE? [Y/N]:
EDI SAVBLD.CMD
PIP *.CMD/PU
```

The following text is always displayed.

```
;
; TASK PMD IS THE POST-MORTEM AND SNAP DUMP PROCESSOR.
; IT IS A PRIVILEGED TASK AND FOR CORRECT OPERATION IT SHOULD
; RUN IN A PARTITION WITH ONLY CHECKPOINTABLE TASKS.
;
* DO YOU WANT TO BUILD TASK PMD? [Y/N]:
```

If the previous question was answered affirmatively, the following question will be displayed. The EDI command will depend on the answer to the edit question.

NOTE

This sequence of two questions and an EDI command is repeated many times further on in the command file. The operation is always the same; therefore, a description will not be given for each successive one.

```
* DO YOU HAVE TO EDIT PMD'S BUILD COMMAND FILE? [Y/N]:
EDI PMDBLD.CMD
```

The task SHF..., referred to below, may only run in a mapped system. Therefore, the text associated with it will only be displayed during the building of mapped systems.

```
;
; TASK SHF IS THE SYSTEM CONTROLLED PARTITION TASK
; COMPACTION ROUTINE. IT WILL AGGLOMERATE FREE SPACE
; IN A SYSTEM CONTROLLED PARTITION ON REQUEST FROM
; THE EXECUTIVE. YOU MUST HAVE SELECTED THIS FEATURE
; DURING SYSGEN PART 1 FOR THIS TASK TO BE CALLED
```

SYSGEN DIALOGUE DETAILS

```
; BY THE EXECUTIVE. IT NORMALLY RUNS IN PARTITION SYSPAR.
;
* DO YOU WANT TO BUILD TASK SHF? [Y/N]:
* DO YOU HAVE TO EDIT TASK SHF'S BUILD COMMAND FILE? [Y/N]:
EDI SHFBLD.CMD
```

The next portion of text is displayed only if the user specifies that the host system has at least 24K of memory. There are two reasons for this:

1. Many of the tasks require BIGTKB to be built.
2. For unmapped systems with only 16K of memory, it is not possible to run the tasks at any base address other than 40000 (8K).

```
;
; THE UTILITY TASKS (MAC, PIP, TKB ETC.) ARE ALREADY BUILT TO RUN IN
; PARTITION GEN (EXCEPT BIGMAC AND BIGTKB WHICH ARE BUILT TO RUN IN
; PAR14K). IF YOU WISH TO CHANGE THE PARTITION IN WHICH ANY OF THEM
; RUN YOU MUST EDIT THE APPROPRIATE TASK'S BUILD COMMAND FILE.
```

```
;
; The following note appears only when building mapped systems.
```

```
; NOTE: FOR MAPPED SYSTEMS IT ISN'T NECESSARY
; TO REBUILD ANY OF THESE TASKS SINCE YOU
; MAY EXPLICITLY SPECIFY THE PARTITION IN
; WHICH THEY RUN AT INSTALL TIME.
```

```
;
; NONE OF THE TASK BUILD COMMAND FILES BUILDS CHECKPOINTABLE TASKS
; EXCEPT FOR THE PRINT SPOOLER TASK PRT. IF YOU WISH TO BUILD ANY
; TASK CHECKPOINTABLE YOU MUST EDIT THE TASK BUILD COMMAND FILE
; TO CHANGE THE /-CP SWITCH ON THE TASK FILE SPECIFICATION TO /CP.
```

```
; NOTE: CHECKPOINTABLE TASKS REQUIRE MORE DISK SPACE
; THAN NON-CHECKPOINTABLE TASKS.
```

```
;
; The following paragraph of text appears only when building
; unmapped systems.
```

```
; FOR UNMAPPED SYSTEMS PARTITION GEN
; IS ASSUMED TO START AT 40000.
; IF IN YOUR TARGET SYSTEM GEN'S
; BASE ADDRESS HAS CHANGED, YOU
; MUST EDIT THE TASK BUILD COMMAND
; FILES AND REBUILD EVERY UTILITY
; TASK YOU PLAN TO RUN ON YOUR
; TARGET SYSTEM.
```

```
;
; THE PRINT SPOOLER IS NOT DISTRIBUTED AS A TASK IMAGE. IF YOU
; WISH TO USE A PRINT SPOOLER IN YOUR TARGET SYSTEM, YOU MUST
; EXPLICITLY BUILD IT.
```

```
;
; If you wish to build the print spooler, you must answer
; affirmatively to the next question.
```

SYSGEN DIALOGUE DETAILS

```

* DO YOU WANT TO REBUILD ANY OF THE UTILITY TASKS? [Y/N]:
* DO YOU WANT TO BUILD TASK PRT (PRINT SPOOLER)? [Y/N]:
* DO YOU WANT TO EDIT TASK PRT'S BUILD COMMAND FILE? [Y/N]:
EDI PRIBLD.CMD
* DO YOU WANT TO REBUILD TASK UFD? [Y/N]:
* DO YOU WANT TO EDIT TASK UFD'S BUILD COMMAND FILE? [Y/N]:
EDI UFDIBLD.CMD
* DO YOU WANT TO REBUILD TASK MAC? [Y/N]:
* DO YOU WANT TO EDIT TASK MAC'S BUILD COMMAND FILE? [Y/N]:
EDI MACIBLD.CMD
* DO YOU WANT TO REBUILD TASK BIGMAC? [Y/N]:
* DO YOU WANT TO EDIT TASK BIGMAC'S BUILD COMMAND FILE? [Y/N]:
EDI BIGMACIBLD.CMD
* DO YOU WANT TO REBUILD TASK TKB? [Y/N]:
* DO YOU WANT TO EDIT TASK TKB'S BUILD COMMAND FILE? [Y/N]:
EDI TKBIBLD.CMD
* DO YOU WANT TO REBUILD TASK BIGTKB? [Y/N]:
* DO YOU WANT TO EDIT TASK BIGTKB'S BUILD COMMAND FILE? [Y/N]:
EDI BIGTKBIBLD.CMD
* DO YOU WANT TO REBUILD TASK PIP? [Y/N]:
* DO YOU WANT TO EDIT TASK PIP'S BUILD COMMAND FILE? [Y/N]:
EDI PIPIBLD.CMD
* DO YOU WANT TO REBUILD TASK FLX? [Y/N]:
* DO YOU WANT TO EDIT TASK FLX'S BUILD COMMAND FILE? [Y/N]:
EDI FLXIBLD.CMD
* DO YOU WANT TO REBUILD TASK VFY? [Y/N]:
* DO YOU WANT TO EDIT TASK VFY'S BUILD COMMAND FILE? [Y/N]:
EDI VFYIBLD.CMD
* DO YOU WANT TO REBUILD TASK DMP? [Y/N]:
* DO YOU WANT TO EDIT TASK DMP'S BUILD COMMAND FILE? [Y/N]:
EDI DMPIBLD.CMD
* DO YOU WANT TO REBUILD TASK EDI? [Y/N]:
* DO YOU WANT TO EDIT TASK EDI'S BUILD COMMAND FILE? [Y/N]:
EDI EDIBLD.CMD
* DO YOU WANT TO REBUILD TASK SLP? [Y/N]:
* DO YOU WANT TO EDIT TASK SLP'S BUILD COMMAND FILE? [Y/N]:
EDI SLPIBLD.CMD
* DO YOU WANT TO REBUILD TASK LBR? [Y/N]:
* DO YOU WANT TO EDIT TASK LBR'S BUILD COMMAND FILE? [Y/N]:
EDI LBRIBLD.CMD
* DO YOU WANT TO REBUILD TASK FOR? [Y/N]:
* DO YOU WANT TO EDIT TASK FOR'S BUILD COMMAND FILE? [Y/N]:
EDI FORIBLD.CMD
* DO YOU WANT TO REBUILD TASK CRF? [Y/N]:
* DO YOU WANT TO EDIT TASK CRF'S BUILD COMMAND FILE? [Y/N]:
EDI CRFIBLD.CMD
* DO YOU WANT TO REBUILD TASK ZAP? [Y/N]:
* DO YOU WANT TO EDIT TASK ZAP'S BUILD COMMAND FILE? [Y/N]:
EDI ZAPIBLD.CMD
* DO YOU WANT TO REBUILD TASK BAD? [Y/N]:
* DO YOU WANT TO EDIT TASK BAD'S BUILD COMMAND FILE? [Y/N]:
EDI BADIBLD.CMD
* DO YOU WANT TO REBUILD TASK VMR? [Y/N]:
* DO YOU WANT TO EDIT TASK VMR'S BUILD COMMAND FILE? [Y/N]:
EDI VMRIBLD.CMD
PIP *.CMD/PU
REM ...EDI

```

Whether or not the utility tasks are to be built, processing will resume here.

SYSGEN DIALOGUE DETAILS

```
SET /UIC=[1,50]
SET /UIC=[1,54]
;
; INSTALL THE TASK BUILDER
;
INS TKB
INS BIGTKB
```

The SYSGEN procedure selects the proper version of the Task Builder, if the Task Builder is not already installed. This could be the case if SYSGEN2.CMD was terminated after building the Executive.

```
* DO YOU WANT TO PRINT THE MAPS FOR THE PRIVILEGED TASKS? [Y/N]:
* DO YOU WANT TO PRINT THE MAPS FOR THE UTILITY TASKS? [Y/N]:
```

The task build command files always generate task build maps. In most cases, these maps are of little use to the user and are not needed. Therefore, a negative response is usually given to both questions. The second question, referring to the utility tasks, is issued only if the utility tasks are being built.

```
; THE TASK MAPS WILL BE PRINTED ON
; THE CONSOLE DEVICE
; THE LINE PRINTER
SET /UIC=[1,20]
PIP PRT.OLB;*/DE,SUBMAC;*,FULMAC;*,TKB;*,PIP;*,FLX;*,VFY;*,DMP;*
PIP EDI.OLB;*/DE,SLP;*,LBR;*,FOR;*,CRF;*,ZAP;*,VMR;*,PIPUTL;*,BAD.OBJ;*
```

When not building the utility tasks on an RK host system, the object library files are immediately deleted to provide more space on the disk.

The next ten commands control processing for building the print spooler. All other tasks to be built are controlled similarly. Therefore, an explanation of the processing will be given only for the print spooler.

```
;
; NOW WE BUILD THE REQUESTED UTILITY TASKS
;
SET /UIC=[1,20]
```

Utility tasks, object library files, and overlay description files reside under UIC [1,20].

All tasks but the print spooler are built to run with the Baseline System. Therefore, if the task is going to be rebuilt and the host is an RK system where disk space is at a premium, the task file is deleted before the new task is built. A command of the form:

```
PIP [1,5x]PRT.TSK;*/DE
```

will be issued to delete the task. The symbol x represents 0 or 4 for unmapped or mapped systems, respectively.

SYSGEN DIALOGUE DETAILS

```
TKB @[1,20]PRTBLD
TKB @[1,24]PRTBLD
```

If the task is to be built, one of the two previous commands will be issued. The command files for building tasks for unmapped systems reside under UIC [1,20]. Those for mapped systems reside under UIC [1,24].

```
SET /UIC=[1,30]
SET /UIC=[1,34]
```

Task Builder maps are generated under UIC [1,30] for unmapped systems and [1,34] for mapped systems. Thus, the correct default UIC is selected by one of the two commands above.

```
PIP LI:=PRT.MAP
```

This command will be issued to print the map if it was specified to be printed.

```
PIP PRT.MAP;*/DE
```

The task build maps are always deleted, whether or not they have been printed.

```
PIP [1,20]PRT.OLB;*
```

For RK host systems, whether or not the task was built, the object module library will be deleted.

```
SET /UIC=[1,20]
PIP [1,50]MAC.TSK;*/DE
PIP [1,54]MAC.TSK;*/DE
TKB @[1,20]MACBLD
TKB @[1,24]MACBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=MAC.MAP
PIP MAC.MAP;*/DE
PIP [1,20]SUBMAC.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]BIGMAC.TSK;*/DE
PIP [1,54]BIGMAC.TSK;*/DE
TKB @[1,20]BIGMACBLD
TKB @[1,24]BIGMACBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=BIGMAC.MAP
PIP BIGMAC.MAP;*/DE
PIP [1,20]FULMAC.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]TKB.TSK/DE
PIP [1,54]TKB.TSK/DE
TKB @[1,20]TKBBLD
TKB @[1,24]TKBBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=TKB.MAP
PIP TKB.MAP;*/DE
SET /UIC=[1,20]
```

SYSGEN DIALOGUE DETAILS

Note: Since the big Task Builder is used to rebuild the utility tasks, it cannot be deleted at this point on RK host systems. It is deleted after all tasks are built, only if a new version was built for the target system. Also, the Task Builder library is used by the CRF task and will not be deleted until after CRF is processed.

```
TKB @[1,20]BIGTKBBLD
TKB @[1,24]BIGTKBBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=BIGTKB.MAP
PIP BIGTKB.MAP;*/DE
SET /UIC=[1,50]
SET /UIC=[1,54]
PIP PIP.TSK;1/RE=PIP.TSK
SET /UIC=[1,20]
```

Note: Since PIP is used during the building of tasks, it cannot be deleted at this time on RK host systems. When the target system is bootstrapped and saved, all tasks residing under UIC [1,50] or [1,54] should be purged to destroy old versions and to free disk space.

```
TKB @[1,20]PIPBLD
TKB @[1,24]PIPBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=PIP.MAP
PIP PIP.MAP;*/DE
PIP [1,20]PIP.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]FLX.TSK;*/DE
PIP [1,54]FLX.TSK;*/DE
TKB @[1,20]FLXBLD
TKB @[1,24]FLXBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=FLX.MAP
PIP FLX.MAP;*/DE
PIP [1,20]FLX.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]VFY.TSK;*/DE
PIP [1,54]VFY.TSK;*/DE
TKB @[1,20]VFYBLD
TKB @[1,24]VFYBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=VFY.MAP
PIP VFY.MAP;*/DE
PIP [1,20]VFY.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]DMP.TSK;*/DE
PIP [1,54]DMP.TSK;*/DE
TKB @[1,20]DMPBLD
TKB @[1,24]DMPBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=DMP.MAP
PIP DMP.MAP;*/DE
```

SYSGEN DIALOGUE DETAILS

```

PIP [1,20]DMP.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]EDI.TSK;*/DE
PIP [1,54]EDI.TSK;*/DE
TKB @[1,20]EDIBLD
TKB @[1,24]EDIBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=EDI.MAP
PIP EDI.MAP;*/DE
PIP [1,20]EDI.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]SLP.TSK;*/DE
PIP [1,54]SLP.TSK;*/DE
TKB @[1,20]SLPBLD
TKB @[1,24]SLPBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=SLP.MAP
PIP SLP.MAP;*/DE
PIP [1,20]SLP.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]LBR.TSK;*/DE
PIP [1,54]LBR.TSK;*/DE
TKB @[1,20]LBRBLD
TKB @[1,24]LBRBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=LBR.MAP
PIP LBR.MAP;*/DE
PIP [1,20]LBR.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]FOR.TSK;*/DE
PIP [1,54]FOR.TSK;*/DE
TKB @[1,20]FORBLD
TKB @[1,24]FORBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=FOR.MAP
PIP FOR.MAP;*/DE
PIP [1,20]FOR.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]CRF.TSK;*/DE
PIP [1,54]CRF.TSK;*/DE
TKB @[1,20]CRFBLD
TKB @[1,24]CRFBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=CRF.MAP
PIP CRF.MAP;*/DE
PIP [1,20]CRF.OLB;*/DE,TKB;*
SET /UIC=[1,20]
PIP [1,50]ZAP.TSK;*/DE
PIP [1,54]ZAP.TSK;*/DE
TKB @[1,20]ZAPBLD
TKB @[1,24]ZAPBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=ZAP.MAP
PIP ZAP.MAP;*/DE

```

SYSGEN DIALOGUE DETAILS

```
PIP [1,20]ZAP.OLB;*/DE
SET /UIC=[1,20]
PIP [1,50]BAD.TSK;*/DE
PIP [1,54]BAD.TSK;*/DE
TKB @[1,20]BADBLD
TKB @[1,24]BADBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=BAD.MAP
PIP BAD.MAP;*/DE
PIP [1,20]BAD.OBJ;*/DE
SET /UIC=[1,20]
```

Note: Since the VMR task will be needed to install tasks in the target system before bootstrapping the system, the current task image is not deleted at this point on RK host systems. It should be handled similarly to PIP.

```
TKB @[1,20]VMRBLD
TKB @[1,24]VMRBLD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=VMR.MAP
PIP VMR.MAP;*/DE
PIP [1,20]VMR.OLB;*/DE
PIP [1,20]PIPUTL.OLB;*/DE
```

This completes the processing of the utility tasks. The file PIPUTL.OLB contains subroutines used by many of the utility tasks. Thus, this file is deleted after all tasks are built.

Whether or not the utility tasks are built, processing continues at this point to build all the privileged tasks.

```
;
; NOW WE BUILD THE PRIVILEGED AND MCR TASKS
;
```

The processing of privileged tasks is similar to the foregoing. Therefore, only one task will be described fully.

```
SET /UIC=[1,20]
SET /UIC=[1,24]
```

One of the two commands above will be issued to select the proper default UIC for the object library, task build command, and overlay description files.

SYSGEN DIALOGUE DETAILS

```
TKB @BOOBLD.CMD
PIP BOO.OLB;*/DE
```

The above two commands build the tasks and delete the object library file. The object library file is deleted only on RK disk host systems.

```
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=BOO.MAP
```

The correct map UIC is set, and, if selected, the map is printed.

```
PIP BOO.MAP;*/DE
```

The task map is always deleted.

```
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @DMOBLD.CMD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=DMO.MAP
PIP DMO.MAP;*/DE
SET /UIC=[1,50]
SET /UIC=[1,54]
PIP FCP.TSK;1/RE=FCP.TSK
```

The file control primitives (FCP) task is always built with a specific version number; therefore, to prevent the new task file from deleting the current one, the old FCP.TSK file is renamed with a version number of one (1).

```
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @FCPBLD
TKB @BIGFCPBLD
```

The selected version of the file control primitives is built.

```
PIP FCP.OLB;*/DE
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=FCP.MAP
PIP LI:=BIGFCP.MAP
PIP FCP.MAP;*/DE
PIP BIGFCP.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @INDBLD.CMD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=IND.MAP
PIP IND.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @INIBLD.CMD
PIP INI.OLB;*/DE
SET /UIC=[1,30]
```

SYSGEN DIALOGUE DETAILS

```

SET /UIC=[1,34]
PIP LI:=INI.MAP
PIP INI.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @INSBLD.CMD
PIP INS.OLB;*/DE
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=INS.MAP
PIP INS.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @MCRBLD.CMD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=MCR.MAP
PIP MCR.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @MOUBLD.CMD
PIP MOU.OLB;*/DE
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=MOU.MAP
PIP MOU.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @SAVBLD.CMD
PIP SAV.OLB;*/DE
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=SAV.MAP
PIP SAV.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @TKNBLD.CMD
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=TKN.MAP
PIP TKN.MAP;*/DE
SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @UFDBLD.CMD
PIP UFD.OLB;*/DE
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=UFD.MAP
PIP UFD.MAP;*/DE

```

The following commands are issued only if the Post-mortem and Snap Shot Dump tasks were selected to be built.

```

SET /UIC=[1,20]
SET /UIC=[1,24]
TKB @PMDBLD
PIP PMD.OLB;*/DE
SET /UIC=[1,30]
SET /UIC=[1,34]
PIP LI:=PMD.MAP
PIP PMD.MAP;*/DE

```

SYSGEN DIALOGUE DETAILS

The following commands are issued only when building a mapped system and the task compaction routine was selected to be built.

```
SET /UIC=[1,24]
TKB @SHFBLD
SET /UIC=[1,34]
PIP LI:=SHF.MAP
PIP SHF.MAP;*/DE
```

At this point, all tasks have been built. If the host system is running on an RK disk, the Task Builders are purged, and all object module libraries, task build command files, and overlay description files are deleted, except for the Executive object library and task build command file.

```
PIP [1,50]BIGTKB.TSK/PU,TKB.TSK/PU
PIP [1,54]BIGTKB.TSK/PU,TKB.TSK/PU
SET /UIC=[1,20]
PIP [200,200]/RE=RSXBLD.CMD
PIP [200,200]/RE=RSX11M.OLB
PIP *.*;*/DE
PIP /RE=[200,200]RSXBLD.CMD
PIP /RE=[200,200]RSX11M.OLB
SET /UIC=[1,24]
PIP [200,200]/RE=RSXBLD.CMD
PIP [200,200]/RE=RSX11M.OLB
PIP *.*;*/DE
PIP /RE=[200,200]RSXBLD.CMD
PIP /RE=[200,200]RSX11M.OLB
SET /UIC=[1,50]
SET /UIC=[1,54]
```

The following text and questions appear only when building mapped target systems.

```
;
; YOU NOW MUST SPECIFY WHETHER THE MEMORY SIZE WHICH YOU
; SPECIFIED FOR YOUR TARGET SYSTEM IN SGN DURING SYSGEN
; PHASE ONE IS GREATER THAN 32K WORDS
;
* IS YOUR TARGET SYSTEM LARGER THAN 32K WORDS? [Y/N]:
```

If the answer to this question is affirmative, the following text is displayed:

```
;
; IF YOU EVER WISH TO HAVE TASKS FIXED ABOVE 32K WORDS IN AN
; IMAGE OF YOUR TARGET SYSTEM, OR IF THE MCR TASK ...SAV
; (WHICH NORMALLY RUNS IN GEN) IS TO EVER RUN ABOVE
; 32K WORDS, YOU MUST CREATE A LARGER COPY OF YOUR SYSTEM
; WITH PIP AT THIS TIME.
;
* DO YOU WISH TO CREATE A LARGER COPY OF YOUR SYSTEM? [Y/N]:
```

If the answer to this question is affirmative, the following text is displayed:

SYSGEN DIALOGUE DETAILS

```
;
; AT THIS TIME WE WILL INVOKE PIP TO ALLOW YOU TO CREATE A
; LARGER COPY OF YOUR SYSTEM. TO DO SO, ENTER THE FOLLOWING
; COMMAND:
;
;     PIP>RSX11M.SYS/NV/CO/BL:N.=RSX11M.TSK
;     PIP>^Z
;
; TO CREATE A SYSTEM IMAGE IN WHICH TASK IMAGES MAY BE FIXED UP
; TO M K WORDS, OR IN WHICH THE TOP OF ...SAV MAY BE AS HIGH
; AS M K WORDS, YOU MAY CALCULATE A VALUE FOR N IN THE ABOVE
; COMMAND AS FOLLOWS
;
;     N=(4*M)+2
;
; FOR EXAMPLE, TO CREATE A COPY OF THE SYSTEM WHICH PROVIDES
; THE AFOREMENTIONED SUPPORT UP TO 40K WORDS, THE COMMAND WOULD
; BE:
;
;     PIP>RSX11M.SYS/NV/CO/BL:162.=RSX11M.TSK
;     PIP>^Z
;
; ONCE PIP IS INVOKED YOU MUST CREATE A FILE RSX11M.SYS
; FOR SUBSEQUENT USE BY VMR.
;
; NOTE: SAVED IMAGES ON 11/70 ARE CURRENTLY
;       SUPPORTED ONLY TO A MAXIMUM OF 124K WORDS
;       (I.E., N=498.).
;
PIP
```

The next lines are displayed only if the size of the system is less than 32K or if the user did not want to extend the size of the system image file.

```
;
; WE WILL NOW MAKE A COPY OF YOUR TARGET SYSTEM
;
PIP RSX11M.SYS/NV=RSX11M.TSK
```

No matter how large the target system is, the processing of text and commands continues at this point.

```
SET /UIC=[1,50]
SET /UIC=[1,54]
```

```
;
; RSX11M.TSK IS A BACKUP COPY OF THE EXECUTIVE YOU JUST BUILT.
; IF YOU DO NOT WISH TO RETAIN IT, WE WILL DELETE IT NOW.
;
* DO YOU WISH TO RETAIN RSX11M.TSK AS A SYSTEM BACKUP? [Y/N]:
```

The normal reason for retaining the RSX11M.TSK file is to be able to set up two or more systems: one for program development, and one for production; or two systems with different partition layouts. If the answer to this question is negative, the following command is issued:

```
PIP RSX11M.TSK;*/DE
```

In all SYSGENS, the following text is displayed to guide the user in setting up partitions and installing tasks into the target system Executive.

SYSGEN DIALOGUE DETAILS

```

;
; YOUR TARGET SYSTEM IS NOW READY TO SET UP PARTITIONS AND INSTALL
; THE REQUIRED TASKS. THE PROCEDURE TO FOLLOW ONCE VIRTUAL MCR
; IS RUNNING IS:
;     1) EXTENDED POOL SPACE TO BASE OF FIRST PARTITION
;     2) SET UP YOUR PARTITIONS
;     2A) SET UP DEVICE COMMON BLOCKS FOR UDC OR ICS/ICR.
;     3) INSTALL TASKS (AT LEAST FCP, INS, MOU,
;         AND MCR MUST BE INSTALLED)
;     4) EXIT FROM VIRTUAL MCR AND BOOT IN YOUR TARGET SYSTEM
;
; SET UP THE TARGET SYSTEM BASED ON THE FOLLOWING EXAMPLE.
;
; VMR EXAMPLE:
;     >RUN $VMR                ! RUN VIRTUAL MCR
;     ENTER FILENAME:RSX11M.SYS ! VMR PROMPTS FOR FILE NAME
;     VMR>SET /POOL=400         ! EXTEND POOL TO FIRST PARTITION BAS
;     VMR>SET /MAIN=SYSPAR:1300:100:TASK ! SET UP SYSTEM PARTITION
;     VMR>SET /MAIN=PAR14K:400:700:TASK ! SET UP 14K PARTITION
;     VMR>SET /SUB=PAR14K:GEN:400:400 ! SET UP 8K PARTITION
;
;     VMR>SET /MAIN=ICOM:7710:10:DEV
;     VMR>SET /MAIN=UDCOM:7710:10:DEV
;     VMR>SET /MAIN=ICOM:17010:10:DEV
;     VMR>SET /MAIN=UDCOM:1710:10:DEV
;     VMR>INS [1,1]ICOM        ! SET COMMON RESIDENT
;     VMR>INS [1,1]UDCOM      ! SET COMMON RESIDENT
;
;     VMR>INS BOO              ! INSTALL BOOT
;     VMR>INS DMO              ! INSTALL DISMOUNT
;     VMR>INS FCP              ! INSTALL FILE SYSTEM
;     VMR>INS BIGFCP          ! INSTALL FILE SYSTEM
;     VMR>INS IND              ! INSTALL INDIRECT FILE PROCESSOR
;     VMR>INS INI              ! INSTALL INITVOL
;     VMR>INS INS              ! INSTALL INSTALL
;     VMR>INS MCR              ! INSTALL MCR
;     VMR>INS MOU              ! INSTALL MOUNT
;     VMR>INS SAV              ! INSTALL SAVE
;     VMR>INS TKN              ! INSTALL TASK TERMINATION TASK
;     VMR>INS UFD              ! INSTALL USER FILE DIRECTORY BUILDE
;     VMR>^Z                  ! EXIT FROM VIRTUAL MCR
;
; END OF VMR EXAMPLE
;
; NOW WE WILL RUN VIRTUAL MCR SO THAT YOU MAY INITIALIZE
; YOUR SYSTEM. BE CAREFUL TO INSTALL EITHER FCP (2K FILE SYSTEM)
; OR BIGFCP (4K FILE SYSTEM) BEFORE BOOTING AND SAVING OR YOU MAY
; HAVE TO START SYSGEN2 ALL OVER.
;
; RUN $VMR
;
; WHEN THE INDIRECT FILE EXITS, BOOT IN YOUR TARGET SYSTEM,
; SET THE DATE AND TIME, AND SAVE THE SYSTEM WITH A BOOTSTRAP.
; WHEN YOUR SYSTEM REBOOTS ITSELF, PURGE THE OLD TASK FILES.
;
; E.G.,
;     >BOOT RSX11M
;
;     RSX11M V02 BL12
;     >TIM 10/15/75 12:00:00
;     >SAV /WB

```

SYSGEN DIALOGUE DETAILS

```
;
;      RSX11M V02 BL12   28K
;      >RED DK0:=SY:
;      >MOU
;      >@[1,2]STARTUP
;      >@ <EOF>
;      >SET /UIC=[1,50]
;      >RUN $PIP
;      PIP *.* /PU
;      PIP>^Z
;      >
;
INS [1,50]BOO; -1
INS [1,54]BOO; -1
REM ...PIP
REM ...TKB
;
```

The user should bootstrap the user-tailored Executive, using the previous commentary as a model.

3.5 SGN ERROR MESSAGES

The System Generation Configuration Query Program (SGN) issues a message whenever it detects an error in the response to a query. These messages are listed below in alphabetical order. Most messages apply to a number of queries. Those which are specific to a single query are so noted in the explanatory text following the message. The "Action" paragraph is included to suggest how to correct the error and proceed with the system generation process.

SGN -- EXPLICIT DECIMAL AND OCTAL IS INVALID

An explicit specification of both decimal and octal is an invalid response to a numeric query. For example, the user entered #n.; the numeric operators "#" and "." are mutually contradictory.

Action: Re-enter correct numeric value.

SGN -- FATAL I/O ERROR ASSEMBLER INDIRECT FILE

SGN was unable to create the RSXASM.CMD file. This error, and other fatal I/O errors, can result from:

1. A full disk - no room remains,
2. No UIC under which to store the file,
3. A full index file,
4. The disk being write-protected, or
5. A write error.

SYSGEN DIALOGUE DETAILS

Action: Each of the above conditions has a low probability of occurrence. Check for:

UIC
Disk write protect
No room (index file or disk)
Write error

Corrective action is to establish the UIC, write enable the disk, reorganize the disk, or call the Digital field service representative.

SGN -- FATAL I/O ERROR CONFIGURATION PARAMETER FILE

SGN was unable to create the RSXMC.MAC file.

lm 19;.i -9 Action: See FATAL I/O ERROR ASSEMBLER INDIRECT FILE message above.

SGN -- FATAL I/O ERROR DEVICE TABLE FILE

SGN was unable to create the SYSTB.MAC file.

Action: See FATAL I/O ERROR ASSEMBLER INDIRECT FILE message above.

SGN -- FATAL I/O ERROR MAPPING TABLE FILE

SGN was unable to create file ICTAB.MAC.

Action: See FATAL I/O ERROR ASSEMBLER INDIRECT FILE message above.

SGN -- FATAL I/O ERROR SYSGEN TEXT FILE.

SGN was unable to read the SYSGEN.TXT file.

Action: See FATAL I/O ERROR ASSEMBLER INDIRECT FILE message above.

SGN -- FATAL I/O ERROR TASK BUILDER INDIRECT FILE

SGN was unable to create the RSXBLD.CMD file.

Action: See FATAL I/O ERROR ASSEMBLER INDIRECT FILE message above.

SGN -- ILLEGAL ALPHABETIC ARGUMENT

A supplied argument should have been numeric or is an illegal alphabetic combination.

Action: Re-enter correct argument value.

SGN -- ILLEGAL DEVICE SPECIFICATION

A device specification in a form other than ddnn was entered.

Action: Re-enter correct argument value.

SYSGEN DIALOGUE DETAILS

SGN -- ILLEGAL NUMBER OF LOCAL LINES

The number of DHlls specified cannot support the number of local lines specified.

Action: Check number of DHlls and the combination of remote and local line calculations. Determine correct number of local lines and re-enter correct value.

SGN -- ILLEGAL NUMBER OF REMOTE LINES

The number of DHlls cannot support the number of remote lines specified.

Action: Check number of DHlls with remote lines specified and re-enter correct value.

SGN -- ILLEGAL VECTOR ADDRESS

Vectors are checked for duplication; if duplication occurs, this message is issued.

Action: Determine correct vector address and re-enter the value.

SGN -- INSUFFICIENT ARGUMENTS

This message is for future additions to syntax. Currently, no query accepts multiple responses.

Action: Notify Digital field service representative.

SGN -- INSUFFICIENT UNIBUS MAPPING REGISTERS

UNIBUS mapping registers are statically allocated by SGN for PDP-11/70 systems with extended memory. All UNIBUS NPR devices (excluding the DH11) require allocated mapping registers and there are insufficient registers for the specified device configuration.

Action: Abort SGN and rerun, reducing the number of UNIBUS NPR devices generated into the target system.

SGN -- INVALID NUMBER OF MODULES

The number of modules specified for an ICS/ICR-11 is not possible. An ICS/ICR-11 can have a maximum of 16 functional modules.

Action: Check total number of modules specified and re-enter correct value.

SGN -- LOW PRIORITY CLASS MUST BE LESS THAN HIGH CLASS

The lowest priority class specified for round-robin scheduling is a higher priority than the previously specified highest priority.

Action: Re-enter value specifying a priority less than or equal to the highest priority class.

SYSGEN DIALOGUE DETAILS

SGN -- NUMERIC RESPONSE OUT OF RANGE

The required numeric value does not lie within the permissible range.

Action: Check value, particularly for number base error, and re-enter correct value.

SGN -- ODD NUMBER IS INVALID RESPONSE

Query requires an even number reply.

Action: Determine correct value and re-enter.

SGN -- OVERLAPPING MODULE RANGE SPECIFIED

The ranges specified for the UDC11 modules have at least one overlapping specification.

Action: Check module range specifications and re-enter correct values.

SGN -- SYNTAX ERROR

Form or format of reply is invalid.

Action: Re-enter reply correctly and proceed.

SGN -- TOO MANY RH11 CONTROLLERS

A maximum of three RH11 controllers is permitted.

Action: Review configuration requirements to meet the maximum allowable number of RH11 controllers.

SGN -- YES-NO QUESTIONS MUST BE ANSWERED WITH Y,N, OR <CR>

None of the three permissible replies has been entered for a Y/N query.

Action: Enter proper reply.

SGN -- 10000. MUST BE AN INTEGRAL MULTIPLE OF INTERRUPTS PER SECOND

The basic clock count rate is 10 kilohertz. The Executive cannot deliver interrupts at a rate not evenly divisible into 10000.

Action: Enter a clock rate which is evenly divisible into 10000.

SGN -- 10000. MUST BE AN INTEGRAL MULTIPLE OF SAMPLES PER SECOND

The LPS11 basic clock rate is 10 kilohertz. The Executive cannot deliver interrupts at a rate not evenly divisible into 10000.

Action: Enter a sample rate which is evenly divisible into 10000.

CHAPTER 4

GENERATING LARGER SYSTEMS

4.1 GENERATING NON-MINIMUM SYSTEMS

In a 16K system, the user must observe the partition boundaries, as defined in the Baseline System. Specifically, SYSPAR starts at 30100(8), and GEN starts at 40000(8). There is no need for the DRVPAR partition, since it exists as an artifice which allows generating a large number of configurations from the same kit. Thus, there is no room for expansion or movement of partitions. But if the system has more than 16K, the user has the option of considering a different partition layout. The consequences of this flexibility depend on the size of the user-tailored Executive and whether the system is mapped or unmapped.

Given the fact that the user has more than 16K of memory (and this usually means he has memory in 8K multiples), he should be aware of certain Digital-supplied software options before laying out his partitions. These options are described below:

- A. There are two versions of Task Builder and MACRO-11. The standard versions operate with 8K of memory. The larger versions (named BIGTKB and BIGMAC) need a 14K partition, but run considerably faster than the standard versions. In addition, BIGMAC supports the floating point instruction set and storage allocation psuedo op-codes. BIGTKB is required for rebuilding the Task Builder itself. BIGMAC is built by the command file BIGMACBLD.CMD, and BIGTKB is built by the command file BIGTKBBLD.CMD.
- B. FCP may be built in two versions: one that operates in 2K, and another that operates in at least 4K. The 4K version operates two to three times faster than the 2K version. The Baseline System comes with a 2K FCP. BIGFCPBLD.CMD is the Task Builder command file used to build the big FCP.
- C. Note also that MCR, FCP, and TKN share a partition in a minimum 16K system. If more memory is available, the user can consider dedicating a partition to FCP. Depending on the characteristics of his applications, substantial throughput improvements can be realized.
- D. The tasks AT., CRF, LBR, MAC, PIP, TKB, and VFY run such that they determine the size of the partition in which they are installed and make use of any additional space beyond their dimension of 8K for symbol table space. Thus, they will benefit from being installed in a partition larger than 8K. Similarly, BIGTKB and BIGMAC will benefit if they are

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installed in a partition larger than 14K. If, during a task build, assembly, or library operation, a symbol table overflow occurs, the symbol table space may be expanded by using a larger partition.

- E. Multi-user systems are easy to generate if there is enough memory to support more than one system task at a time. A multi-user system is one which has more than one terminal and whose terminals may be used simultaneously for program development or running other tasks. Given enough memory and a suitable processor, RSX-11M may satisfactorily support from 2 to 16 or more users who are editing, compiling, task building, debugging, and running production tasks.

System tuning, however, is application sensitive. Each installation must establish optimum tradeoffs of hardware and software. The partitioning layouts offered in the following sections are mainly designed to minimize the duration of the SYSGEN process itself, while maintaining a balance with known performance and size requirements of system software.

4.1.1 Unmapped System - Executive Less Than 8K

All system tasks for an unmapped system are built to run at specific physical memory addresses and must be rebuilt if they are to run elsewhere. The tasks distributed on the release disks fall into two classes:

1. Those built to run at 30100(8) (6K) (which is the SYSPAR partition), and
2. Those built to run at 40000(8) (8K) (which is the GEN partition).

If, after the creation of the user-tailored Executive, \$SYTOP exceeds 30100(8), but is less than 40000(8), the simplest strategy is to move the SYSPAR partition. This means that only the task build command files for MCR, FCP, and TKN need to be edited. Figure 4-1 depicts a suggested layout for a 24K system where \$SYTOP lies between 30100(8) and 40000(8).

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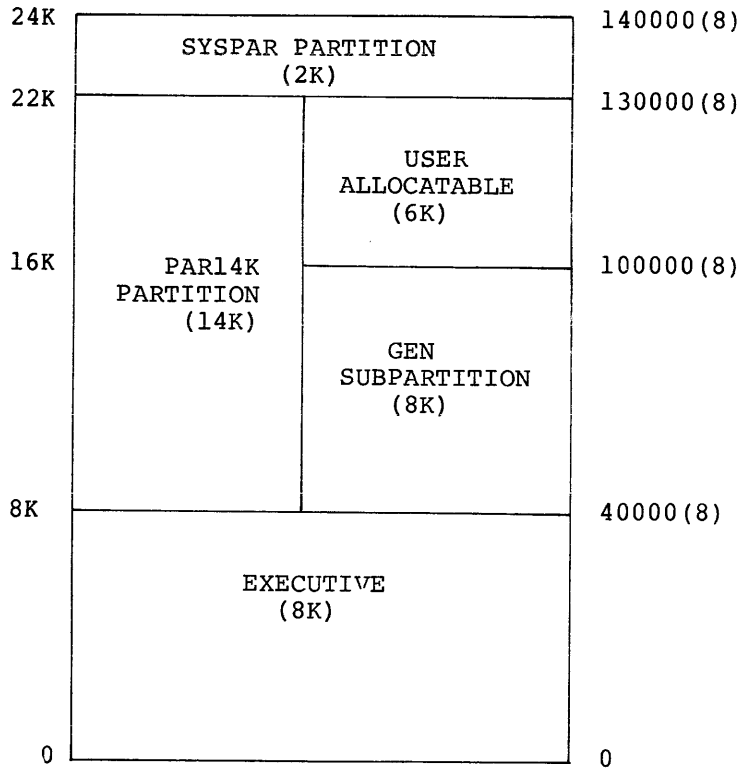


Figure 4-1
Typical Unmapped 24K System

Figure 4-1 shows that SYSPAR was moved, requiring the editing of the task build command files for MCR, FCP, and TKN. The partition PAR14K is now a real partition (rather than a pseudo partition, as was the case in a 16K system) and is properly placed to run BIGTKB without rebuilding. Furthermore, GEN has not been moved; therefore, no system task other than the privileged tasks running in GEN need be rebuilt. Finally, a user-allocatable subpartition of 6K is available in PAR14K. Of course, the user is free to define this 6K memory block into any configuration of subpartitions that meets his requirements.

Figure 4-2 illustrates a suggested 28K unmapped system. It is identical to Figure 4-1 in its allocation of the 0-24K block of memory. The additional 4K is allocated as a main partition which can be used by the print spooler (which actually requires only 2K) or which can be partitioned to suit user requirements.

If the print spooler is operating in a dedicated partition, the printer to which output is being spooled will print at a maximum throughput rate. This is the reason for allocating the partitions as shown in Figure 4-2.

GENERATING LARGER SYSTEMS

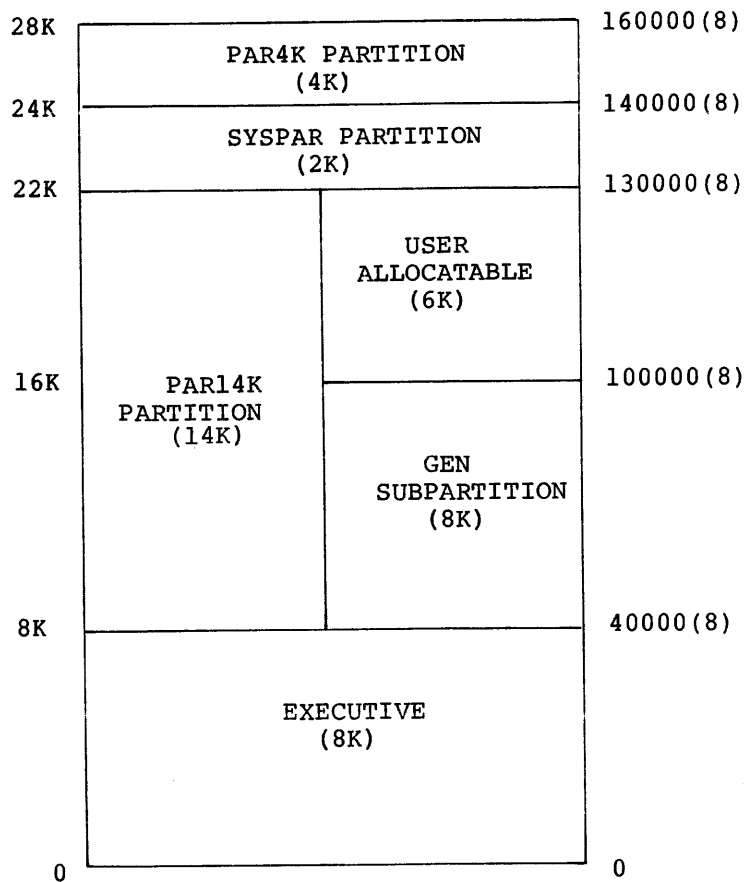


Figure 4-2
Typical Unmapped 28K System

Both of these layouts are attempts to balance SYSGEN requirements with known system software requirements. Local user requirements may dictate an alternative partitioning scheme. The following system requirements for unmapped systems should, however, be considered:

1. Most Digital non-privileged software requires an 8K partition. This software assumes that its name is GEN and that it starts at 40000(8).
2. MCR, FCP, and TKN require a 2K partition. These tasks assume that its name is SYSPAR and that it starts at 30100(8).
3. BIGTKB and BIGMAC require 14K. These tasks assume that the partition is named PAR14K and that it starts at 40000(8).

Changing a starting address or default partition name requires that the task build command files be edited and the tasks involved be rebuilt.

Changing the partition's name does not require a rebuild, since the Install command allows the partition name to be specified. However, the base addresses of the new partition and that for which the task was built must be the same, since unmapped system tasks are linked to physical addresses.

GENERATING LARGER SYSTEMS

4.1.2 Unmapped System - Executive Greater Than 8K

If the value of \$SYTOP exceeds 40000(8) on an unmapped system, all system tasks must be rebuilt. Since TKB cannot be rebuilt without BIGTKB, a 24K system is, in general, the minimum system for a user-tailored Executive which exceeds 8K.* The layout of partitions becomes a user responsibility, limited only by the stated requirements for system software and application performance goals.

4.1.3 Mapped Systems

The minimum memory size for a mapped system is 24K. The user with a mapped system will not have to rebuild non-privileged tasks if his partition boundaries move. This is true because non-privileged tasks on a mapped system are built to run at a virtual base address of zero, rather than at a physical base address. Thus, the value of \$SYTOP is much less critical in a mapped system.

Privileged tasks, as with an unmapped system, must always be rebuilt because they are linked to the Executive symbol table file. Non-privileged tasks need be rebuilt only if the user changes any of the task's attributes. The Task Builder establishes task attributes in building a task. The following are defined task attributes and their associated Task Builder switches.

| <u>SWITCH</u> | <u>DEFINED ATTRIBUTE</u> | <u>DEFAULT</u> |
|---------------|--|----------------|
| AC | Task is an ancillary control processor | -AC |
| CC | Input file has concatenated object modules | CC |
| CP | Task is checkpointable | -CP |
| DA | Task contains a debugging aid | -DA |
| EA | Task uses extended arithmetic element (EAE) | -EA |
| FP | Task uses 11/45 floating point processor (FPP) | -FP |
| HD | Task image is to contain a header | HD |
| LB | Input file is a library file | -LB |

* New systems exist in multiples of 8K and 16K memory stacks. Existing systems of 20K could support a user-tailored Executive which exceeded 8K.

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| | | |
|------|--|------|
| MM | System has memory management unit (KT11) | MM** |
| MP | Input file contains an overlay description | -MP |
| PI | Task is position independent | -PI |
| PM | Post mortem dump requested on SST abort | -PM |
| PR | Task has privileged access rights | -PR |
| SH | Short memory allocation file is requested | -SH |
| SQ | Task p-sections are allocated sequentially | -SQ |
| TR | Task is traceable | -TR |
| XT;n | Task Builder exits after n diagnostics | -XT |

4.1.4 System-controlled Partitions

RSX-11M supports two kinds of partitions: user-controlled (or fixed) partitions, and system-controlled partitions.

A user-controlled partition can be subdivided into a maximum of seven fixed subpartitions. A single task may execute in the entire partition or up to seven tasks may be simultaneously executing in the subpartitions. Execution of tasks requiring the entire partition and those requiring subpartitions is mutually exclusive.

The main attribute of a user-controlled main partition or subpartition is that only one task can be executing in the partition at once, regardless of memory requirements. This can lead to substantial waste in memory resources, but gives the user absolute control over system activity.

System-controlled partitions are contiguous areas of memory that are managed and dynamically allocated to tasks by the Executive. As many tasks as will fit are allowed to run simultaneously in a system-controlled partition. Tasks are allocated a contiguous region in the partition and are relocated with the memory management unit.

Disregarding checkpointing for the moment, the allocation of user-controlled partitions and the subpartitions is simple and straightforward. Tasks are simply granted residency on the basis of their priority. When a task is made active, it is merged into a queue of tasks waiting to gain residency in the partition. When the partition is freed, the highest priority task is granted control of the partition.

Allocation of a system-controlled partition (again disregarding checkpointing) involves the examination of the current state of the partition to determine whether there is enough contiguous space to load a task. This is accomplished by examining a list of allocated areas in the partition and calculating the size of the gaps that exist between allocated areas. The list of allocated areas is sorted by

** The default switch setting is /MM if the system on which the Task Builder resides has memory management unit; otherwise, the default is /-MM.

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physical memory address, so computation of gap size is simple. The first gap that is big enough is allocated to the task, and its allocation descriptor is merged into the list of allocated areas.

If a big enough gap cannot be found and memory compaction has not been generated into the system, then the task is placed in a priority-ordered list of tasks waiting to be loaded into the partition. Each time a task exits and frees memory in the partition, the partition wait queue is examined and an attempt is made to allocate memory to the highest priority waiting task. If memory compaction has been generated into the system and the shuffler task is installed, the Executive will activate the shuffler to compact memory, and an attempt will be made to load tasks again.

RSX-11M supports checkpointing in both user-controlled and system-controlled partitions. The objective is to avoid preempting a lower priority task, unless a higher priority task can actually be brought in and make use of the freed memory. This optimizes the use of computer system resources while maintaining a priority scheduling discipline.

Checkpointing in a user-controlled partition occurs under one of two conditions:

1. A task requires the user-controlled main partition and is of a higher priority than any task currently occupying it or any subpartition of the partition. Furthermore, all the occupying tasks must be checkpointable, and no task can have checkpointing disabled. If all these conditions hold, then all the occupying tasks are rolled out to disk, and the higher priority task is granted control of the main partition.
2. A task requires a subpartition of the user-controlled main partition, and a lower priority task occupies the partition or the subpartition into which the task is to be loaded. Furthermore, the occupying task must be checkpointable and have checkpointing enabled. If all these conditions hold, then the occupying task is rolled out to disk, and the higher priority task is granted control of the partition.

Checkpointing in a system-controlled partition occurs as the result of an allocation failure, as described above. That is, an attempt is made to allocate a contiguous region of a system-controlled partition to a task, and an unoccupied memory area of sufficient size cannot be found. In this case, the list of allocated areas in the partition is re-examined to determine whether a free space of sufficient size can be formed by checkpointing one or more tasks. As with user-controlled partitions, each task considered for checkpointing must be of a lower priority, it must be checkpointable, and it must not have checkpointing disabled.

The list is scanned from the beginning, looking for a series of non-contiguous tasks, where each task satisfies the checkpoint criteria. If the aggregate sum of the memory occupied by such a series of tasks is adequate to satisfy the memory requirement for the higher priority task, then the non-contiguous tasks are rolled out, and the higher priority task is allocated the freed space and brought into memory. If such a series of tasks cannot be found, and the shuffler task cannot compact memory sufficiently to reclaim enough memory, then no task is rolled out, and the higher priority task is

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placed in the partition wait queue. Note, in this case, that checkpointing of any task does not improve the situation, because there is not sufficient contiguous memory that can be reclaimed to satisfy the requirements of the high priority task.

RSX-11M's philosophy of checkpointing in system-controlled partitions is to avoid preempting memory unless it can actually be used. No lower priority task is checkpointed unless it is known beforehand that enough contiguous space will be made available to load a higher priority task.

Since the Executive controls the system-controlled partition, the user should be aware of the following feature. If the partition is the last real memory partition in the system (not including device partitions), the partition's size will be dynamically altered at bootstrap time to use all the memory from the beginning of the partition to the end of physical memory.

Thus, if a user bootstraps his system on a machine with more or less memory than he usually runs, the partition will be adjusted to the proper size. In addition, if the user purchases more memory, a system generation is not required to make use of this additional memory, since the additional memory is included automatically.

System-controlled partitions are especially useful in multi-user systems. By installing all the user tasks in the partition, space is used as needed. One user can be running an 8K task, such as PIP, while another user is running a larger task, such as BIGTKB; neither user needs a dedicated partition. Later, a different task combination is possible.

4.2 BUILDING SYSTEMS FOR RESIDENCE ON OTHER DEVICES

RSX-11M may use any file-structured device for system residence. Thus, in addition to the RK05, RP02, RP03, and RP04 disks, the system may reside on RF11, RS03/RS04, RX01, or DECTape devices. A system including all privileged and non-privileged tasks requires approximately 2200 blocks of storage. This storage requirement must be considered when using a single platter RF11, RS03/RS04, RX01 or DECTape as a system residence device, since these devices have less than the required space.

It is fairly easy to put a system on another device. The steps are:

1. Format the disk, if necessary.
2. Initialize the disk as a Files-11 volume.
3. Mount the disk and establish the following UICs on it.

[1,1] [1,2], [1,4] and [1,50] or [1,54]

4. PIP all files in UICs [1,1], [1,2], and [1,50] or [1,54] from the system disk to the new device, as shown below:

```
>SET /UIC=[1,1]
>PIP DS0:=DK0:*. *
>PIP DS0:[1,2]=DK0:[1,2]*.*
>PIP DS0:[1,50]=DK0:[1,50]*.*
```

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5. You will need a virgin image of the target system Executive to bootstrap on the new device. Thus, in SYSGEN2 you should specify that a copy be made of the Executive. Using PIP, transfer file RSX11M.TSK to the new disk and rename it RSX11M.SYS. Be sure that it is a contiguous file. If it is not, make it contiguous by issuing the following command:

```
PIP [1,50]RSX11M.SYS/CO=[1,50]RSX11M.SYS
```

NOTE

The target system Executive must have the device on which it is to reside generated into the system; otherwise the device driver will not be available to load tasks.

6. Using the Assign (ASN) command, create the logical device name SY: and assign it to the new disk, as follows:

```
>ASN DS0:=SY:
```

7. Run VMR to set up the partitions and install the required tasks.
8. Bootstrap in the new system and save it with a bootstrap block, as shown below.

```
>SAV /WB
```

4.3 SUPPORTING MORE THAN ONE SYSTEM ON THE SAME VOLUME

Supporting more than one system on the same device is fairly straightforward. Create a UIC for the new system, such as [2,50] or [2,54].

1. Copy all files from [1,50] or [1,54] to the new UIC (or rename them into the new UIC). Note that tasks may not be installed in two systems at the same time; therefore, all tasks to be used in both systems must be copied.
2. Create the file RSX11M.SYS from the RSX11M.TSK file.
3. Run VMR, set up partitions, and install tasks.
4. Bootstrap the system and save it (with a bootstrap block, if desired).

There are now two systems on the same volume. If the install-run-and-remove option of the Run command is to work properly, the default UIC for the task image (specified by \$ in RUN \$xxx) must be set up for the proper UIC. This may be done using ZAP. Get a map of MCR and locate the object module RPSOV, set up a relocation register to the block and starting address of RPSOV, and open the location at offset 36(8) from the beginning of the module. This is the beginning of a text string [1,50] or [1,54], depending on whether it is an unmapped or mapped system. Change the string to the correct

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UIC. Note that the length of the string must not be changed.

EXAMPLE:

```
>UFD SY:[2,54]
>SET /UIC=[2,54]
>PIP =[1,54]
>PIP RSX11M.SYS:*/DE
>PIP RSX11M.SYS=RSX11M.TSK
>VMR
ENTER FILENAME: RSX11M
VMR> SET /MAIN=SYSPAR:400:100:TASK
VMR> SET /MAIN=GET:500:1100:SYS
VMR> SET /POOL=400
VMR> INS FCP
VMR> INS INS
VMR> INS MCR
VMR> INS MOU
VMR> INS SAV
VMR> ^Z
>ZAP
ZAP>MCR
_55:102054:1R
_1,36\
055:102112\133
-
055:102113\061
-062
-X
>BOO
RSX11M V02 BL12
>SAV
RSX11M V02 BL12 64K MAPPED
>RED DK0:=SY0:
>MOU DK0:
>@[1,2]STARTUP
>@<EOF>
```

4.4 INCREASING FILE SYSTEM THROUGHPUT

4.4.1 Building a Faster File System

As distributed, the SYSGEN command files build a 2K or 4.5K file system. The 4.5K file system is two to three times faster than the 2K system for certain operations. However, increased speed in directory operations is possible by increasing the number of directory blocks read in at one time. This becomes important on large disks, such as the RP02, RP03, and RP04.

To increase or decrease the number of directory blocks read in at one time, the user must edit the file BIGFCPBLD.CMD. The size of BIGFCP can be reduced to 4K by eliminating the buffer allocated to directory blocks, or it may be increased by .25K for each additional block to be used. The program section name is \$\$BUF3. To reduce the size of BIGFCP to 4K, delete the line:

```
EXTSCT=$$BJF3:2000
```


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To increase the number of blocks read, edit the line to increase the PSECT by the number of additional bytes to be read. Keep in mind that directory blocks are read in multiples of 1000(8) bytes; thus, the PSECT should be altered only by increments of 1000(8). For example, the statement:

```
EXTSCT=$$BUF3:6000
```

will read in six directory blocks at a time.

NOTE

The file system task should not share a partition with any task that performs file-structured I/O. Any other configuration will cause a malfunction of the RSX-11M system. The operation of RSX-11M is heavily dependent on the file system. Nearly all tasks request processing from it. Thus, for a system to operate properly, the file system must be in a partition where it can react promptly. Most tasks request an I/O operation through FCP, and while this I/O operation is in progress, they cannot be checkpointed. Thus, if FCP is running in the same partition, it will not be able to get in to process the request.

4.4.2 File Control Primitives Dynamic Memory Requirements

A special feature of the file control primitives (FCP) task allows directory operations to be speeded up. However, as many as 54 (decimal) words of dynamic memory may be required for each mounted volume.

This feature allows directories to be pre-accessed, as follows: the first time a directory operation is performed on a given directory (master file directory or user file directory), the directory is accessed. An 18-word file control block is stored in the directory least-recently-used (LRU) list. The LRU list is actually part of the file control block list pointed to by the volume control block.

Pre-accessing directories in this way generally saves three disk accesses for every directory operation. The search of the master file directory for the identification of the user file directory is eliminated completely, thus eliminating the read of the MFD file header and MFD data block. Accessing the user file directory precludes the necessity for reading the UFD's file header.

The dynamic memory required to effect this time saving may be intolerable for users with limited dynamic memory space, because up to three 18-word LRU entries may be required for each mounted volume.

The maximum number of directory LRU-list entries that will be used by FCP is set at volume mount time by use of the /LRU parameter. The default is currently set to 3; however, it may be overridden.

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4.5 INSTALLING AND USING RESIDENT LIBRARIES AND COMMON BLOCKS

RSX-11M supports resident libraries and common blocks which may be shared by separate tasks. Resident libraries and common blocks must be installed in common partitions.

4.5.1 Setting up a Common Partition

A common partition is established through an MCR Set Command which specifies that the partition type is "COM". For example, the following command:

```
>SET /MAIN=FORRES:1000:300:COM
```

will set up a main common partition named "FORRES", starting at 100000, that is 30000 bytes long.

To eliminate a common partition, use the SET /NOMAIN or SET /NOSUB command.

4.5.2 Installing a Library or Common Block

Both the task and symbol table files (.TSK and .STB) must be stored under UIC [1,1]. Tasks using the common block or resident library must specify such use during task build. Before a task referencing a library or common block can be installed, the common block or library must be installed. This is done with the MCR Install command, as shown below:

```
INS [1,1]FORRES/PAK=FORRES
```

This command causes the library or common block to be loaded into the partition. Tasks that reference the library or common block can then be installed.

4.5.3 Eliminating a Library or Common Block

A common block or library can be eliminated only through the MCR Set command. For example, the command:

```
SET /NOMAIN=FORRES
```

will eliminate the library FORRES (installed as shown in section 4.5.2 above) and the partition FORRES. Care should be exercised when eliminating a library or common block to remove any tasks which reference it before removing the library.

4.6 BUILDING A FORTRAN OTS MEMORY-RESIDENT LIBRARY

In order to save memory space, a user may wish to build a shareable (resident) library containing frequently-used FORTRAN routines.

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A MACRO-11 source file designed to aid the user in building a resident FORTRAN library is distributed with RSX-11M. This file, named FORRES.MAC, is located under UIC [200,200]. As distributed, this module generates an 8K library for a system with no extended arithmetic support.

While it is not necessary to build the resident library during system generation, memory space for it should be considered at that time. Otherwise, it may be difficult to install the library.

Building an optimal resident library is an interactive process. The file FORRES.MAC must be edited with consideration for size and program requirements.

For most efficient use of virtual memory, the library should be as close as possible to a 4K boundary, without exceeding that boundary.

The following steps are a guide to tailoring the FORTRAN library to individual system requirements. This process assumes that a system generation has already been done, that all tasks are installed, and that the system has been saved.

1. For easy reference to the MACRO-11 file, a listing of FORRES.MAC may be useful:

```
>SET /UIC=[200,200]
>PIP LP:=FORRES.MAC
```

2. The MACRO-11 file may now be edited to insert or remove entry points for various routines.
3. Assemble the MACRO-11 file:

```
>MAC FORRES=FORRES
```

4. Task build the file, specifying the /-HD and /-PI switches on the symbol table file. The only Task Builder option required is STACK=0. The appropriate command sequence is shown below:

```
TKB>,LP:.,SY:FORRES/-HD/-PI=FORRES
TKB>/
ENTER OPTIONS:
TKB>STACK=0
TKB>//
```

5. Check the Task Builder map to obtain the size of the library (in octal bytes), as shown in the line "R/W MEM LIMITS:". If the library will not fit into the partition planned for it, examine the rest of the map to obtain the sizes of individual modules. Remember that the library should be as close as possible to a 4K boundary without exceeding that boundary.
6. Edit (or re-edit) the MACRO-11 file, adding or removing semicolons in accordance with size and usage constraints.
7. Re-assemble the MACRO-11 file and task build it again in order to verify the size of the library. The short TKB map may be specified, as follows:

```
>MAC FORRES=FORRES
>TKB
TKB>,TI:/SH,SY:FORRES/-HD/-PI=FORRES
```

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```
TKB>/  
ENTER OPTIONS:  
TKB> STACK=0  
TKB>//
```

8. When the library is the desired size, task build it in UIC [1,1], specifying all output files. In addition to the STACK= option, the PAR= option must be used, as shown below:

```
SET /UIC=[1,1]  
>TKB  
TKB>FORRES, TI:/SH,SY:FORRES/-HD/-PI=[200,200]FORRES  
TKB>/  
ENTER OPTIONS:  
TKB> STACK=0  
TKB> PAR=FORRES:base:length  
TKB>//
```

(If there is a system resident library, the TKB option LIBR=SYSRES:RO may also be used.)

9. Allocate space for the library, as shown below:

```
>SET /MAIN=FORRES:base:length:COM
```

10. Install the library using the following command:

```
>INS FORRES
```

11. Now perform a SAVE, or edit the [1,2] STARTUP.CMD command file to install FORRES at bootstrap time.

4.7 BUILDING AN FCS POSITION-INDEPENDENT MEMORY-RESIDENT LIBRARY

In order to save memory, a user may wish to produce a position-independent library containing all the FCS modules required by a set of programs that are intended to run simultaneously.

The MACRO-11 source file, [200,200] FCSRES.MAC, is provided to aid the user in building an FCS resident library. As distributed, this file produces a 4K library and contains every module in FCS. A user wishing to produce a smaller version of FCSRES may do so by editing the FCSRES.MAC file, eliminating the .GLOBL references for those modules to be excluded.

It should be understood that the number of FCS modules that goes into a resident library is dependent on which programs are going to use FCS and what modules those programs require. An essential point to bear in mind is that a program which links to FCSRES will not be able to link in missing FCS modules from the SYSLIB.OLB object library. Such a program cannot link with FCSRES. It must instead link all of FCS from SYSLIB.

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To build FCSRES:

1. Edit the FCSRES.MAC file, if desired.
2. Assemble it, as shown below:

```
MAC>FCSRES=FCSRES
```

3. Task build it with the following command sequence:

```
>SET /UIC=[1,1]
>TKB
TKB>FCSRES/-HD/PI,LP: ,SY:FCSRES=[200,200]FCSRES
TKB>/
ENTER OPTIONS:
TKB>STACK=0
TKB>PAR=FCSRES:base:size
TKB>//
```

The base address for FCSRES will always be 0 for a mapped system. For an unmapped system, it will be the actual common block base address. The size of the partition may be assumed to be 4K. After one task build, a more accurate size can be given.

4. Set up a common block, as shown below:

```
>SET /MAIN=FCSRES:1400:200:COM
```

The above example sets up a 4K common block at 140000.

5. Install the library using the following command:

```
>INS [1,1]FCSRES
```

6. Save the system or edit the [1,2] STARTUP.CMD command file to install FCSRES at bootstrap time.

If a FORTRAN resident library is also desired in conjunction with an FCS resident library, build FCSRES first, then include the Task Builder option statement:

```
LIBR=FCSRES:RO
```

in the task build commands for FORRES. This, of course, results in a considerably smaller FORRES. By properly tailoring the FORTRAN resident library, a very flexible 4K FORRES using a 4K FCSRES can be built. This would allow the use of FCSRES by itself when FORRES was also not required.

4.8 PRINT SPOOLER (PRT)

A print spooler (PRT) task is provided which can be built to print listings simultaneously with the operation of other tasks. The MACRO-11 assembler, Task Builder, and FORTRAN compilers will try to spool all listing or map files generated by them onto disk. If the print spooler is not installed, the files will remain on disk. If the spooler is installed, it will be started, thus printing any files in its receive list (input queue). When a file has been printed, it will

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be deleted. Using the print spooler speeds up the operation of MACRO-11, the Task Builder, and compilers, since they do not have to wait for I/O to complete on the relatively slow (compared to disk) line printer. For optimum operation, the print spooler should be installed in its own partition. The print spooler requires a 2K partition in which to run. It may be built checkpointable or not checkpointable. However, if it is built non-checkpointable, it will run considerably faster because it will double-buffer printing. The Executive limits checkpointable tasks to one outstanding I/O request. Non-checkpointable tasks do not have this restriction.

It is possible for the user to build a non-deleting print spooler. This is accomplished by editing the task build command file PRTBLD.COM during SYSGEN phase 2. When the Line Text Editor (EDI) prompts, enter the following commands:

```
F GBLPAT
GBLPAT=PRT:$DELET:1
*C/1/01
GBLPAT=PRT:$DELET:0
*EX
```

4.9 BUILDING MULTI-USER SYSTEMS

As mentioned before, RSX-11M is capable of supporting more than one terminal which is running tasks. Such systems are called multi-user systems. Depending on the processor, disks, and memory size, RSX-11M can support from 2 to 16 or more users at the same time.

4.9.1 Setting Up a Multi-User System

At system generation, more than one terminal should be generated into the system. These terminals may consist of any combination of DL11s, DJ11s, or DH11s. DH11s may have either local or dial-up lines.

When the partitions are laid out, the system manager has the choice of setting up fixed partitions or system-controlled partitions. System-controlled partitions must be selected at system generation time. In a fixed partition system, each user terminal is allocated a dedicated partition in which to run its tasks. In a system-controlled partition, the Executive parcels out memory to user tasks, as required. This scheme is much more flexible than a fixed partition scheme, since only the space needed for the current task mix is used. In a fixed partition system, much space could be wasted if partitions are made big enough to run tasks such as BIGTKB and BIGMAC; most work is done using smaller tasks such as EDI or PIP.

4.9.2 Installing and Naming Tasks

A single task image may be installed any number of times in RSX-11M, as long as it is not checkpointable.

Checkpointable tasks must be copied to allow multiple users to run them. For example, the indirect file processor task (AT.) is checkpointable, and copies of it must be made to allow more than one

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user to run it. Thus, there should be INDO.TSK, IND1.TSK -...INDn.TSK, where the number n after the file name "IND" indicates the terminal to which the task image belongs. INDO should be installed as AT.0, IND1.TSK as AT.1, and INDn.TSK should be installed as AT.n. The parameter n may be any octal number from 0-377(8).

Similarly, other checkpointable tasks should be copied and named accordingly (a checkpointable MACRO-11 in file MACn.TSK would be named MACn). The applicable convention is that the task name should be built from the MCR command name used to invoke it (e.g., MAC) and the terminal number from which it is to run.

4.9.2.1 Fixed Partition Systems

For fixed partitions, all tasks to be started by MCR, rather than a Run command, should be installed in the above manner. In addition, for the install-run-and-remove option of the Run command to work properly on fixed partition systems, the task INS should be installed in each user partition dedicated to a terminal. Tasks started by the install-run-and-remove command will automatically be named TTn, where n is the unit number of the terminal from which it was started. The task will run in the partition that the task INSn was running in at the time it installed the task. The partition and naming conventions may be overridden by explicitly naming the task and partition in the Run command.

4.9.2.2 System-Controlled Partitions

For multi-user systems with a system-controlled partition, the Executive performs the naming and creating of tasks. Except for checkpointable tasks, only one copy of each task needs to be installed in the system-controlled partition. The default name should be that used in single-user systems (e.g., MACRO-11 is ...MAC).

4.9.2.3 Task Invocation

When the user types the command to invoke a task (e.g., >MAC A,A=B), the system executes the following algorithm, where XXX is the command name:

1. Search for task ...XXX. If found and not active, start it and assign TI: to the terminal which issued the command. If active, issue "task active" message.

Otherwise:

2. Search for task XXXn. If found and not active, start it and assign TI: to the terminal which issued the command.

Otherwise: If active, issue "task active" message.

3. If task XXXn is not found and task ...XXX is found, and task ...XXX is installed in a system-controlled partition, then duplicate the task control block entry for task ...XXX, name

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the task XXXn, start it, and assign TI: to the invoking terminal. On task exit, deallocate the temporary task control block entry.

4. If tasks ...XXX and XXXn are not found, issue "TASK NOT IN SYSTEM" message.
5. For the install-run-and-remove option of the Run command, the task is always named TTn, where n is the unit number of the terminal from which it was requested. It is installed in the partition that task INS is running in, unless overridden by the /PAR= option.

4.9.3 Memory Compaction

The shuffler task SHF... works in conjunction with the Executive to assure that space in a system-controlled partition is used to its fullest. Thus, if small blocks of memory exist where none are large enough for a task to run in, but the total free space is large enough, the Executive will call task SHF... to move all tasks down in memory to reclaim the free space into one contiguous piece big enough to accommodate the task. This option must be selected at SYSGEN time and the task SHF... must be built. SHF... should be installed in a user-controlled partition with tasks that execute for short periods of time, thus allowing it to respond quickly to Executive requests. It should not run in a system-controlled partition or in the same partition as FllACP or any other ACP task.

4.9.4 Round-Robin Scheduler

There is an option at system generation time to include a round-robin scheduler into the Executive. This scheduler time-slices the CPU among tasks in a priority range selected at system generation time. It ensures that all tasks of equal priority share in the CPU resources. But, since RSX-11M is a priority-structured system, higher priority tasks will be allocated more of the CPU time than lower priority tasks. Tasks not in the priority range are unaffected.

4.9.5 Checkpointing During Terminal Input Wait

A SYSGEN option exists which allows tasks that are checkpointable to be displaced to the disks while they are waiting for input from a terminal. This feature allows more copies of terminal I/O-bound tasks (e.g., EDI) to be run than normally could be run in a given amount of memory. However, the tasks must be built as checkpointable, which requires more disk space than non-checkpointable tasks.

When a checkpointable task is waiting for terminal input, its effective priority is zero (its real priority never changes). Therefore, lower real priority tasks ready to run will cause a higher real priority task that is waiting for terminal input to be checkpointed. When the terminal input to the checkpointed task completes, the higher priority task will be brought back into memory, causing other lower priority checkpointable tasks to be checkpointed,

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if necessary, to make room for it. A task which has been checkpointed while awaiting terminal input will not be brought back into memory until its terminal request has been satisfied. This is true even if there is enough memory available for it.

CHAPTER 5

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

5.0 INTRODUCTION

The Virtual Monitor Console Routine (VMR) is an RSX-11M system program that allows the complete on-line generation of RSX-11M and RSX-11S systems. As its name suggests, VMR provides the capability to execute MCR commands that are directed to the disk image of a system.

VMR supports a compatible subset of the MCR commands described in the RSX-11M Operator's Procedures Manual. All supported commands have identical syntax and semantics as their MCR counterpart with one exception, which is the Save command.

5.1 INITIATING VMR

There are six methods for initiating VMR. These methods are described below. The first four methods apply when VMR is installed and ready to be executed. The remaining two cause VMR to be installed, executed, and then removed on exit.

Method 1:

```
>VMR @indirect
```

VMR is loaded, executes the specified indirect command file, and then exits.

Method 2:

```
>VMR
```

VMR is loaded and responds with the following prompt:

```
ENTER FILENAME:
```

Method 3:

```
>RUN ...VMR
```

VMR is loaded and responds with the following prompt:

```
ENTER FILENAME:
```

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

Method 4:

>RUN ...VMR/UIC=[g,m]

The UIC under which VMR executes is explicitly specified for this run only. Normally, VMR executes with the default UIC associated with the initiating terminal. VMR is loaded and responds with the following prompt:

ENTER FILENAME:

Method 5:

>RUN \$VMR

VMR is installed from the system UIC ([1,50] or [1,54]), loaded, and responds with the following prompt:

ENTER FILENAME:

Method 6:

>RUN \$VMR/UIC=[g,m]

The UIC under which VMR executes is explicitly specified for this run only. Normally, VMR executes with the default UIC associated with the initiating terminal. VMR is installed from the system UIC ([1,50] or [1,54]), loaded, and responds with the following prompt:

ENTER FILENAME:

In all methods of initiation except method 1, VMR prompts with:

ENTER FILENAME:

At this point, the user enters the file specifier for the file that contains the image of the RSX-11M or RSX-11S system he wishes to modify. A symbol table file corresponding to the system image file with the same filename, but of type .STB, must be under the same UIC. (See exception described for the /IM switch below.) For example, if the file specifier RSX11S.SYS was entered in response to the

ENTER FILENAME:

prompt, there must be a corresponding file named RSX11S.STB that contains the symbol definitions for the RSX11S.SYS system image.

The system image and symbol table files are in the standard format produced by the RSX-11M Task Builder.

Upon receiving a valid file specifier, VMR proceeds to open and read the symbol table file; it also opens the system image file and verifies that the system image file is indeed a system image. VMR then prompts with

VMR>

and awaits the entry of a command. The user may enter any valid VMR command or terminate VMR by typing CTRL/Z*.

*CTRL/Z is typed by simultaneously depressing the CTRL and Z keys.

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If method 1 is used to initiate VMR, the specified file is considered to contain a series of commands to be executed by VMR.

The first record in the file must contain a file specifier for the system image file that is to be modified.

In addition to accepting an indirect file during initiation, the user may also enter

@filespecifier

anytime that VMR is prompting for input. This directs VMR to obtain input from the specified file until an end-of-file is reached and then to return to the terminal for further input. This feature of VMR is very useful in cases where a series of Install commands, for example, are to be repeated for several generated systems.

5.2 VMR FILE SPECIFIERS

File specifiers accepted by VMR are in the standard RSX-11M form:

dev:[g,m]filename.type;ver/sw

where:

dev: is the device-unit on which the volume containing the desired file is mounted, for example, DK0: or DT1:. The name consists of two ASCII characters followed, by an optional 1- or 2-digit octal unit number.

Default: SY0:

[g,m] is the user identification code (UIC), consisting of a group number and a member number, associated with the user file directory (UFD) containing the desired file.

Default: the UIC under which VMR is running.

filename is the name of the file. In RSX-11M, a filename can be up to nine alphanumeric characters in length. Filename and type are always separated by a period (.).

Default: none; must be specified.

typ is the the file type, consisting of up to three alphanumeric characters.

Default: SYS for system image files, and CMD for indirect files.

ver is the version number in the range 0 through 77777(8).

Default: latest version.

/sw is a 2-character ASCII name identifying a switch option.

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Only one switch option (/IM) is provided with VMR, and it is used in conjunction with the Save command to write non-RSX-11M/RSX-11S system images to secondary media in bootstrappable format. The switch may be specified only on the system image file and overrides the requirement for the symbol table file.

When the /IM switch is specified, the only command VMR will accept is the Save command. The /IM switch is useful in cases where RSX-11M is used as a host system to develop and create small, core-only systems that must be loaded from a serial media such as paper tape.

5.3 COMMAND SUMMARY

VMR commands are classified into four categories: initialization, informational, task control, and system maintenance. The following command summary lists each command by category, the page on which it may be found, and a brief description of the command.

Initialization Commands

| | | |
|---------|--------|--|
| ASSIGN | [5-8] | Assign a logical name to a physical device. |
| INSTALL | [5-10] | Install a task into the system image. |
| SET | [5-15] | Set system parameters. |
| TIME | [5-24] | Establish or display the time as stored in the system image. |

Informational Commands

| | | |
|------------|--------|---|
| DEVICES | [5-25] | Display the list of peripheral devices recognized by the system on the entering terminal. |
| LUNS | [5-26] | Display the list of LUN assignments for an indicated task on the entering terminal. |
| PARTITIONS | [5-27] | Display the list of partition definitions on the entering terminal. |
| TASKLIST | [5-28] | Display the system task directory on the entering terminal. |

Task Control Commands

| | | |
|--------|--------|--|
| ALTER | [5-29] | Alter the priority of a task. |
| CANCEL | [5-30] | Cancel time-based initiation requests for a task. |
| FIX | [5-31] | Fix a task in memory (task is copied into system image). |

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| | |
|----------|---|
| REASSIGN | [5-32] Change LUN assignment(s). |
| REDIRECT | [5-33] Redirect all I/O requests from one physical device to another. |
| REMOVE | [5-35] Remove a task from the system image. |
| RUN | [5-36] Schedule a task's activation. The task may run immediately when the system is bootstrapped, after a delay, or in synchronization with the system clock. Periodic rescheduling is optional. |
| UNFIX | [5-40] Unfix a task in the system image. |

System Maintenance Command

| | |
|------|--|
| SAVE | [5-41] Write the system image of memory onto a secondary media in bootstrappable format. |
|------|--|

5.3.1 Command Syntax

It is not necessary to type in the entire command name when entering a command. VMR requires only the first three letters of a command, followed by the command parameters. If parameters are entered, they must be preceded by at least one blank or tab.

The following example shows how the Time command may be specified. Note that brackets are used in the example to indicate that the "E" is optional; the square brackets are not actually entered as part of the command name.

```
VMR>TIM[E]<CR>*  
14:00:04 22-AUG-73
```

Thus, either

```
VMR>TIME<CR>
```

or

```
VMR>TIM<CR>
```

is acceptable.

* The angle brackets are used to denote that the enclosed character(s) are not taken literally as part of the command syntax. For example, <CR> indicates that a carriage return terminates the input line.

5.3.2 Keywords

Some commands use keywords which generally apply to a command argument. A keyword consists of a slash (/), followed by an ASCII identification, and optionally followed by an equal sign (=) and the value of the keyword, as follows:

```
/Keyword=value
```

Keywords can be submitted in any order. As an example of keyword usage, the Install command requires a filename argument specifying the task to be installed. Keywords can be appended to the filename. One such keyword, /TASK, can specify the name under which the task is to be installed. Thus:

```
VMR>INS JIM/TASK=SUPER
```

will cause the task contained in the file named JIM.TSK to be installed with the name SUPER. Keywords are command specific and, thus, are defined with each command.

5.3.3 Comments

VMR will treat a line of text as a comment if the first character in the line is a semicolon (;). In addition, the exclamation mark (!) may be used to delimit comments on a command line. The first exclamation mark starts the comment, and the next exclamation mark, or the end of the line, terminates the comment. Any text between the two exclamation marks is ignored, as shown below:

```
>; THIS LINE IS A COMMENT
>TAS !THIS IS A COMMENT STRING!
```

This feature is especially useful in providing comments in indirect files.

5.4 VMR COMMANDS

Command names are at least three characters in length. VMR accepts the first three characters of a command and then searches for a blank, tab, carriage return, or ESCape character. Therefore, embedded blanks are not allowed in a command name. If a command is entered incorrectly, an error message will be displayed at the entering terminal.

Syntactical descriptions of commands and messages described in this chapter observe the following notational conventions:

1. Lower case indicates a variable whose actual value is determined when the command is entered or when the message is issued. For example, the value of "taskname" depends on the name of the task associated with the command or message.
2. Brackets [] enclose optional items. A syntactical element enclosed in brackets (e.g., [dt]) may or may not be included in the command, at the user's option. In the UIC keyword,

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square brackets are part of the required syntax. This exception is noted as it occurs.

3. Unless explicitly qualified, all numeric values required in a command may be entered as decimal or octal. Decimal values are indicated by a trailing period; octal values are indicated by the absence of a trailing period. Thus,

255.

and

377

have the same value. (The value 255. is decimal, while the value 377 is octal.)

5.4.1 Command Description Format

Each command is described using four subheadings. Any subheadings that do not apply are omitted.

COMMAND NAME

This section is headed by the command name in capital letters. On the right margin, the minimal VMR command mnemonic is shown.

Following the heading, the action of the command is described.

Format:

The command format is given, and all parameters are described.

Examples:

Example are shown.

Command-Related Error Messages:

Error messages specific to the command appear in this section. The command may also produce messages listed in section 5.5 (common error messages), but these are not listed here.

Notes:

A list of special considerations that may prove helpful in assisting the programmer in the proper use of the command.

5.4.2 Initialization Commands

ASSIGN

ASN

The Assign command is used to define, delete, or display logical device assignments. Logical device assignments are a convenient way to associate logical names with physical devices. There are two types of logical device assignments; local and global. Only global assignments are supported by VMR (see the RSX-11M Operator's Procedures Manual for a complete description of local assignments). Logical device names may be the same as physical device names, or they may be purely random, as long as they follow the syntax for device names. This syntax requires a 2-character ASCII device name followed by an optional 1- or 2-digit octal unit number. When referring to a logical device, the name must be terminated by a colon, just as any physical device.

Format:

ASN ppnn:=llnn:/GBL

Assign logical name llnn to physical device ddnn. The assignment is global.

ASN /GBL

Display all global assignments on the entering terminal.

ASN =llnn:/GBL

Delete the global logical device assignment of logical name llnn.

ASN =/GBL

Delete all global logical assignments.

where:

pp - physical device name.

nn - unit number.

ll - logical device name.

Example:

```
VMR>ASN DK:=GB0:/GBL !DEFINE GLOBAL DEVICE GB0:
VMR>ASN /GBL          !LIST ALL ASSIGNMENTS
GB0: DK0:             !GLOBAL
VMR>ASN =/GBL         !ELIMINATE ALL GLOBAL ASSIGNMENTS
```

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Command-Related Error Messages:

VMR -- LOGICAL DEVICE NOT IN SYSTEM

The specified logical device name has not been previously defined and, therefore, cannot be found in the logical device assignment table.

VMR -- PSEUDO DEVICE ASSIGNMENT ERROR

A logical device name may not be assigned to a pseudo device.

Notes:

1. VMR supports only global assignments, and /GBL is required syntax.

INSTALL

INS

The Install command is used to make tasks known to the system and to load resident libraries into common partitions. Filename is the only required argument. The keywords are optional arguments for parameters that were either not specified at task-build time, or are to be overridden during the performance of the Install command. The process of task installation results in a task control block (TCB) being constructed and recorded in the system image. Once installed, a task may be acted upon by specifying its name in an appropriate command.

Format:

```
INS[TALL] filespec[/keyword][/keyword]...
```

Keywords:

```

/CKP = option
/INC = extension size
/PAR = pname
/PMD = option
/PRI = number
/TASK = taskname
/UIC = [group,member]

```

where:

```
filespec - dev:[group,member]filename.type;version
```

The standard defaults for file specifiers apply. TSK is the default type.

CKP - Checkpoint option. If CKP=YES (default for checkpointable tasks), checkpointing of a checkpointable task will be allowed. If CKP=NO, checkpointing will be disabled for the task.

Default: yes, for checkpointable tasks.

INC - The number of words to be allocated to a task which is run in a system-controlled partition. The extension size is usually expressed in octal, but may also be expressed in decimal by appending a period. This keyword will override the EXTTSK parameter used at task-build time and is used for tasks which determine the size of the partition in which they are running in order to decide how much dynamic space they may allocate to symbol tables or buffers. Tasks such as MACRO-11, Task Builder, PIP, LBR, and VFY, use the space from the end of the task image to the end of the partition as dynamic memory. In effect, the INC keyword defines the number of words in this dynamic region.

Default: size specified at task-build time or zero.

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- PAR - A partition name which overrides the partition specified at task-build time. In an unmapped system, the partition specified must have the same base address as the partition the task was built for.
- Default: the Task Builder uses the name GEN.
- PMD - Post-Mortem Dump option. If PMD=YES, a Post-Mortem dump will be requested for the task if it aborts due to an SST error condition. If PMD=NO (the default at task-build time), no dump will be requested at SST abort time. This keyword will override the /PM switch specified at task-build time.
- Default: specified at task-build time.
- PRI - Task priority. The value range is 1 through 250(10). Number conventions apply.
- Default: 50. (decimal).
- TASK - Taskname. The name by which the task is to be referenced.
- Default: name specified at task-build time or the first six characters of the filename. (See the RSX-11M System Generation Manual for an explanation of the multi-user system default.)
- UIC - [group,member]. The square brackets are required syntax. This UIC is the default for the task. It can be overridden in the Run command. The task UIC determines the file protection class (system, owner, group, world) of the task, thus directly influencing file access.
- Default: default from task build.

Examples:

VMR>INSTALL SCAN

Install task SCAN. Priority and UIC are defaulted.

VMR>INSTALL DK1:[1,54]SCAN.TSK;4/PRI=103

Install task SCAN, with file type TSK, version 4 on device DK1:, group number 1, member number 54, and a priority of 103(8).

VMR>INS MAC/INC=4096./PAR=SYSCTL

Install task MAC in the system-controlled partition SYSCTL and increase the task size by 4096. words.

Command Error Messages:

VMR -- BASE ADDRESS MUST BE ON 4K BOUNDARY

The base address of the task is not on a 4K boundary.
Applicable only to mapped systems.

VMR -- BASE MISMATCH COMMON BLOCK <common-name>

The base address of the partition does not match that
of the common block. Applicable only to unmapped
systems.

VMR -- CHECKPOINT AREA TOO SMALL

The area allocated for checkpointing the task is
smaller than the partition into which it is being
installed.

VMR -- COMMON BLOCK IS TASK PARTITION <common-name>

A task's request for access to a common block is
rejected because the partition requested is a task
partition.

VMR -- COMMON BLOCK NOT LOADED <common-name>

The specified common block is linked to the task, but
has not been loaded into the system. Install the
common block, then install the task.

VMR -- COMMON BLOCK OCCUPIED

An attempt has been made to load a common block which
is already occupied.

VMR -- COMMON BLOCK PARAMETER MISMATCH <common-name>

Parameters of a common block do not match those in the
task's label block.

VMR -- DEVICE ddnn: NOT IN SYSTEM

Device specified during task build by the Assign
keyword option does not exist in the system.

VMR -- FILE NOT CONTIGUOUS

An attempt is being made to install a task from a
non-contiguous file. Task images may exist only in
contiguous files.

VMR -- FILE NOT TASK IMAGE

Data in the label block is not correct, indicating the
file is not a task image.

VMR -- ILLEGAL DEVICE/VOLUME

The device specified is not a valid task residence
device.

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VMR -- ILLEGAL FIRST APR

The Task Builder allows the user to specify the virtual base address of a task image as a multiple of 4K words. Privileged tasks normally start at 100000(8) in order to allow them to be mapped into the first 16K of the Executive, but they may also start at 120000(8) or 140000(8). Non-privileged tasks must start at 0.

VMR -- ILLEGAL PRIORITY

The value of the priority in the command is out of range, i.e., not 1 to 250(10), inclusive.

VMR -- LENGTH MISMATCH COMMON BLOCK <blockname>

The length parameter for the common block, as described in the label block for the task image, does not match the corresponding length parameter defined in the system. A task's label block data must match system data for that task before it can be installed.

VMR -- NOT ENOUGH APRS FOR TASK IMAGE

A privileged task built to run using APR 4, 5, or 6 as its base is too large. Using APR4, the task is larger than 12K; using APR5, the task is larger than 8K; using APR6, the task is larger than 4K. Applies only to mapped systems.

VMR -- NO ROOM AVAILABLE IN STD FOR NEW TASK

This message means that there is no dynamic memory available to build the system task directory (STD) entry (task control block); therefore, no task can be installed.

VMR -- PARTITION NOT COMMON

A partition specified for a common library is not defined as a common partition.

VMR -- PRIVILEGED TASK LARGER THAN 12K

Privileged tasks have a maximum size of 12K.

VMR -- SPECIFIED PARTITION FOR COMMON BLOCK

A task is being installed into a common block.

VMR -- SPECIFIED PARTITION TOO SMALL

The task being installed is larger than the partition into which it is being installed.

VMR -- TASK AND PARTITION BASES MISMATCH

The base of the partition does not match that of the task being installed. Applies only to unmapped systems.

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VMR -- TASK IMAGE I/O ERROR

The Install command cannot read the task image file.

VMR -- TASK IMAGE CURRENTLY INSTALLED

The requested task image, which is checkpointable, is already installed. Checkpointable tasks may only be singly installed; other tasks may be multiply installed.

VMR -- TASK NAME ALREADY IN USE

An attempt has been made to install a task with the same name as one already in the system.

VMR -- TOO MANY COMMON BLOCK REQUESTS

A task is limited to three common blocks.

VMR -- TOO MANY LUNS

A task has requested more than 255(10) LUNs to be assigned.

VMR -- UNDEFINED COMMON BLOCK <blockname>

A task references a common block that is not defined in the system. Usually, this indicates that the task was built for another system.

Notes:

1. In order to install a task, the specified residence device (i.e., the device from which the task is being installed) must exist in both the host system and the system image. This is necessary in order to read the task image and to create the task control block. In most cases, the device is defaulted to SY:, and since all systems have an SY:, this default is always valid. However, a problem sometimes arises in building RSX-11S systems when the residence device exists only in the host system. The intent is to install and then to fix the task in the system image, but the install cannot be completed because the residence device does not exist in both systems. This problem can be solved with the Assign (ASN) command. Suppose that a task exists on DK2: and that it is desired to install and fix the task in an RSX-11S system that does not contain a DK2:. A logical assignment can be made in the system image that associates the device name DK2: with any valid device (e.g., TT0:); then the task can be installed and fixed. The following VMR command sequence:

```
VMR>ASN TT:=DK2:/GBL
VMR>INS DK2:TASK
VMR>FIX TASK
```

will solve the problem.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

SET

SET

The Set command makes it possible to alter a number of system-wide parameters. In particular, the Set command enables the user to:

1. Establish the default buffer size for a device;
2. Establish terminal device characteristics;
3. Establish a terminal as privileged;
4. Characterize a terminal as a slave terminal (i.e., a terminal from which the system will not accept unsolicited input);
5. Establish a default UIC for a terminal;
6. Create partitions or subpartitions;
7. Add space to the dynamic storage region, and
8. Cause all writes to an RK05 disk to be automatically followed by a write check to ensure that the data was written correctly.

Format:

SET /Keyword=values

Only one keyword per command is permitted. All the keywords except BUF, POOL, and UIC may be prefixed by NO, which negates the effect of the keyword. Specifying NO in conjunction with the keywords BUF, POOL, and UIC produces a syntax error.

The keywords for setting device characteristics follow:

```
/BUF = dev:[size]
/LA30S [= dev:]
/LOWER [= dev:]
/PRIV [= dev:]
/SLAVE [= dev:]
/SPEED = dev:[recv:xmit]
/UIC [= [group,member]]
/UIC [[group,member]:]dev:]
/VT05B [= dev:]
```

The effects of these keywords are as follows:

BUF - Set or display the default buffer size of the specified device. If the size is not entered, this keyword results in the current size being displayed. BUF is particularly useful for defining line printer width (80 or 132 columns).

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

- LA30S - The LA30S keyword establishes the specified terminal device as an LA30S. If the device parameter (= dev:) is omitted, all LA30S terminals are displayed.
- NOLA30S - Resets the terminal to other than an LA30S. If the device parameter (= dev:) is omitted, all non-LA30S terminals will be displayed.
- LOWER - The LOWER keyword specifies that lower-case characters are not to be converted to upper-case when received from the specified terminal. If the device parameter (= dev:) is omitted, all terminals for which lower-case characters are not converted are displayed.
- NOLOWER - Resets the terminal so that lower-case characters received on input will be automatically converted to upper-case and echoed as upper-case. The absence of the device parameter (= dev:) results in a display of all terminals for which conversion to upper-case is specified.
- PRIV - The PRIV keyword will set the identified device to a privileged terminal. If the device parameter (= dev:) is omitted, VMR will display all terminals that are privileged.
- NOPRIV - The NOPRIV keyword sets the identified terminal to non-privileged status. The absence of the device parameter (= dev:) results in a display of all non-privileged terminals.
- SLAVE - The SLAVE keyword establishes the identified device as a terminal that can only enter data if it is solicited from a task; thus, unsolicited input is always rejected. The absence of the device parameter (= dev:) will result in the display of all terminals currently classified as slaves.
- NOSLAVE - Resets slave status. The absence of the device parameter (= dev:) results in the display of all non-slave terminals.
- SPEED - The SPEED keyword establishes the receive and transmit baud rate for terminals attached to the system through a DH11 multiplexer. The parameter "recv" is the receive baud rate for the DH11, while "xmit" is the transmit baud rate for the DH11. Both must be specified in setting the speed. If neither is specified, the current settings will be displayed. Valid baud rates are: 0, 110, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, A (user-specified baud rate A), and B (user-specified baud rate B).
- VT05B - The VT05B keyword sets the terminal as a VT05B (a 2400 baud VT05). If the device parameter (= dev:) is omitted, all terminals classified as VT05Bs will be displayed.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

- NOVT05B - Resets the terminal to other than a VT05B. If the device parameter (= dev:) is omitted, all terminals classified as non-VT05B terminals will be displayed.
- UIC - The specified UIC is established as the default UIC for the specified terminal. All tasks that are to run from the terminal, after the system is bootstrapped, will run with the UIC of the terminal, unless explicitly overridden with the UIC switch in the Run command. Furthermore, external* MCR function tasks are requested with this UIC. If a UIC is not specified, the current UIC will be displayed. If the UIC is specified with the parameter dev:, the default UIC for the specified terminal will be set. If the UIC is not specified, but the parameter dev: is, the default UIC for the specified terminal will be displayed.

The keywords for altering memory allocation are:

```
/MAIN = pname[:base:size:type]
/SUB  = mname:pname[:base:size]
/POOL [=top]
```

These keywords are used as follows:

- MAIN - This keyword is used to establish a main partition.
- pname = The 1- to 6-character alphanumeric partition name.
- :base = Physical base address of the partition, specified as a number of 64-byte blocks.
- :size = Size of the partition, specified as a number of 64-byte blocks.
- :type = TASK for a user-controlled task partition, SYS for a system-controlled task partition, COM for a common partition, or DEV for a common partition mapping into the device registers. User-controlled and system-controlled task partitions are used for user tasks. COM partitions are used for resident libraries and common blocks. DEV partitions are used by non-privileged tasks to access device registers in the external page, such as those for the UDC11 and ICS/ICR-11.

* These are the MCR Mount, Install, Dismount, and UFD commands (which run as tasks), and all system-supplied software.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

Base and size may be entered in any one of the following formats; the value nnnn is a number to which a multiplication factor is applied to determine the value used.

| Format | | Calculated Value |
|--------|---|------------------------|
| nnnn | - | Octal (nnnn*100) |
| nnnn. | - | Decimal (nnnn.*64.) |
| nnnK | - | Octal K (nnn*4000) |
| nnn.K | - | Decimal K (nnn.*2048.) |

Valid ranges of calculated values are:

| | | |
|-----------|------------------|---------------|
| Octal | 0<=base<177777 | 0<size<2000 |
| Decimal | 0.<=base<65535 | 0.<size<1024. |
| Octal K | 0K<=base<3777K | 0K<size<40K |
| Decimal K | 0.K<=base<2047.K | 0.K<size<32.K |

For system-controlled partitions, partition size may range from 0<size<1024.K, or any valid representation of these limits.

Example:

Any of the following inputs for size will allocate a 2048. byte partition.

40
32.
1K
1.K

If base, size, and type are not specified, VMR displays the values of these parameters for the named partition. If the named partition has subpartitions, the parameters of all its subpartitions will also be displayed.

NOMAIN - pname

The NOMAIN keyword eliminates the named partition from the system.

SUB - This keyword is used to establish a subpartition. Subpartitions may not be established in system-controlled main partitions.

mname = The 1- to 6-character main partition name. The subpartition being defined will become a subpartition in the named main partition.

:pname = The 1- to 6-character subpartition name. The subpartition being defined is a subpartition of the main partition specified in mname.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

:base = Physical base address of the subpartition, specified as a number of 64-byte blocks.

:size = Size of the subpartition, specified as a number of 64-byte blocks.

Base and size may be entered in any one of the following formats: the value nnnn is a number to which a multiplication factor is applied to determine the value used.

| Format | Calculated Value |
|--------|--------------------------|
| nnnn | - Octal (nnnn*100) |
| nnnn. | - Decimal (nnnn.*64.) |
| nnnK | - Octal K (nnn*4000) |
| nnn.K | - Decimal K (nnn.*2048.) |

Valid ranges of values are:

| | | |
|-----------|------------------|---------------|
| Octal | 0<=base<177777 | 0<size<2000 |
| Decimal | 0.<=base<65535 | 0.<size<1024. |
| Octal K | 0K<=base<3777K | 0K<size<40K |
| Decimal K | 0.K<=base<2047.K | 0.K<size<32.K |

Example:

Any of the following inputs for size will allocate a 2048. byte partition.

40
32.
1K
1.K

If base and size are omitted, the current values will be displayed for the named subpartition.

NOSUB - =mname:pname

Eliminates the named subpartition from the system.

POOL - This keyword is used to increase the size of the dynamic storage region.

top - First location in memory to be used for user partitions. This is given in number of 64-byte blocks. It can be given in octal or decimal. If top is not given, the system will print out the current top of memory, the size of the longest block of pool space in words, and the total number of words in the pool.

The format is:

POOL = top:max:total

where top is given in units of 64-byte blocks. Max and total are decimal number of words.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

The keyword for specifying write check on writes to RK05 disks is:

/WCHK[=dev:]

WCHK - Specifies the RK05 disk which is to have all writes followed by a write check. This feature provides high reliability for data transfers to the RK05 disk. If the device parameter (= dev:) is omitted, all RK05 disk drives with write check enabled will be displayed.

NOWCHK - Specifies that write check is to be disabled for the specified device. If the device parameter (= dev:) is not specified, the RK05 disks which have write check disabled will be displayed.

Command Error Messages:

VMR -- ALIGNMENT ERROR

An attempt has been made to create a partition, but the base address or size conflicts with existing partitions or physical memory size.

VMR -- DEVICE NOT DH11

An attempt has been made to set the baud rate for a terminal which is not attached to a DH11 multiplexer.

VMR -- DEVICE NOT TERMINAL

An attempt has been made to set terminal characteristics on a non-terminal device.

VMR -- NON EXISTENT MEMORY

An attempt has been made to define a partition in non-existent memory.

VMR -- PARTITION ALREADY EXISTS

An attempt has been made to define a partition with a name that is already in use.

VMR -- SPACE USED

An attempt has been made to create a partition or subpartition in a storage area already occupied.

VMR -- TASK INSTALLED IN PARTITION

An attempt has been made to eliminate a partition containing installed tasks.

VMR -- TOO MANY SUBPARTITIONS

A main partition is limited to a maximum of seven subpartitions.

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VMR -- UNKNOWN MAIN PARTITION

An attempt has been made to define a subpartition of a non-existent main partition.

VMR -- WRITE CHECK NOT SUPPORTED

An attempt has been made to enable write check on a device which is not an RK05. Write check is currently supported only for RK05s.

Notes:

1. If a task is currently installed in a partition and an attempt is made to eliminate the partition (/NOMAIN, /NOSUB), the command will be rejected.
2. If a main partition is eliminated, all its subpartitions are also eliminated.
3. If a subpartition is being eliminated, only the specified subpartition will be eliminated. A main partition that has subpartitions with tasks installed will not be allowed to be eliminated until those tasks are removed.
4. When defining a partition (main or sub), the name must not already be defined as a partition. In addition, main partitions may not overlap any other main partition, nor may subpartitions of a main partition overlap any other subpartitions of the main partition.
5. The numeric value convention applies to all the Set command numeric parameters.
6. All partitions except LDR are considered user partitions by the Pool command. Thus, SYSPAR is included as a user partition.
7. Once space has been allocated to the dynamic storage region, it can never be recovered for use in partitions.
8. System-controlled partitions may not have subpartitions explicitly defined by the Set command. The Executive defines subpartitions of the system-controlled partition dynamically, as needed, for tasks installed in the system-controlled partition.

Examples:

Example 1:

```
VMR>SET /BUF=LP0:  
BUF=LP0:132.
```

Display the default buffer size of LP0:.

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Example 2:

```
VMR>SET /BUF=TT1:40.
```

Set TT1: buffer size to 40(10).

Example 3:

```
VMR>SET /LA30S=TT2:
```

```
VMR>SET /LA30S
```

```
LA30S=TT0:
```

```
LA30S=TT2:
```

Set TT2: as an LA30S device.
Display all LA30Ss.

Example 4:

```
VMR>SET /NOLA30S=TT0:
```

Set TT0: to other than an LA30S.

Example 5:

```
VMR>SET /PRIV=TT0:
```

Set TT0: to a privileged terminal.

Example 6:

```
VMR>SET /PRIV
```

```
PRIV=TT0:
```

```
PRIV=TT1:
```

Display all privileged terminals.

Example 7:

```
VMR>SET /SLAVE=TT3:
```

Set TT3: to a slave terminal.

Example 8:

```
VMR>SET /VT05B
```

```
VT05B=TT4:
```

```
VT05B=TT5:
```

```
VT05B=TT6:
```

Display all terminals which are VT05Bs.

Example 9:

```
VMR>SET /MAIN=SYSPAR:420:140:TASK
```

Define a main partition, called SYSPAR, as a user-controlled partition whose base address is 42000(8), and whose length is 14000(8) bytes.

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Example 10:

```
VMR>SET /SUB=SYSPAR:MCRPAR:445:56
```

Define a subpartition, called MCRPAR, of main partition SYSPAR whose base address is 44500(8), and whose length is 5600(8) bytes.

Example 11:

```
VMR>SET /MAIN=SYSPAR  
MAIN=SYSPAR:0420:0140:TASK  
SUB=SYSPAR:MCRPAR:0445:0056
```

Display the parameters of the main partition SYSPAR and all of its subpartitions.

Example 12:

```
VMR>SET /NOSUB=SYSPAR:MCRPAR
```

Eliminate subpartition MCRPAR.

Example 13:

```
VMR>SET /NOMAIN=SYSPAR
```

Eliminate main partition SYSPAR.

Example 14:

```
VMR>SET /MAIN=GEN:1000:6000:SYS
```

Define a main partition, called GEN, as a system-controlled partition whose base address is 100000(8), and whose length is 600000(8) bytes.

Example 15:

```
VMR>SET /POOL=420
```

Set the beginning of user partitions to 42000.

Example 16:

```
VMR>SET /POOL
```

```
POOL=0420:150.:420.
```

The first location for user partitions is 42000; the longest free block is 150. words; and the total of all pool space is 420. words.

Example 17:

```
VMR>SET /WCHK=DK1:
```

Enable write check on DK1:.

TIME

TIM

The Time command makes it possible to:

- Set the current time of day in the system image;
- Set the current date in the system image, or
- Display the time and date stored in the system image.

Format:

TIM[E] [hrs:mins[:secs]] [mnth/day/year]

where:

- hrs = Hours (range 0-23);
- mins = Minutes (range 0-59);
- secs = Seconds (range 0-59) (optional);
- mnth = Month (range 1-12);
- day = Day (range 1-31), and
- year = Year (range 0-99). Year is relative to 1900; thus, 1974 is entered as 74.

Examples:

Example 1:

```
VMR>TIM
10:23:31 03-May-75
```

Display the time and date stored in the system image.

Example 2:

```
VMR>TIM 1:30 4/7/75
```

In the system image, set the time to 01:30:00 and the date to 07-May-75.

Notes:

1. If neither time nor date is specified, the time and date will be displayed on the entering terminal.
2. If the time and date are specified, the clock and calendar will be set; if only the time is specified, the clock will be set; if only the date is specified, the calendar will be set.
3. The order of time and date on the command is not significant. Either order will be accepted.
4. All numeric quantities are decimal. No terminating period is necessary (or permitted).

5.4.3 Informational Commands

DEVICES

DEV

The Devices command displays, on the entering terminal, the symbolic names of all device-units specified in the system image.

Format:

DEV[ICES]

Example:

```
VMR>DEV
DK0:
DK1:
DF0:
DT1:
DT2:
DT3:    OFFLINE
LP0:
TT0:
TT1:
TI0:
CO0:    TT0:
CL0:    LP0:
SY0:    DK0:
```

Notes:

1. A device name in the second column is the device to which the corresponding device in the first column has been redirected.
2. OFFLINE is an optional message which indicates that, although the system tables contain entries for this device, the host configuration on which the system was last saved did not contain the related device.

LOGICAL UNIT NUMBERS

LUN

This command is used to determine which physical devices a task has statically assigned. A list of physical device units and corresponding logical unit numbers is displayed on the entering terminal. This list indicates which devices were assigned to the task specified in the LUNs command.

Format:

LUN[S] taskname

Example:

```
VMR>LUN XKE
TI0: 1
SY0: 2
CL0: 3
TT3: 4
TT3: 5
DK0: 6
TT3: 7
```

The display shows static assignments for LUNs 1, 2, 3, 4, 5, 6, and 7; no other LUNs are statically assigned to task XKE.

Command Error Messages:

VMR -- NO LUNS

The task which is the argument of the LUNs command does not have any logical units. This is not an error message, but rather, an indication that there are no assignments to display.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

PARTITIONS

| |
|-----|
| PAR |
|-----|

The Partition Definitions command displays, on the entering terminal, a description of each memory partition in the system image.

The following is displayed:

1. Partition name;
2. Partition base address (octal);
3. Partition size (octal);
4. Partition kind, main partition or subpartition, and
5. Partition type, TASK (user-controlled), COM (common), DEV (device registers), or SYS (system-controlled).

Format:

PAR[TITIONS]

Example:

```

VMR>PAR
LDR      023544  001000  MAIN  TASK
SYSPAR   030100  007700  MAIN  TASK
TKNPAR   030100  000400  SUB   TASK
GEN      040000  100000  MAIN  SYS
COMPAR   140000  020000  MAIN  COM
DEVPAR   160000  020000  MAIN  DEV
    
```

Notes:

1. The display contains the name, base, size, kind, and type of the partition in columns 1 through 5, respectively.
2. Partitions of type TASK are user-controlled task partitions. COM partitions are used for reentrant libraries and common data areas. DEV partitions are used to allow tasks to communicate with specific device registers, such as the UDC11 and ICS/ICR-11 industrial control subsystems. SYS partitions are system-controlled task partitions.

TASK LIST

TAS

The Task List command displays, on the entering terminal, a description of each task installed in the system image. The display contains:

1. Task name;
2. Task version identification;
3. Partition name;
4. Task priority;
5. Size of task in bytes (octal);
6. Load device identification;
7. Disk address logical block number (octal), and
8. Task memory state.

Format:

TAS[KLIST]

Example:

```
VMR>TAS
LOADER  0001M PAR1   248. 010600 DK0: -00000010572
.TKTN.  0001M GEN    249. 002200 DK0: -00000011112  FIXED
...MCR  0001M MCR    221. 002200 DK0: -00000010511
...MOU  0001M PAR3K  221. 001400 DK0: -00000011255
```

Notes:

1. The display contains, in columnar form, from left to right: task name, task version identification, partition name, task priority, task size, load device identification, logical block number on the load device, and task memory state.
2. FIXED indicates that the task is fixed in the system image.

5.4.4 Task Control Commands

ALTER

| |
|-----|
| ALT |
|-----|

This command provides the capability to change the priority of an installed task.

Format:

ALT[ER] taskname /keyword=value

Keyword:

/PRI = priority

where:

taskname - name of task whose priority is to be altered.

priority - new priority to be assigned to the specified task.

Example:

VMR>ALT TEST /PRI=250

Alter the priority of task TEST to 250(8).

Notes:

1. Priority must be less than or equal to 250(10) and greater than 0. The numeric conventions apply.

CANCEL

| |
|-----|
| CAN |
|-----|

The Cancel command provides the capability to cancel the time-based initiation requests for a task. These requests result from a Run directive, or any of the time-synchronized variations of the VMR Run command.

Format:

CAN[CEL] taskname

Example:

VMR>CAN XKE

Cancel all periodic rescheduling and time-based initiation requests for task XKE.

FIX-IN-MEMORY

FIX

The Fix-in-Memory command provides the capability to fix a task in its partition. The task image is copied into the system image, and its partition is marked busy.

Format:

FIX taskname

Example:

VMR>FIX XKE

FIX task XKE in its partition.

Command Error Messages:

VMR -- TASK ALREADY FIXED

The task used as the argument of the Fix command is already fixed in the system image.

VMR -- TASK CHECKPOINTABLE

A checkpointable task cannot be fixed.

Notes:

1. Fixed tasks remain physically in the system image even after they exit; thus, they need not be reloaded when requested to run. Their ability to respond to realtime demands is, therefore, increased. Only an Unfix command can place the task in a state which will permit subsequent freeing of the occupied space in the system image.
2. Tasks may not be fixed in system-controlled partitions.
3. Checkpointable tasks are not fixable.
4. A task must be installed before it can be fixed.

REASSIGN

| |
|-----|
| REA |
|-----|

The Reassign command provides the capability to reassign a task's logical unit numbers (LUNs) from one physical device-unit to another. The reassignments are made in the task image.

Format:

```
REA[SSIGN] taskname lun nud:
```

where:

```
lun = logical unit number
nud = new device-unit
```

Examples:

Example 1:

```
VMR>REA JOE 3 TT0:
```

Reassign LUN 3 of task JOE to device TT0:.

Example 2:

```
VMR>REA BILL 2 TT1:
```

Reassign LUN 2 of task BILL to device TT1:.

Command Error Messages:

```
VMR -- LUN OUT OF RANGE
```

An attempt has been made to reassign a logical unit number which is greater than the maximum number of logical unit numbers allocated during task build.

Notes:

1. The Reassign command performs re-assignments in the indicated task's image.
2. The Reassign command does not affect a system image resident task; hence, Reassign has no effect on the assignments of a task that is fixed in the system image. The Redirect command is used for dynamic device reconfiguration.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

REDIRECT

RED

The Redirect command provides the capability to redirect all I/O requests directed to a physical device-unit from that unit to another.

Format:

RED[IRECT] nud:=old:

where:

nud: = new device-unit; this is the redirected-to device.

old: = old device-unit; this is the redirected-from device.

Examples:

Example 1:

VMR>RED TT3:=TT6:

Redirect all I/O requests for device TT6: to device TT3:.

Example 2:

VMR>RED TT:=LP:

Redirect all I/O requests for device LP0: to device TT0:.

Command Error Messages:

VMR -- CIRCULAR REDIRECT ERROR

An attempt has been made to redirect a device such that a circular list of redirected devices would result.

VMR -- DEVICE NOT REDIRECTABLE

The specified old device may not be redirected.

VMR -- DEVICE ddnn: NOT IN SYSTEM

New device in Redirect command is not in the system (does not exist in the device tables).

VMR -- OLD DEVICE ATTACHED

An attempt has been made to redirect an attached device.

VMR -- PSEUDO DEVICE REDIRECT ERROR

An attempt has been made to redirect a pseudo device to another pseudo device.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMR -- TI REDIRECT ERROR

The pseudo device TI: may not be redirected.

Notes:

1. The device TI: may not be redirected.
2. A pseudo device may not be redirected to another pseudo device.
3. An attached device may not be redirected.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

REMOVE

| |
|-----|
| REM |
|-----|

The Remove command provides the capability to delete a task name from the system task directory (STD), actually removing the task from the system image.

Format:

REM[OVE] taskname

Example:

VMR>REM SCAN

Remove task SCAN from the system image.

Notes:

1. The process of removing a task from the system makes a task unknown to the system. It is the complement of the Install command.
2. If a task that is the object of a Remove command is fixed, it is automatically unfixed and then removed.

RUN

RUN

The Run command initiates the execution of a task. With Run, a task may be:

Started immediately at bootstrap time;

Started a time increment from the system image time;

Started a time increment from clock unit synchronization, or

Started at an absolute time of day relative to the system image time.

All the Run commands modify the system image in such a way that the desired action will occur when the system image is subsequently bootstrapped.

All these options are available with or without optional rescheduling.

The Run command has four format variations, as described below.

Formats:

1. Run immediately at bootstrap time.

RUN taskname [/Keyword] [/Keyword]

Keywords:

/RSI = nnnnu

/UIC = [group,member]

where:

taskname = 1- to 6-character taskname.

RSI = The reschedule interval. The format is the same as for dtime detailed below under Format 2. The reschedule interval specifies how often the task is to be rerun. Thus, each time the specified time interval elapses, an initiation request is made for the specified task.

Default: no rescheduling.

UIC = Keyword for the UIC parameter. Legal group and member numbers range from 1 through 377(8). The square brackets are required syntax. This is the UIC under which the task will be requested. The UIC determines which files the task may access.

Default: the value established at task-build time.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

2. Run a time increment from system image time.

RUN taskname dtime [/Keyword][/Keyword]

Keywords:

/RSI = nnnnu

/UIC = [group,member]

where:

taskname = 1- to 6-character taskname.

dtime = The time at which the task will be initiated in time units from system image time. It is of the form nnnnu:

A time parameter consists of:

- a. A magnitude field, and
- b. A units field.

where:

nnnn = the magnitude

u = units, with:

T for ticks,
S for seconds,
M for minutes, and
H for hours.

The legal value of the magnitude is related to the value of the units field, which is encoded as:

T = Ticks. A tick is a clock interrupt, and the rate at which interrupts occur depends on the type of clock installed in the system.

For a line-frequency clock, the tick rate is either 50 or 60 per second, corresponding to the line frequency.

For a programmable clock, a maximum of 1000 ticks per second is available. (Frequency is selectable at system generation.)

S = Seconds.

M = Minutes.

H = Hours.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

The magnitude is the number of units to be clocked, but the magnitude value cannot exceed 24 hours in the specified units.

Units = T. Any positive value is valid (maximum of 15 bits).

Units = S. Any positive value is valid (maximum of 15 bits).

Units = M. 1440. is maximum magnitude.

Units = H. 24. is maximum magnitude.

RSI = See Format 1 above.

UIC = See Format 1 above.

3. Run a time increment from clock unit synchronization.

The task start time is determined by first waiting for the system image's next time unit occurrence (hour, minute, second, tick), and then waiting for the specified time increment to elapse.

Run taskname sync [dtime][/*Keyword*][/*Keyword*]

Keywords:

/RSI = nnnnu

/UIC = [group,member]

where:

taskname = 1- to 6-character taskname.

sync = H = synchronize on the next hour,
M = synchronize on the next minute,
S = synchronize on the next second,
T = synchronize on the next tick.

dtime = As defined in Format 2 above; dtime, if present, is added to the synchronization unit to produce the actual run time for running the task.

RSI = See Format 1 above.

UIC = See Format 1 above.

4. Run at an absolute time of day relative to the system image time.

RUN taskname atime [/*Keyword*][/*Keyword*]

Keywords:

/RSI = nnnnu

/UIC = [group,member]

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

where:

taskname = 1- to 6-character taskname.

atime = Absolute time of day when this task will be initiated relative to the system image time. Input format is hh:mm:ss where:

hh = hours (decimal assumed),
mm = minutes (decimal assumed),
ss = seconds (decimal assumed).

RSI = See Format 1 above.

UIC = See Format 1 above.

Examples:

```
VMR>RUN XKE 15M
```

```
    RUN task XKE 15 minutes from system image time.
```

```
VMR>RUN XKE 15M/RSI=90S/UIC=[3,1]
```

```
    RUN task XKE 15 minutes from system image time, rescheduling  
    it every 90 seconds with a user identification code of  
    [3,1].
```

Command Error Messages:

```
VMR -- INVALID TIME PARAMETER
```

```
    A time field is incorrect.
```

Notes:

1. The Cancel command may be used to cancel all initiation requests for a task, including those to run immediately when the system is bootstrapped.
2. When a Run command is issued for an absolute time of day, the absolute time is converted to a time increment from the current time stored in the system image. Thus, if the current time in the system image is 8:00 and a Run command is issued with an absolute time of 9:00 specified, the task will run one hour from the time the system is bootstrapped, regardless of whether the time is reset.
3. All time parameters are converted to double-precision magnitude, in ticks. The number of ticks per second is taken from the system image. This value will be the one in use the last time the system was saved, or the value specified during SYSGEN phase 2 for the virgin system image. Note that if the system is bootstrapped on a machine with a clock different from the one indicated in the system image (i.e., with a programmable clock in lieu of a line clock, or vice versa), the ticks will be measured on the machine's clock; thus, the effective time will be different from that specified to VMR.

UNFIX

UNF

The Unfix command provides the capability to free a fixed task from the system image. Unfix is the complement of the Fix command.

Format:

UNF[IX] taskname

Example:

VMR>UNFIX XKE

Unfix task XKE, freeing the partition in which it resides.

Command Error Messages:

VMR -- TASK NOT FIXED

An attempt has been made to unfix a task which is not fixed.

Notes:

1. If a task exits or aborts, but is fixed, it will still remain in control of the system image memory in which it resides.

5.4.5 System Maintenance Command

SAVE

SAV

The VMR Save command is used to write the image of a system onto a sequential medium in bootstrappable format. This command is intended to provide the user with a facility to save an RSX-11S or foreign system (see /IM switch) onto a load medium that can be transported to another system and bootstrapped using a hardware bootstrap or the /BO switch in PRESRV.

System images created with the Save command on all media, except paper tape, are in a format compatible with the logical tape format in PRESRV. Thus, any of PRESRV's logical tape operations may be performed on system images created with the Save command. System images created by the Save command always start at the beginning of the medium.

On paper tape, system images are created in Absolute Loader format and must be bootstrapped via the Absolute Loader.

Format:

SAV[E] ddnn:[label]

where:

ddnn: Specifies the device-unit onto which the system image is to be written. Valid devices are:

CT: Tape cassette,
 DT: DEctape,
 DX: Flexible diskette,
 MM: TU16 magtape,
 MT: TU10/TS03 magtape, and
 PP: Paper tape.

label The file label name must be specified for all secondary media except paper tape. It consists of from one to twelve alphanumeric characters.

Example:

VMR>SAV MT:MYSYS

In the example above, the system image is written onto MT: in bootstrappable format. System changes made by the Redirect or other VMR commands are also saved with the system image.

Command Error Messages:

VMR -- DEVICE ddnn: NOT IN SYSTEM

The specified device does not exist on the host system.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMR -- ILLEGAL DEVICE VOLUME

The specified device was other than one of the valid devices specified above.

VMR -- I/O ERROR ON OUTPUT DEVICE

An I/O error was encountered on the output device while writing the system image.

Notes:

1. When the /LI command is used in PRESRV to list a medium (other than paper tape) containing a system image created with the Save command, each system image will cause a line to be printed which contains the following: VM (for VMR), indicated as the source device, the label specified in the SAV command line, a block size of 512, the number of 512-byte blocks in the system image (excluding boot and label blocks), and the date and time that the system was saved.
2. When RSX-11S systems are saved to paper tape (without the /IM switch specified at VMR initiation time), the last 1000(8) bytes of the system image are not written out. This is to allow space to accommodate the Absolute Loader. When the /IM switch has been specified with the system's file name, the entire system image is written out to paper tape. In this case, it is the user's responsibility to insure that the system image is not so large that it will overlay the Absolute Loader.
3. When bootstrapping systems on media other than paper tape, regardless of the size of the system image, the last 1000(8) bytes of physical memory will not be loaded to accommodate the bootstrap.
4. Systems saved on a TU10/TS03 9-track, magtape drive can be booted from a TU16 drive, and vice-versa.
5. When the /IM switch has been specified with the system file specifier, the Save command will always use a bootstrap which does not enable memory management.
6. The maximum memory size of a mapped system is 124K words. For physical and practical limitations, the Save command imposes maximum sizes on saved images in mapped systems for certain devices. If a mapped system is saved, whose memory size is greater than the maximum size imposed by the Save command for the specified device, only the amount of memory equal to the maximum size (starting at physical location 0) is saved; no diagnostic message is issued. The devices for which the Save command imposes a maximum size on saved system images are:

Paper tape punch (PP) - 28K words,

Flexible disk (DX) - 123K words, and

Cassette tape (CT) - 28K words.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

7. None of the bootstraps require that the target RSX-11S system have a driver for the bootstrap device.

5.5 VMR ERROR MESSAGE SUMMARY

All error messages produced by VMR appear in this section in alphabetical order.

VMR -- ALIGNMENT ERROR

An attempt has been made to create a partition, but the base address or size conflicts with existing partitions or physical memory size.

VMR -- BASE ADDRESS MUST BE ON 4K BOUNDARY

The base address of the task is not on a 4K boundary. Applicable only to mapped systems.

VMR -- BASE MISMATCH COMMON BLOCK <common-name>

The base address of the partition does not match that of the common block. Applicable only to unmapped systems.

VMR -- CHECKPOINT AREA TOO SMALL

The area allocated for checkpointing the task is smaller than the partition into which it is being installed.

VMR -- CIRCULAR REDIRECT ERROR

An attempt has been made to redirect a device such that a circular list of redirected devices would result.

VMR -- COMMAND I/O ERROR

An I/O error was detected during a read to an indirect file.

VMR -- COMMAND SYNTAX ERROR

command line

The command line printed has incorrect syntax.

VMR -- COMMON BLOCK IS TASK PARTITION <common-name>

A task's request for access to a common block is rejected because the partition requested is a task partition.

VMR -- COMMON BLOCK NOT LOADED <common-name>

The specified common block is linked to the task, but it has not been loaded into the system image. Install the specified common block, then install the task.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMR -- COMMON BLOCK OCCUPIED

An attempt has been made to load a common block that is already occupied.

VMR -- COMMON BLOCK PARAMETER MISMATCH <common-name>

Parameters of a common block do not match those in the task's label block.

VMR -- DEVICE ddnn: NOT IN SYSTEM

The device specified in the command was not generated into the system image.

VMR -- DEVICE NOT DH11

An attempt has been made to set the baud rate for a terminal which is not attached to a DH11 multiplexer.

VMR -- DEVICE NOT MOUNTED

The device specified in the file specification is not mounted.

VMR -- DEVICE NOT REDIRECTABLE

The specified device may not be redirected.

VMR -- DEVICE NOT TERMINAL

An attempt has been made to set terminal characteristics for a device which is not a terminal.

VMR -- EXECUTIVE SIZE GREATER THAN 16K

The system image indicates that the Executive is larger than 16K words. The system is unusable.

VMR -- FILE filename HAS ILLEGAL FORMAT

The specified symbol table file has an invalid format for an RSX-11M/RSX-11S symbol table file.

VMR -- FILE filename HAS INCONSISTENT DATA

References to the the indicated system image file, via the symbol table file, have retrieved inconsistent data.

VMR -- FILE NOT CONTIGUOUS

An attempt has been made to install a task from a non-contiguous file. Task images must be contiguous.

VMR -- FILE NOT FOUND

The requested file is not in the directory on the specified volume.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMR -- FILE NOT TASK IMAGE

Data in the label block is not correct, indicating that the file is not a valid task image.

VMR -- ILLEGAL DEVICE/VOLUME

The device specified is not a valid task residence device.

VMR -- ILLEGAL ERROR-SEVERITY CODE code

This message indicates an internal failure in VMR. If this error message persists, contact a Digital software representative.

VMR -- ILLEGAL FILE SPECIFICATION

filespec

The indicated file specification has an illegal format or contains wild cards.

VMR -- ILLEGAL FIRST APR

The Task Builder allows the user to specify the virtual base address of a mapped task image as a multiple of 4K words. Privileged tasks normally start at 100000(8) in order to allow them to be mapped into the first 16K of the Executive, but they may also start at 120000(8) or 140000(8). Non-privileged tasks must start at 0.

VMR -- ILLEGAL FUNCTION

A command has been entered which VMR does not recognize.

VMR -- ILLEGAL GET COMMAND LINE ERROR CODE

This error indicates a system failure. If this message persists, contact a Digital software representative.

VMR -- ILLEGAL KEYWORD VALUE

A value entered for a keyword exceeds its limits.

VMR -- ILLEGAL PRIORITY

The value of the priority in the command is out of range, i.e., not 1 to 250(10), inclusive.

VMR -- ILLEGAL SWITCH

/switch

The indicated switch, in the context of the command line entered, is illegal.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMR -- INDIRECT COMMAND SYNTAX ERROR

command line

The indicated command line was entered with an improper indirect file specifier.

VMR -- INDIRECT FILE DEPTH EXCEEDED

command line

The indicated command line contains more than two levels of indirect files.

VMR -- INDIRECT FILE OPEN FAILURE

command line

The indirect command file in the indicated command line could not be opened.

VMR -- INVALID KEYWORD

A keyword has been encountered which is illegal in the context of the specified command.

VMR -- INVALID TIME PARAMETER

A time field is incorrect.

VMR -- INVALID UIC

A value of zero for either the group number or the member number was detected.

VMR -- I/O ERROR ON INPUT FILE

filename

An input I/O error occurred on the indicated file.

VMR -- I/O ERROR ON OUTPUT DEVICE

An output I/O error was encountered while saving the system.

VMR -- I/O ERROR ON OUTPUT FILE filename

An output I/O error occurred on the indicated file.

VMR -- LENGTH MISMATCH COMMON BLOCK <common-name>

The length parameter for the common block, as described in the label block for the task image, is different from the corresponding length parameter defined in the system image. A task's label block data must match system data for that task before it can be installed.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMR -- LOGICAL DEVICE NOT IN SYSTEM

The specified logical device is not defined in the logical device tables.

VMR -- LUN OUT OF RANGE

An attempt has been made to re-assign a LUN which is greater than the maximum number of LUNs allocated during task build.

VMR -- NO LUNS

The task specified as the argument of the LUNs command does not have any logical units assigned. This is not an error message; rather, it is an indication that there are no assignments to display.

VMR -- NO POOL SPACE

A request for dynamic memory in the system image by VMR cannot be satisfied.

VMR -- NO ROOM AVAILABLE IN STD FOR NEW TASK

This message means that there is no dynamic storage available to make an entry in the system task directory (STD); therefore, no task can be installed.

VMR -- NON EXISTENT MEMORY

An attempt has been made to define a partition in non-existent memory.

VMR -- NOT ENOUGH APRS FOR TASK IMAGE

Because of the virtual base address of the task, there are not enough APRs left to map the entire task image.

VMR -- OLD DEVICE ATTACHED

An attempt has been made to redirect an attached device-unit.

VMR -- OPEN FAILURE ON FILE filename

The indicated file could not be opened.

VMR -- PARTITION ALREADY EXISTS

An attempt has been made to define a partition with a name that is already in use.

VMR -- PARTITION NOT COMMON

A partition specified for a common library is not defined as a common partition.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMP -- PARTITION NOT IN SYSTEM

The partition name specified as an argument in a command cannot be found in the system.

VMR -- PRIVILEGED TASK LARGER THAN 12K

Privileged tasks have a maximum size of 12K.

VMR -- PSEUDO DEVICE ASSIGNMENT ERROR

A logical device name may not be assigned to a pseudo device.

VMR -- PSEUDO DEVICE REDIRECT ERROR

An attempt has been made to redirect a pseudo device to another pseudo device.

VMR -- SPACE USED

An attempt has been made to create a partition or a subpartition in a main storage area already occupied.

VMR -- SPECIFIED PARTITION FOR COMMON BLOCK

An attempt is being made to install a task in a common block.

VMR -- SPECIFIED PARTITION TOO SMALL

The task being installed is larger than the partition into which it is being installed.

VMR -- SYNTAX ERROR

This message generally indicates that the required information has been entered incorrectly. The user can usually correct this condition by retyping the arguments according to the command specifications.

VMR -- TASK ACTIVE

The task used as the argument of the command is active.

VMR -- TASK ALREADY FIXED

The task used as the argument of the Fix command is already in the system image.

VMR -- TASK AND PARTITION BASES MISMATCH

The base of the partition does not match that of the task being installed. Applicable only to unmapped systems.

VMR -- TASK IS CHECKPOINTABLE

A checkpointable task cannot be fixed in the system image.

VIRTUAL MONITOR CONSOLE ROUTINE (VMR)

VMR -- TASK IMAGE I/O ERROR

The Install command cannot read the task image file.

VMR -- TASK IMAGE CURRENTLY INSTALLED

The requested task image is already installed and it is checkpointable.

VMR -- TASKS INSTALLED IN PARTITION

An attempt has been made to eliminate a partition containing installed tasks.

VMR -- TASK NAME ALREADY IN USE

An attempt has been made to install a task having the same name as one already in the system.

VMR -- TASK NOT FIXED

An attempt has been made to unfix a task which is not fixed.

VMR -- TASK NOT IN SYSTEM

The referenced task has not been installed.

VMR -- TI REDIRECT ERROR

The psuedo device TI: may not be redirected.

VMR -- TOO MANY COMMON BLOCK REQUESTS

A task is limited to three common blocks.

VMR -- TOO MANY LUNS

A task has requested more than 255(10) LUNs to be assigned.

VMR -- UNDEFINED COMMON BLOCK <common-name>

A task references a common block that is not defined in the system image. Usually this indicates that the task was built to run in another system.

VMR -- UNKNOWN MAIN PARTITION

An attempt has been made to define a subpartition of a non-existent main partition.

VMR -- WRITE CHECK NOT SUPPORTED FOR DEVICE

Write check is only supported for RK05 disks.

APPENDIX A

PRESRV

A.1 INTRODUCTION TO PRESRV

The Volume Preservation Program (PRESRV) is a complete, stand-alone system with an integrated Executive. Its principal function is to create copies of disk and magnetic tape volumes. The copy capability is the basis for the backup and restoration procedures used for preserving images of the RSX-11M distribution kit disks. Both backup and restoration of kit disks are copy operations carried out by PRESRV.

PRESRV makes copies in three formats:

1. Files-11,
2. Logical tape, and
3. Image mode.

Files-11 format copies are those in which all Files-11 information is copied to the backup medium. The Files-11 information indicates which blocks are allocated to files and includes the files themselves. Blocks not allocated to files are not copied.

Logical tape format copies are those in which the medium assumes the characteristics of a sequential medium (e.g., magnetic tape). Thus, a disk can be copied into logical tape format, and the structure on the disk assumes sequential access of the data. Also, a Files-11 volume can be copied to another disk in logical tape format. The resulting copy can then be treated in subsequent PRESRV operations as a logical tape.

A logical tape consists of a boot block, a label block, a stand-alone RSX-11M system image (first volume only), followed by the preserved data. Bootstrapping the first volume of a logical tape will activate PRESRV, so that the contents of the tape may be restored to the original device type. When a tape is produced by PRESRV, be it physical or logical, the user may specify a label of up to twelve characters in length for the tape to be produced.

Image mode copies non-Files-11 disk volumes to other disks or to tape. In this mode, non-Files-11 volumes may be saved and restored. Image mode copies all physical blocks on a device to the backup volume, as opposed to Files-11 mode, which copies only those blocks that are in use. Thus, Files-11 mode assumes knowledge of the disk structure, while image mode does not.

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PRESRV supports both multi-file volumes and multi-volume files. Multiple disk representations on magtape are separated by an end-of-file mark (tape mark). For output to magtape only, it is assumed that the volume is correctly positioned at the load point, initially, or after a tape mark, subsequently. After each file is written, two tape marks are written, and the magtape volume is then positioned between the two tape marks for possible further processing.

NOTE

PRESRV determines the position of the tape to decide whether or not to write the boot block when copying to a tape. If the above tape is positioned at BOT, a boot block is written. If the tape is not at BOT (e.g., one file is copied to tape already), a boot block is not written. If the tape drive is off-line when this check is made, the tape looks like it is past BOT and, therefore, PRESRV decides not to write a boot block. When PRESRV actually writes to tape, the driver determines if the tape is off-line and issues a message. When the tape is put on-line, no boot block is written.

Therefore, to be sure to get a boot block on the tape, the tape must be on-line and positioned at BOT before the copy operation is started.

On input from magtape, there are two possibilities:

1. If a file label is specified, the input volume is rewound, and a search is made for the named file.
2. If no file label is specified, the next file on the tape is taken as input. It is assumed that the tape is properly positioned (at the load point for the first file).

A file may extend across a volume boundary, but no new files may begin on the second or subsequent volume of a multi-volume file.

A.2 PRESRV SERVICES

PRESRV provides the following services:

1. Make image copies of volumes.
2. Make copies of volumes in Files-11 format. Only the used blocks of the Files-11 volume are copied, either to another Files-11 volume, or to a logical tape. The logical tape may be multi-volume.
3. Make copies of volumes formatted as logical tapes.
4. List labels from volumes formatted as logical tapes.
5. Format RK05, RP02, RP03, and RP04 disks.

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PRESRV acts on user requests which are in two forms:

1. File command strings, and
2. Commands.

A.2.1 PRESRV File Command Strings

Any component of RSX-11M which needs to refer to files does so via a standard file command string having the following general format:

```
outflespc1.,.,.,outflespcn = inflespc1,...inflespcn
```

PRESRV restricts this general form to one input and one output file specifier. Thus, the PRESRV file command string has the general form:

```
outflespc=inflespc
```

Outflespc is an output file specifier, and inflespc is an input file specifier. In no case can the total length of the command string exceed the maximum line length (80 bytes).

Each file specifier (whether input or output) has the following format:

```
dev:[g,m]filename.type;version/switch.../switchn
```

where:

dev: = The physical device on which the volume containing the desired file is mounted, for example, DK0: or DT1:. The name consists of two ASCII characters, followed by an optional 1-digit (octal) unit number and a colon. If no unit number is specified, unit 0 is assumed. PRESRV is generated with units 0 and 1 for each type of device.

[g,m] = Not used by PRESRV (must be null).

filename = A label for a file written to a logical tape. In RSX-11M, this field is used to name a file. A filename can be up to nine alphanumeric characters in length; however, PRESRV allows file names of up to twelve characters in length.

PRESRV, however, does not use the filename as an identifier for searching a directory to effect a name mapping. The filename is used by PRESRV as a label for a file on a logical tape. The label is then used to extract files on multi-file volumes. PRESRV never operates on Files-11 files; PRESRV only copies volumes. The filename field enables the user to label the copied volume.

type = Not used by PRESRV (must be null).

version = Not used by PRESRV (must be null).

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/switch = A 2-character ASCII name identifying the switch option. The switch identifier may be followed by any number of values. In PRESRV, only the block switch accepts a value. No PRESRV switch uses switch negation.

Since PRESRV does not use the [group,member] designator, or the type or version component of the filename, the PRESRV filename command string has the general format:

```
dev:filename/switch1.../switchn
```

The filename is used only to identify files on a logical tape.

A.2.2 PRESRV Copy Switches

The file specifier and any applied switches specify actions PRESRV is to initiate in its copy operation. Switches are divided into three categories.

1. Device Specific:
 - a. Set 200-BPI mode (/20);
 - b. Set 556-BPI mode (/55);
 - c. Set 800-BPI mode (/80);
 - d. Set 1600-BPI mode, phase-encoded magtape (/PE), and
 - e. Format disk (/FO).
2. Administrative:
 - a. Abort on hard I/O error (/ER);
 - b. Rewind at completion (/RW), and
 - c. Verify (/VE).
3. Formatting:
 - a. Blocking (/BL:nn);
 - b. Files-11 format (/FI);
 - c. Logical tape format (/TP), and
 - d. Image mode (/IM).

The details of these switches are covered in section A.3.

A.2.3 PRESRV Command Switches

PRESRV command switches are divided into two categories; hardware-specific switches, which may all appear on one line, and stand-alone switches, which are entered one at a time. Both types are

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acted upon by PRESRV immediately. PRESRV will not accept another command until it completes the current command. Hardware-specific switches are:

1. Set the address of the control status register for a device (/CSR);
2. Set the physical unit number for a device (/UNIT);
3. Set the interrupt vector for a device (/VEC), and
4. Set the unit number of the TM02 formatter for the TU16 tape drive (/TM02).

Stand-alone switches are:

1. Obtain a summary of PRESRV's services (/HE); also called the Help command;
2. Obtain a listing of all file labels on a logical tape (/LI);
3. Set the time and date (/TIM), and
4. Bootstrap a device (/BO).

Refer to section A.4 for details.

A.3 PRESRV FILE COMMAND STRING SWITCHES - DETAILED DESCRIPTION

A.3.1 Device-Specific Switches

A.3.1.1 TU10 7-Channel Magtape Switches

Three switches:

/20
/55
/80

apply only to 7-channel TU10 magtapes operating in image copy mode. Furthermore, when 7-channel tape is being used, the copy operation must be accomplished in image mode. If no tape density is defined, the default density is 800 BPI.

These switches may be applied in either input or output file specifiers.

Example:

```
PRE>MT0:/VE=MT1:/80
```

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NOTE

Logical tapes written on 7-channel drives are always in core-dump mode (two 4-bit frames per byte).

A.3.1.2 Phase-Encoded Tape Switch (/PE)

This switch indicates that magtape volumes to be written or read on a TU16 drive are to be treated in phase-encoded mode (1600 BPI). This switch may appear on either input or output file specifiers.

NOTE

1. File labels, bootstraps, and system images are always written at 800 BPI. This implies that logical tapes written with the /PE switch may not be copied in image mode.
2. Logical tapes written on a TU16 are bootstrappable on a TU16, TU10, or TS03, and logical tapes written on a TU10 or TS03 are bootstrappable on a TU10, TS03, or TU16. However, only 800-BPI TU16 tapes are readable on a TU10 or TS03.

A.3.1.3 Format Disk (/FO)

PRESRV is capable of writing the necessary timing and sector identification information on RK05, RP02, RP03, and RP04 disks to prepare them before being used to store data. This operation is called formatting the volume and is specified by the /FO switch.

Formatting may be specified as a separate operation or in conjunction with a copy operation. If a copy operation has been specified, the format pass is made before the copy is made. The /FO switch may be specified only on the output side of the command string.

Examples:

```
PRE>DK0:/FO
```

```
PRE>DP0:/FO/VE=MT0:DISK
```

When formatting starts, the message:

```
** BEGIN FORMATTING **
```

is displayed. When formatting has been completed, the message

```
** END FORMATTING **
```

is displayed.

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Before RP02 or RP03 disks may be formatted, formatting must be enabled with the format enable switch on the RP11 controller. This switch is located on the controller in the third bay from the bottom. The front cover must be removed to expose the switch. PRESRV will prompt the user to enable and disable formatting at the proper times with the following messages:

```
ENABLE FORMATTING WITH SWITCH ON CONTROLLER.  TYPE CR WHEN READY>  
DISABLE FORMATTING WITH SWITCH ON CONTROLLER.  TYPE CR WHEN READY>
```

When the switch is set properly, the user should press the carriage return key to notify PRESRV to continue.

A.3.2 Administrative Switches

A.3.2.1 Abort on Hard I/O Error (/ER)

If the /ER switch is attached to a file specifier, an unrecoverable I/O error will cause the termination of the current PRESRV operation. PRESRV prompts with:

```
PRE>
```

after issuing an error message.

The switch /ER applies to either input or output file specifiers.

Examples:

```
PRE>DT1:A/ER=DK:
```

A.3.2.2 Rewind at Completion (/RW)

The /RW switch will cause PRESRV to rewind any physical tape that has completed the specified transfer. The /RW switch applies to either input or output file specifiers.

Example:

```
PRE>MT1:FILEABC/RW=DP0:
```

A.3.2.3 Verify Switch (/VE)

The /VE switch will cause a second pass over the input and output media so that every record written is read back and compared with the corresponding record on the input device. A verification failure is declared if the comparison fails. The /VE switch may be on either the input or output side of the command line.

Example:

```
PRE>DK0:/VE=DK1:  
PRE>DK0:=DK1:/VE
```

A.3.3 Formatting Switches

PRESRV's principal function is to make media copies. Four switches:

```

/BL (Blocking),
/FI (Files-11),
/TP (Logical tape), and
/IM (Image mode),

```

are used to explicitly establish formats. Defaults are assumed for all devices supported by PRESRV.

Devices handled by PRESRV fall into one of two classes:

1. Tape devices, to which the TU10, TS03, TU16, and TAll cassette belong, and
2. Block-structured devices, to which DECTape and all disks belong.

Tape devices are always defaulted to logical tape format, and block-structured devices are always defaulted to Files-11 format. Two exceptions to this rule exist:

1. If the input is in Files-11 format and the output is a block-structured device without a switch, and the input and output devices are not identical, then the output will be defaulted to logical tape. Thus, the string:

```
PRE>DT0:A=DK0:
```

will create a logical tape on DT0: rather than a Files-11 format. This choice was made since the typical transfer between non-identical media is done to create backup copies of the system. The resulting DECTape(s), being in logical tape format, contain a bootstrappable image of PRESRV on the first volume;

2. If both the input and output devices are identical and neither has a switch, the transfer will be in image mode, producing an output format identical to the input format.

Blocking can be imposed on transfers on either logical tapes or block-structured devices. A block is a unit of 256 words, representing the smallest amount of data that will be transferred by a single read or write request issued by PRESRV.

Each device has a default blocking factor which is used by PRESRV if no blocking switch is specified, and if buffer space is available to perform the default blocking.

The defaults, shown in Table A-1, are overridden as follows:

1. For block-structured devices the /BL switch can be used on either input or output file specifiers to establish a blocking factor.
2. For logical tape output, a /BL switch can establish the blocking factor.

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3. For logical tape input, the blocking factor is always taken from the file label; the /BL switch is ignored.
4. Finally, if a copy is image mode, PRESRV will, for tapes, use a blocking factor which uses all available buffering space.

Blocking calculations used to match available buffering space to blocking specifications for a file specifier appear in section A.3.3.1.

Table A-1
Default Blocking Factors

| <u>DEVICE</u> | <u>FORMAT CLASS</u> | <u>DEFAULT BLOCK SIZE</u> |
|---------------|---------------------|---------------------------|
| CT | Logical tape | 1. |
| DB | Block structured | 22. |
| DF | Block structured | 8. |
| DK | Block structured | 12. |
| DP | Block structured | 10. |
| DS | Block structured | 8. |
| DT | Block structured | 2. |
| DX | Block structured | 6. |
| MM | Logical tape | 1. |
| MT | Logical tape | 1. |

A.3.3.1 Blocking Switch (/BL:nn)

This switch is of the form:

/BL:nn

where:

- : is the standard switch separator.
- nn is the number of 256(10)-word blocks in each record. May be specified in octal or decimal (trailing decimal point).

The /BL switch can apply to either input or output file specifiers.

Example:

```
PRE>MT1:ABQRS/BL:20.=DB0:/BL:11.
```

NOTE

1. For image copies, the blocking factor specified with a disk or DECTape must be a submultiple of the number of blocks on the volume (e.g., 4800 for DK).
2. If buffer space permits, use a large blocking factor for DECTape to improve operational efficiency.

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A.3.3.2 Files-11 Format Switch (/FI)

This switch applies only to Files-11 devices (disks and DECTape). The /FI switch is used to override a default that would result in a PRESRV operation not intended by the user. For example, when units are identical and no switches are used, the transfer is in image mode. A Files-11 transfer can be effected by using the /FI switch. The /FI switch may apply to either input or output file specifiers.

NOTE

If an image transfer (DK0:=DK1:) fails and the input volume is a Files-11 device, use an /FI transfer to copy only blocks in use. The blocks which are unreadable may be free blocks which do not contain data. This type of copy (/FI) takes more time and should be used only if I/O errors occur in an image mode copy.

Example:

```
PRE>DK0:/FI=DK1:/FI
```

A.3.3.3 Logical Tape Format Switch (/TP)

As with the /FI switch, the /TP switch is used to override an inappropriate PRESRV default. On output, the /TP switch can apply to any device, and the the result of the copy operation will be a logical tape.

On input, the volume to which /TP is attached must, in fact, be in logical tape format.

Example:

```
PRE>DK0:=DT0:A/TP
```

It is possible to copy specific files from one tape to another in logical tape mode. This is useful if one wishes to combine a number of small tapes (e.g., 600-ft.) into a large tape (e.g., 2400-ft.), or to extract a few files onto a small tape from a large tape. This is done by specifying a filename on the output side and, optionally, on the input side. If no filename is given on the input side, the next file on the tape is copied.

Examples:

```
PRE>MT1:ABC/TP=MT0:ABC/TP
PRE>MT1:DEF/TP=MT0:/TP
PRE MT1:GHI/TP=MT0:JKL/TP
```

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A.3.3.4 Image Mode Switch (/IM)

This switch is used to override the Files-11 default in copying disk-structured volumes to tape. Using the /IM switch, an operator is capable of copying DOS-11, RSTS, MUMPS, or any other format disk to tape.

Example:

```
PRE>MT0:A=DP0:/IM
```

A.4 PRESRV COMMAND SWITCHES - DETAILED DESCRIPTION

A.4.1 Hardware-Specific Switches

During the system generation of PRESRV, the following CSR and vector addresses are established:

| DEVICE | CSR | VECTOR |
|--------|--------|--------|
| CT | 177500 | 260 |
| DB | 176700 | 300 |
| DF | 177460 | 204 |
| DK | 177404 | 220 |
| DP | 176714 | 254 |
| DS | 172040 | 310 |
| DT | 177342 | 214 |
| DX | 171700 | 264 |
| MM | 172440 | 320 |
| MT | 172522 | 224 |

Two units (physical unit numbers 0 and 1) are generated for each device type. Both units of each device type are defined as being on the same controller. Thus, if the CSR or vector is changed for one unit, it is automatically changed for the other units.

If the generated CSR or vector address does not correspond to the actual hardware configuration in use, the /CSR and /VEC commands can be used to correct PRESRV-generated values.

The /UNIT switch is used to set the desired physical unit number for a device mnemonic. Thus, for a system which has more than two drives of any device type, it is possible to use them in PRESRV by setting the physical unit number. For example:

```
DK0:/UNIT=2
```

will set DK0: to physical unit 2, and every reference to the name DK0: will actually reference physical unit 2 on the RK11 controller. Another use for the /UNIT switch is for mixed massbus peripherals. It is possible to attach RP04, RS03/RS04 disk drives and TM02 tape formatters to the same RH11/RH70 controller. By using the /UNIT and /TM02 switches, it is possible to set up the mapping of device mnemonics to the actual physical devices. The /TM02 switch is used to set the unit number of the TM02 tape formatter on the RH controller.

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The /UNIT switch is used to select the unit number of RP04, RS03, and RS04 disk drives on the RH controller or the drive number of the TU16 tape drives on the TM02.

The /CSR, /VEC, /UNIT, and /TM02 switches may all be specified in the same command line.

A.4.1.1 Set Control Status Register Address

The format is:

dev:/CSR=nnnnnn

where:

dev: = The device whose CSR is to be changed.

nnnnnn = The octal address of CSR used by the device.

Example:

DS0:/CSR=172040

A.4.1.2 Set Physical Unit Number

The format is:

dev:/UNIT=nn

where:

dev: = The device-unit whose unit number is to be changed.

nn = The new unit number for the device-unit.

Example:

DB1:/UNIT=3

A.4.1.3 Set Vector Address

The format is:

dev:/VEC=nnn

where:

dev: = The device-unit whose vector address is to be changed.

nnn = The new octal vector address.

Example:

MM0:/VEC=224

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A.4.1.4 Set TM02 Unit Number

The format is:

```
dev:/TM02=n
```

where:

```
dev: = The TM02 formatter whose position on the RH
       controller is to be changed.
```

Example:

```
MM0:/TM02=2
```

A.4.2 Stand-Alone Switches

Stand-alone switches must be specified on separate command lines.

A.4.2.1 Help Switch

The Help switch, whose format is:

```
/HE or /HELP
```

causes a summary of the PRESRV commands, switches, and defaults to be printed on the console terminal.

A.4.2.2 Listing Switch

This switch is of the form:

```
dev:/LI
```

and lists all tape file labels on the specified device. The device must be formatted as a logical tape. Regardless of whether the tape was created with the /PE switch specified or not, the tape labels are always written in 800-BPI mode on 9-track drives. Thus, the /PE switch is not needed to list the files on a tape created with the /PE switch specified.

A.4.2.3 Time Switch

This switch is of the form:

```
/TIM=mm/dd/yy hh:mm[:ss]
```

where:

```
mm    = month (1-12);
dd    = day (1-31);
year  = year (0-99);
```

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hh = hour (0-23);
mm = minutes (0-59), and
ss = seconds (0-59) (optional).

All values are decimal and do not require a trailing decimal point.

A.4.2.4 Boot Switch

This switch is of the form:

```
dev:/BO
```

and will read the bootstrap block on the specified device into memory, starting at location 0, and pass control to it.

This is a means of bootstrapping a system from a device for which there is no ROM bootstrap loader.

A.5 PRESRV OPERATOR INTERFACE

A.5.1 Bootstrapping PRESRV

To initiate the PRESRV version distributed with the Release 2 kits, first bootstrap the RSX-11M system, as discussed in section 2.3. When the system prompts with:

```
>
```

enter

```
>INS [1,50]BOO (Install Boot command)  
>BOO [1,50]PRESRV (RK Exec source, unmapped object or RP disks)
```

or

```
>INS [1,54]BOO (Install Boot command)  
>BOO [1,54]PRESRV (RK mapped object disk)
```

To bootstrap PRESRV from logical tapes (e.g., RP distribution kit tapes), use the bootstrap loader to bootstrap from the logical tape. The PRESRV stand-alone system will replace the current Executive and display an identification message of the form:

```
RSX-11S V01 BL12  
VOLUME PRESERVATION PROGRAM - V02.1  
FOR HELP TYPE /HE  
nn. - BLOCKS AVAILABLE FOR BUFFERING
```

Following this message, PRESRV prompts with:

```
PRE>
```

indicating its readiness to accept commands.

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PRESRV is built as a task running under the RSX-11S Executive. Thus the display:

```
"RSX-11S V01 BL12"
```

indicates the version of the RSX-11S Executive in use. V02.1 is the version number of PRESRV.

NOTE

It is advisable for the user to bootstrap PRESRV from its original medium, configure it if necessary (using /CSR, etc.), and write a DECTape, magtape, cassette, or floppy disk by preserving some Files-11 volume with a command such as:

```
PRE>DT0:A=DK0:
```

Subsequent bootstrapping of the logical tape will activate a user-tailored version of PRESRV. The data on the logical tape is of no consequence.

If, in the course of trying to perform some function, PRESRV halts at location 522, the system has crashed. The probable cause is improper values for the CSR or vector for one of the specified devices in the command string. Set the correct CSR and vector addresses for the devices in question and issue the command again.

A.5.1.1 Computing Required Blocks for Buffering

In the display of the number of blocks available for buffering, the value nn. is the number of 256(10)-word blocks available for data transfer and verification operations. The user must use nn. to determine if a given PRESRV media copy has sufficient buffering space. The space required depends on blocking factors and the use of the verification switch. Default block sizes for devices supported by PRESRV are given in Table A-1.

The example presented below illustrates the method for determining the blocks required for PRESRV copy operations. The rule is to establish the blocks required for:

```
Input,  
Output, and  
Verification.
```

Example 1:

```
PRE>MT0:ABC=DK0:
```

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This example creates a logical tape labeled ABC on unit MT0:.
Blocking requirements are:

| | | |
|--------------|-----|------------------------------|
| Input | 12. | (DK default block size). |
| Output | 1. | (MT default block size). |
| Verification | 0. | (No verification specified). |
| Total | 13. | |

Example 2:

PRE>DK0: = MT0:XYZ

Copy file XYZ on MT0: to Files-11 unit DK0:.

| | | |
|--------------|--|--------------------------|
| Input | Record size specified in file XYZ's label. | |
| Output | 12. | (DK default block size). |
| Verification | 0 | |
| Total | 12., plus record size of file XYZ. | |

Example 3:

PRE>DK0:/VE = MT0:IJK

Copies file IJK on MT0: to unit DK0:. Each record written to DK0:
will be read and compared to its memory-resident image.

| | | |
|--------------|------------------------------------|----------------------------|
| Input | Record size of file IJK. | |
| Output | 12. | (DK default block size). |
| Verification | 12. | (Re-read block from DK0:). |
| Total | 24., plus record size of file IJK. | |

Example 4:

PRE>MM0: = MM1:

Image copies MM1: to MM0:. The image copy mode will use all
available memory buffer space in creating blocks on MM0:. If any
input record is too large, the transfer will be aborted.

Example 5:

PRE>MM0:/VE = MM1:

Image copies MM1: to MM0:. Since verification is requested, one-half
of available memory buffer space will be used to form blocks to be
written to MM0:. If any input record is too large, the transfer will
be aborted.

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A.5.1.2 Bootstrapping Another System or Stand-alone Program

Use the /BO switch to bootstrap another system or stand-alone program if the device has a bootstrap block pointing to the desired system or program.

A.5.2 Operator Messages

A.5.2.1 Action Messages

During the course of PRESRV's operation, it may be necessary for the operator to take certain actions. At such times, PRESRV will issue prompting messages to the user's terminal. These messages are as follows:

****BEGIN VERIFICATION****

MOUNT OUTPUT VOLUME nn AND TYPE CR>

MOUNT INPUT VOLUME nn AND TYPE CR>

OUTPUT VOLUME WRITE-LOCKED. TYPE CR WHEN READY>

VOLUME FAULTY - "R" TO RETRY, "C" TO CONTINUE>

ENABLE FORMATTING WITH SWITCH ON CONTROLLER. TYPE CR WHEN READY>

DISABLE FORMATTING WITH SWITCH ON CONTROLLER. TYPE CR WHEN READY>

The VOLUME FAULTY message is issued whenever a verification error or a write error occurs and the /ER switch has not been specified.

NOTE

If PRESRV is ready to accept input and the user types "ALTMODE", the current operation will be aborted.

A.5.2.2 Error Messages

PRESRV error messages are listed alphabetically below.

CONFLICTING SWITCHES

Two switches which conflict in the operation to be performed have been specified, .e.g, /TP and /FI.

Action: Specify the correct switches.

DEVICE NOT FORMATTABLE

The device specified to be formatted is not one of the following: RK03/05, RP02/03, or RP04. Only these devices may be formatted by PRESRV.

Action: Specify correct device mnemonic.

PRESRV

DEVICE OFFLINE

The specified device is not in the hardware configuration, or the CSR is set improperly.

Action: Set the CSR and vector for the device to the proper addresses. Then retype command.

DICTIONARY READ ERROR

An error has occurred in reading a dictionary (storage bitmap equivalent) from a logical tape.

Action: Retry or abort.

DRIVE NOT READY

The specified drive is not up to speed and ready.

Action: Wait until the drive is ready.

ERROR IN READING COMMAND

There is some problem with terminal input, or a ^Z was typed.

Action: Retype command.

EXPECTED EOF NOT FOUND

During verification of a tape-image copy, an EOF mark was read from the input volume, but not from the output volume.

Action: Retry the operation.

FATAL ERROR ON INPUT DEVICE

An error has occurred while reading the input volume during a tape-image copy.

Action: Retry the operation.

FATAL ERROR ON OUTPUT DEVICE

An error has occurred while reading or writing the output volume during a tape image copy.

Action: Retry the operation.

ILLEGAL BLOCK COUNT

The number of blocks specified with the /BL switch is too high for the available buffer space, or it is 0.

Action: Retry the operation with a valid block count.

PRESRV

INPUT DEVICE ERROR nnnnnn nnnnnn

An error has occurred in attempting to read data. The number provided is the octal logical block number (24 bits) when the error was detected.

Action: None.

INPUT VOLUME nn. OUT OF SEQUENCE

The number of the input volume does not match the number of the required volume.

Action: Mount proper volume and proceed.

INSUFFICIENT BUFFER SPACE

A record (or all records) on an input tape has been found to be larger than the available buffer space. Alternatively, the transfer specification requires more blocks than are available (see section A.5.1.1).

Action: Abort (or retry in the alternate case).

LABEL OR BOOTSTRAP WRITE ERROR

An error has occurred while writing the initial part of a logical tape.

Action: Retry or abort the operation.

LUN ASSIGNMENT ERROR

A device and unit combination specified in a command string is either not represented in the current PRESRV system or it is not a valid device for PRESRV operations.

Action: Determine device status and try a proper command.

NO SUCH FILE

A file named in the command string was not found on a (logical) tape, or a magtape was at EOVS for input.

Action: Retry the operation with proper filename.

OUTPUT DEVICE ERROR nnnnnn nnnnnn

An error occurred when PRESRV attempted to read or write data on the output volume. The number indicated is the octal logical block number of the location where the error occurred.

Action: PRESRV continues unless the /ER switch was specified.

PRESRV

OUTPUT VOLUME OVERFLOW

Output volume is a Files-11 device, and input has more blocks than the output volume can hold.

Action: Try some other transfer mode.

SYNTAX ERROR

Input not recognizable.

Action: Retype command.

TAPE LABEL READ ERROR

An error has occurred in reading a logical tape label record.

Action: Retry or abort the operation.

TAPE WAS WRITTEN FOR dd

The Files-11 volume being restored from a logical tape is not of the same type as the one from which the tape was originally made. The new volume will be given the bitmap of the old volume. This is only a warning message, not an error message. The characters dd identify the intended Files-11 device.

TRANSFER SPECIFICATION MODE ERROR

Some inconsistency appears in the transfer command, e.g., a magnetic tape has an /FI switch associated with it.

Action: Retype an acceptable command.

VERIFICATION ERROR nnnnn nnnnn

The data read back from the output volume does not match what was written. The number indicated is the octal logical block number of the location where the error occurred.

Action: Retry, continue, or abort the operation.

Any of the following three messages may appear if a volume assumed to be in Files-11 format is found not to be:

BITMAP FILE HDR READ ERROR

STORAGE BITMAP FILE READ ERROR

HOME BLOCK READ ERROR

Action: Retype the command to specify the proper transfer mode, or wait until the device is ready.

APPENDIX B
SYSTEM CONVENTIONS

B.1 RSX-11M UIC CONVENTIONS

The RSX-11M Release 2 distribution kits observe a set of UIC conventions for files on the disks. The purpose of these conventions is to provide a uniform and consistent means of allocating, locating, and maintaining files on disk.

On a disk, there are many user file directories (UFD's) under which files are catalogued. A particular UFD is referenced by specifying the correct UIC. The UIC consists of two numbers separated by a comma and enclosed in brackets (i.e., UIC [11,20]). The first number (11) is the group member; the second number is the member number (20) and indicates the specific directory within a group of directories. RSX-11M makes use of the UICs to keep related files in specific directories.

B.1.1 Group Number

The group number is used to identify groups of directories. By convention, group numbers of 1 through 10 are reserved for access by the Executive. At present, only group number 1 is used. It is used to identify UFD's which contain files relevant to an RSX-11M system. Group numbers 11-377(8) may be used for user files. Group numbers 11-27(8) are reserved by Digital for storing files relevant to the Executive and Ancillary Control Processors (ACP).

| | | |
|--------------|----|-----------------------------|
| Group Number | 11 | is used for Executive files |
| | 12 | is used for MCR files |
| | 13 | is used for FCP files |

Group numbers 30-100(8) are reserved by Digital for DEC-supplied software tasks. The distribution kit only uses group numbers 1, 11, 12, 13, and 35.

| | | |
|--------------|----|------------------------|
| Group number | 35 | is used for DMP files. |
|--------------|----|------------------------|

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B.1.2 Member Number

The second number (member number) is used to hold different file types of the group. The UIC [11,10] contains source modules of the Executive. Member numbers currently in use are:

- 10 - Source modules.
- 20 - Object modules, assembly and task build command files, object module libraries, overlay descriptor files for all unmapped, privileged and non-privileged tasks.
- 24 - Same as 20 above, except that files are for mapped, privileged tasks, and the Executive.
- 30 - Listing and map files for all unmapped, privileged, and non-privileged tasks.
- 34 - Listing and map files for all mapped, privileged, and non-privileged tasks.
- 40 - SLP correction files for files located under member number 10.
- 50 - Tasks and Executive for RSX-11M unmapped system.
- 54 - Tasks and Executive for RSX-11M mapped system.
- 60 - Tasks and Executive for RSX-11S unmapped system.
- 64 - Tasks and Executive for RSX-11S mapped system.

Member numbers 50, 54, 60, and 64 exist only for group number 1. Member numbers 10 and 40 exist only for group numbers above 10. Member numbers 20, 24, 30, and 34 exist for all group numbers.

For example, for MCR:

- [12,10] Source.
- [12,20] Unmapped object modules, assembly command file.
- [12,24] Mapped object modules, assembly command file.
- [12,30] Unmapped listing files.
- [12,34] Mapped listing files.
- [12,40] SLP correction files for files under [12,10].

For the unmapped system:

- [1,20] Object module libraries, task build command files, and Task Builder overlay description files for all tasks.
- [1,30] Area for task maps.
- [1,50] Executive and system tasks.

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For the mapped system:

- [1,20] Object module libraries, all task build overlay descriptor files for all non-privileged tasks.
- [1,24] Object module libraries, task build command files for all mapped tasks, and overlay description files for all privileged tasks.
- [1,34] Executive and task maps.
- [1,54] Executive and system tasks.

Other UICs:

- [1,1] System and macro object module libraries.
- [1,2] System message files.
- [1,3] Directory for lost files found by VFY.
- [1,4] Directory for Post-Mortem and Snapshot Dump programs.

B.2 NAMING CONVENTIONS

System file names have the following general format:

pppnnnsss.typ

where:

ppp is an optional prefix used to designate a special version or characteristic of the named file. The designation BIG, for example, is sometimes used to designate a task, such as TKB, that is built to operate in more than 8K of memory, e.g., BIGTKB.

nnn is the system identification for the task. Table B-1 lists all system tasks, together with the identification and group codes.

sss is a suffix for noting the relationship of the file to the task specified in the nnn identification. For example, PIPBLD.CMD is the command file for building PIP.

Suffixes:

ASM - Assembly command file
BLD - Task Builder command or overlay description file

typ is the standard mnemonic for file type, such as MAP, CMD, etc.

Types:

CMD - Command File
LST - MACRO-11 Listing File
MAC - MACRO-11 Source File
MAP - Task Map File
MLB - User Macro Library File
OBJ - MACRO-11 Object Library File

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ODL - Overlay Description File
 OLB - Object Library File
 PMD - Post-Mortem or Snapshot Dump File
 SML - System Macro Library File
 STB - Task Symbol Table File
 TSK - Task File

Table B-1
 System Identification Codes

| <u>SYSTEM IDENTIFICATION</u> | <u>GROUP CODE</u> | <u>DESCRIPTION</u> |
|------------------------------|-------------------|---|
| RSX | 11 | RSX-11M Executive, drivers, and tables |
| MCR | 12 | Monitor Console Routines |
| FCP | 13 | File Control Processor |
| PMD | 15 | Post-Mortem and Snap-Dump Processor |
| BMR | 16 | Basic MCR (RSX-11S) |
| OTL | 20 | On-Line Task Loader (RSX-11S) |
| SIP | 21 | System Image Preservation Program (RSX-11S) |
| MAC | 30 | MACRO-11 Assembler |
| TKB | 31 | Task Builder |
| PIP | 32 | Peripheral Interchange Program |
| FLX | 33 | File Transfer Program |
| VFY | 34 | File Structure Verification Program |
| DMP | 35 | File Dump Utility |
| EDI | 37 | Line Text Editor |
| SLP | 40 | Source Language Input Program |
| PRESRV | 41 | Volume Preservation Program |
| LBR | 42 | Librarian |
| FOR | 44 | FORTTRAN compiler |
| SGN | 45 | Sysgem Generation Configuration Query Program |
| PRT | 46 | Print Spooler |
| FCE | 50 | File Control Services |
| FOROTS | 51 | FORTTRAN-IV Object Time System |
| ZAP | 57 | File Patch Utility Program |

SYSTEM CONVENTIONS

Table B-1 (Cont.)
System Identification Codes

| <u>SYSTEM IDENTIFICATION</u> | <u>GROUP CODE</u> | <u>DESCRIPTION</u> |
|------------------------------|-------------------|---------------------------------|
| BAD | 62 | Bad Block Locator Program |
| CRF | 65 | Cross Reference Utility Program |
| VMR | 70 | Virtual MCR Program |

APPENDIX C

RSX-11M OPERATION

C.1 BOOTSTRAPPING A WRITE-LOCKED DISK

It is possible to bootstrap RSX-11M from a write-locked disk. In the Baseline System, this usually manifests itself in the lack of response from the Mount command in the load sequence of the system and in the display of checkpoint write errors for the Save command and MCR. Thus, for a system bootstrapped from DK0:, the console output might be displayed as:

```
RSX-11M V02 BL12 24K
>RED SY:=DK0:
>MOU DK0:
*** ...SAV SY0: -- CHECKPOINT WRITE ERROR
*** ...MCR SY0: -- CHECKPOINT WRITE ERROR
```

The reason for this problem is that the Save and Mount commands run in the same partition. The Save is checkpointable and waits for Mount to complete before continuing. But since Save could not be checkpointed due to the disk being write-locked, Mount could not get in. There are two solutions to the problem:

1. Write-enable the disk and reboot.
2. Write-enable the disk and abort Save. This will allow Mount to come in and run. When Mount has completed, the system will prompt normally. The user will then have to issue the @[1,2] STARTUP command manually.

C.2 RUNNING OUT OF DYNAMIC MEMORY

It is possible to run out of dynamic memory during the running of RSX-11M. This is possible if a large number of tasks are installed, if many volumes are mounted, or if a number of other conditions are present. (Appendix F describes all dynamic memory uses.) This problem manifests itself in the lack of any response from the system. Although the system looks like it is operating successfully, it cannot accept any MCR commands or complete the execution of presently running tasks because they all require dynamic memory. The only solution to this problem is to rebootstrap the system and make more dynamic space available (SET /POOL), remove tasks, mount fewer volumes, or rebuild the system with more dynamic memory.

C.3 DYNAMIC MEMORY REQUIREMENTS

During the course of its execution, the RSX-11M Executive has varying needs for dynamic memory. At any one instant in time, many I/O requests can be active, several files can be open, or multiple time-dependent scheduling requests can be queued. Rather than allocate a fixed amount of memory for each requirement, the RSX-11M Executive makes use of a dynamically allocated memory space called the dynamic storage region. As demands for space are made, the necessary memory is allocated from this region using a first-fit algorithm. When allocated space is no longer needed, it is released back to the pool of available memory. The initial size of the dynamic storage region is established during the execution of the System Generation Configuration Query Program (SGN). This initial allocation can later be extended via the MCR SET /POOL command when the generated system is bootstrapped.

Dynamic memory requirements for a system are dependent on the configuration, application, and degree of system loading. Enough memory must be available to satisfy peak demands; otherwise, a degradation in system performance will occur. On the other hand, if too much memory is made available, it is never used and is thus wasteful of system resources.

Summarized below are the sources that make demands on the dynamic storage region. In general, a system should contain a dynamic storage region equal to the size of the aggregate sum of the peak demands made simultaneously among the various categories. Having calculated this figure, it is also advisable to add an increase of approximately ten percent to cover possible fragmentation contingencies. The maximum size of the dynamic storage region is limited by physical memory in an unmapped system. In a mapped system, the size of the Executive, plus the size of the dynamic storage region, must be less than 16K words.

C.3.1 Sources Requiring Dynamic Memory

The following list identifies those system elements requiring dynamic memory:

1. Each task installed in the system requires 20 words for a task control block.
2. Each I/O request results in the allocation of an 18-word I/O packet which is queued to the appropriate device driver.
3. Each message sent to a task results in an 18-word message packet being allocated to hold the requisite data.
4. Each main partition and subpartition requires a 14-word partition control block to describe its memory. In addition, for each active task in a system-controlled partition, whether they are checkpointed or not, a PCB is built and allocated in the dynamic storage region.
5. Each open file requires 18 words for a file control block and 18 words for a window block which contains virtual-to-logical block mapping pointers.

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6. Each mounted volume requires 18 words for a volume control block, 18 words for the index file window block, and 18 words for the index file control block. In addition, three 18-word control blocks are required to hold information pertaining to the last three directory files that were accessed. (See space saving hint 4 below.)
7. Each clock queue entry requires eight words. These entries represent mark time, schedule, and periodic rescheduling requests.
8. Each powerfail, receive, and FPP AST trap-enable for active tasks requires eight words for an AST control block.
9. All terminal input is buffered in the terminal driver before transferring information to the user buffer. Each solicited and unsolicited input request requires a 42-word input buffer.
10. Card images read from the CM/CR11 are buffered in the card reader driver before transferring the translated information to the user buffer. Binary input requires an 80-word buffer, whereas ASCII input requires a 40-word buffer.
11. Each LPS11 synchronous function requires 20 words for a sample control block.
12. In a mapped system, the task header is copied into a block of memory allocated from the dynamic storage region. Approximately 64 words (dependent upon the number of LUNs) are required for each task that is in memory (i.e., in execution and not checkpointed, or inactive and fixed).
13. Each task linked to ICS/ICR-11 interrupts requires 16 words of dynamic memory, plus six words for each interrupt linkage.

C.3.2 Space Saving Hints

The following list identifies potential methods of saving space:

1. By including the install, request, and remove on exit capability into a generated system, considerable dynamic memory may be saved for tasks that are initiated from a terminal. The MCR Run command will install the tasks when needed and cause them to be removed when they exit (see the RSX-11M Operator's Procedures Manual). Thus, task control blocks need not be permanently allocated. Typical tasks in this category are the program development and utility tasks provided with the RSX-11M system, (PIP, MAC, TKB, etc.).
2. The use of checkpointing and nonresident tasks, where appropriate, can reduce the number of tasks that are simultaneously in memory. This saves space in a mapped system, since less task headers need to be copied. Also, checkpointable tasks are limited to one outstanding I/O request, thus reducing the potential need for simultaneous I/O packets.

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3. Open files should be closed as soon as possible, thereby releasing the dynamic memory required for the file control and window blocks.
4. The directory least-recently-used table default is three 18-word file control blocks. The effect of this table is a significant increase in the speed of directory operations. If this level of performance is not required, a volume may be mounted using the /LRU keyword, thereby reducing the number of FCBs used.

C.4 PARITY MEMORY SUPPORT

As an option, RSX-11M will support parity memory on all processors. In addition, parity on the PDP-11/70 cache is supported. If a main memory parity error is detected with this option selected, the task occupying the space where the error was detected will be aborted and locked in memory to prevent re-using it. A message will be issued noting the fact that the task was aborted due to a parity error. If the error is detected in the Executive, the system will attempt to print the message:

```
*** EXEC PARITY ERROR STOP***
```

and then halt.

For 11/70 cache parity errors, the half of the cache in which the parity error was detected will be disabled, if two errors in the same half are detected within the same minute of each other. If less than one error per minute is detected, and the system recovers by reading through to main memory, the cache will not be disabled. With either one or both halves of the cache disabled, the processor will still operate, but in a degraded state.

C.5 SAVING THE SYSTEM WITH A KW11-Y WATCHDOG TIMER

Before a system with a KW11-Y watchdog timer is saved, the timer must be disabled. There is a switch located on the timer for this purpose. The reason is that the Save command routine takes over the system for the duration of the save-and-restore operations and disables clock interrupts. If the KW11-Y is allowed to run during this period, it would time out and cause the alarm to be turned on.

To save a system with the KW11-Y watch dog timer, perform the following steps:

1. Disable the timer (with switch);
2. Save the system, and
3. When the system is up and running, turn the timer on.

APPENDIX D
ZAP UTILITY PROGRAM

D.1 INTRODUCTION TO ZAP

The ZAP Utility Program provides a facility (similar to ODT) for examining and modifying task image files and data files. It can be used to make permanent patches to a task image file without having to reassemble or rebuild the task.

D.2 INITIATING ZAP

One of the following methods may be used to invoke ZAP:

1. >ZAP @filename

If this method is used, ZAP will be loaded, it will execute the commands in the indirect file, and then exit to MCR.

2. >ZAP

if ZAP is installed, or

>RUN \$ZAP

if ZAP is not installed.

If this method is used, when ZAP has been loaded, it responds first with the prompting message:

ZAP>

At this point, the user can enter the file specifier for the file to be processed. When it has been accepted, ZAP responds with the prompting character underscore:

-

Commands to examine or modify the specified file can then be entered.

ZAP UTILITY PROGRAM

D.3 FILE SPECIFIERS

D.3.1 Format of File Specifier

The general format of the file specifier is:

```
dev:[uic]filename.typ;ver
```

which is the standard Files-11 file specifier format.

It may optionally be followed by command switches of the form:

```
/sw
```

D.3.2 Defaults in File Specifiers

If any of the elements of the file specifier, except the filename, are omitted, ZAP uses a default. These default values are listed in Table D-1.

Table D-1
Default File Specifiers

| <u>Element</u> | <u>Default Value</u> |
|----------------|---|
| dev: | SY0: -- The unit on which the system disk is mounted. |
| [uic] | The terminal default UIC. |
| filename | No default -- Must be explicitly specified. |
| .typ | .TSK -- The file type normally used for task image files. |
| ;ver | The most recent version number. |

D.3.3 Command Switches

The following switch specifications are accepted:

```
/AB Absolute mode
```

If this switch is specified, addresses specified in ZAP commands are treated as absolute byte addresses within the file. The /AB switch must be specified, if the file is not a task image; it may be specified for task images also.

If the /AB switch is not specified, then addresses specified in ZAP commands refer directly to those in the Task Builder map for the task image. In this case, ZAP may be used exactly as ODT would be used at execute time.

```
/LI List segment data
```

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If this switch is specified, a listing of the starting disk block, and address bounds for each overlay segment will be printed on the console. Each line is of the form:

```
sssss:   aaaaa-bbbbb
```

where sssss is the starting block, and aaaaa-bbbbb are the address bounds in octal.

```
/RO      Read only
```

If this switch is specified, the file will be opened for reading. Modification commands will not have any effect on the file.

D.4 COMMAND SYNTAX

D.4.1 Overview

In general, the syntax of ZAP commands is as much like ODT commands as possible. The differences are outlined below. The notation <CR> denotes the carriage return key.

1. The syntax for specifying addresses has been extended to provide for overlaid programs. This subject is treated in depth in section D.4.2.
2. All commands are terminated by the carriage return key. The ODT command 0/ would thus be typed as 0/<CR>. Unlike ODT, the RUBOUT, CTRL/U, and CTRL/R editing facilities can be used to correct typing errors prior to typing <CR>.
3. A null line is interpreted by ZAP as equivalent to the linefeed command in ODT. Hence, successive locations can be modified by entering n <CR> to alter the open location and open the next location. A <CR> by itself will open the next location.
4. The V command has been added for use with an indirect command file to permit the user to verify the contents of a location before modifying it. The command has the form nV, where n is an octal number. It causes the contents of \$Q, the last value printed, to be compared to n. ZAP exits if they are not equal. For example:

```
3270/    open 3270
6V       verify the contents
10       modify to 10
```

Thus, the user can verify the contents of a location before modifying it, when ZAP is running under the control of an indirect command file.

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D.4.2 Specification of Addresses

Addresses are specified in one of three forms:

Format 1:

S:n

In absolute mode, s is taken as a virtual block number (VBN), and n is a byte offset. If s is omitted, it is taken to be 1, the first block of the file. Virtual blocks are 256 words, or 1000(8) bytes, long. For example:

| EXTENDED | ACTUAL | ADDRESS |
|----------|--------|------------|
| 4 | VBN=1 | location 4 |
| 2:6 | VBN=2 | location 6 |
| 2:1006 | VBN=3 | location 6 |
| 3004 | VBN=4 | location 4 |

In task image mode, s denotes the lower disk block limit of an overlay segment, as obtained from the Task Builder map, and n denotes an address within the segment. If s is omitted, it is taken to be zero.

For example, using the following excerpt from a map:

```
*** SEGMENT:  LEXSY0
DISK BLK LIMITS: 000061  000121  000041
*** FILE:  CLASY.OBJ
<.BLK.> 037700  004163  001164
```

the word at offset 34 in CLASY would be addressed as:

61:37734 or 61:37700+34

or using a relocation register (see Format 3 below):

```
61:37700;0R        Set Relocation Register
0,34/              Open location
```

Note that the disk block limits, as printed, are not the same as virtual block numbers within the file.

Format 2:

n

This is equivalent to 1:n in absolute mode, 0:n in task image mode.

Format 3:

r,n

This denotes the address n locations away from the value in relocation register r. Note that segment information is obtained from the relocation register, which may be considered as pointing to an address in a specific segment. For example:

```
22:15376;0R
0,526/
```

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D.4.3 Commands

Generally, ZAP commands have the same parameters and functions as the corresponding ODT commands. A summary of the available ZAP facilities is found in Table D-2.

Table D-2
ZAP Commands

Internal Registers

| | | | |
|-----|-----|-----|------|
| \$A | \$C | \$F | \$H |
| \$L | \$M | \$Q | \$nR |
| . | C | Q | |

Operators

| | |
|-------|---|
| : | Sets off segment number |
| , | Sets off relocation register |
| ; | Separates parameters |
| + | Addition |
| space | Addition |
| - | Subtraction |
| * | Multiplication by octal 50 and addition |

Commands

| | |
|------|--|
| X | Exit |
| = | Type in octal |
| K | Type relocation |
| O | Type offsets |
| R | Set relocation register |
| V | Verify contents of a location |
| / | Open word, type in octal |
| \ | Open byte, type in octal |
| " | Open word, type in ASCII |
| ' | Open byte, type in ASCII |
| % | Open word, type in radix 50 |
| <CR> | Close with modification |
| <LF> | Close with modification, open next |
| ^ | Close with modification, open previous |
| | Close with modification, open PC relative |
| @ | Close with modification, open indirectly |
| < | Close with modification, open branch relative |
| > | Close with modification, return to previous sequence |

ZAP UTILITY PROGRAM

D.5 ZAP ERROR MESSAGES

ZAP error messages are listed and described below.

NO SUCH RELOCATION REGISTER

Relocation registers are numbered 0 through 7.

ADDRESS NOT WITHIN SEGMENT

The specified address was not within the overlay segment specified.

NO SUCH SEGMENT

The starting disk block was not the start of any segment in the task image.

TOO MANY ARGUMENTS

More arguments were given to a command than were expected.

NO SUCH INTERNAL REGISTER

The character following a dollar sign was not the name of an internal register.

UNRECOGNIZED COMMAND

Possibly, the command contained an illegal character.

NO OPEN LOCATION

A modification command was given with no location open to receive the data.

CANNOT BE USED IN BYTE MODE

The commands @, _, and > cannot be used when a location is open as a byte.

ERROR IN FILE SPECIFICATION

The file specification was not properly formed.

OPEN FAILURE FOR TASK IMAGE FILE

The file to be modified could not be opened. Possibly, it does not exist, or it is locked, or the device was not mounted.

ERROR ON COMMAND INPUT

An I/O error occurred while a command was being read.

I/O ERROR ON TASK IMAGE FILE

An I/O error occurred while reading or writing the file to be modified.

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NOT A TASK IMAGE FILE

An error occurred while the segment description tables were being constructed. Possibly, the file is not a task image, the /AB switch was not specified, or the task image is defective.

VERIFY FAILURE

The V command determined that the actual contents of a location did not match the expected contents.

APPENDIX E

BAD BLOCK LOCATOR PROGRAM

E.1 FUNCTIONAL DESCRIPTION

The Bad Block Locator Program (BAD) provides a facility for verifying disks, i.e., determining the number and location of any bad blocks on a Files-11 device (excluding magtape). It does this by writing a "worst-case" test pattern onto each block of the disk, and then performing a write check of the block. Before a block is considered to be bad, the initial write or write check must fail, as well as a subsequent write/write-check operation.

As BAD locates bad blocks, it formats this information internally in a buffer. When all blocks on the disk have been processed, this buffer is written into the last good block of the disk.

NOTE

There must be at least one good block within the last 256 blocks on the disk. Also, if block 0 is bad, the BAD task will print a message warning the operator not to use the disk as a system disk.

BAD must be initiated as an MCR function task. The command line is of the form:

>BAD ddu:

where ddu is the device-unit specification of the volume to be subjected to bad block analysis. The specified device must not be mounted as a Files-11 volume. If it is, dismount it with the MCR Dismount command. Once a volume has been checked for bad blocks by this task, the last good block contains a list of all bad blocks on the volume. The MCR Initialize Volume command will search for and use the bad block record if the switch /BAD=[AUTO] is included in the command line. If the /BAD switch is not included, any bad blocks found will be allocated to files.

BAD BLOCK LOCATOR PROGRAM

E.2 BAD BLOCK ERROR MESSAGES

The error messages of the Bad Block Locator Program are listed and described below.

BAD -- BAD BLOCK FILE OVERFLOW

More than 256 sets of contiguous bad blocks have been detected. This usually indicates a unit failure.

Action: Check the integrity of the unit (head alignment).

BAD -- BLOCK 0 BAD - DO NOT USE DISK

This is a warning message. When block 0 is bad, a boot block cannot be written, making the disk useless as a system disk.

Action: Label the disk to prevent inadvertent misuse.

BAD -- DEVICE NOT IN SYSTEM

Requested device is either not generated into the system or it does not physically exist on the host configuration.

Action: Probably operator error. Examine command line and enter intended unit correctly.

BAD -- DISK ATTACH FAILED

BAD must have exclusive control of the unit it is servicing, but it could not obtain it.

Action: Determine task which has attached the unit and, if appropriate, abort the task and request BAD again.

BAD -- DISK ERROR

I/O error forced program termination.

Action: Re-run BAD. If it fails again, check unit integrity.

BAD -- DISK MOUNTED

BAD will not process mounted volumes.

Action: Dismount the unit (MCR Dismount command) and re-enter the command line.

BAD -- DISK NOT READY

The disk unit was not up to speed when the first access was attempted.

Action: Wait for unit to reach operating speed, then re-enter command line.

BAD BLOCK LOCATOR PROGRAM

BAD -- DISK WRITE LOCKED

Disk unit write locked.

Action: Unlock unit and re-enter the command line.

BAD -- FAILED TO READ MCR COMMAND BUFFER

BAD issued a \$GMCR directive and no buffer exists. This is usually caused by starting BAD by issuing:

>RUN ...BAD

instead of

>BAD DK0:

Action: Start BAD properly.

BAD -- FAILED TO WRITE BAD BLOCK FILE

BAD could not write the bad block file. Usually due to a disk write error.

Action: Try again by re-entering command line. If the failure persists, check hardware integrity.

BAD -- ILLEGAL DEVICE

Device to which bad block processing is directed is not a Files-11 device (disk or DEctape).

Action: Request BAD again for a Files-11 volume.

BAD -- SYNTAX ERROR

Command line syntax invalid.

Action: Re-enter the command line.

BAD -- TOTAL NO. OF BAD BLOCKS = 00000000

Informational message. Indicates total number of bad blocks.

Action: Put bad block count on disk label.

APPENDIX F

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

.MACRO ABODFS,L,B

```

;+
; TASK ABORT CODES
;
; NOTE: S.COAD=S.CFLT ARE ALSO SST VECTOR OFFSETS
;=
S.COAD='B'0.           ;ODD ADDRESS AND TRAPS TO 4
S.CSGF='B'2.           ;SEGMENT FAULT
S.CBPT='B'4.           ;BREAK POINT OR TRACE TRAP
S.CIOT='B'6.           ;IOT INSTRUCTION
S.CILI='B'8.           ;ILLEGAL OR RESERVED INSTRUCTION
S.CEMT='B'10.          ;NON RSX EMT INSTRUCTION
S.CTRP='B'12.          ;TRAP INSTRUCTION
S.CFLT='B'14.          ;11/40 FLOATING POINT EXCEPTION
S.CSST='B'16.          ;SST ABORT-BAD STACK
S.CAST='B'18.          ;AST ABORT-BAD STACK
S.CABO='B'20.          ;ABORT VIA DIRECTIVE
S.CLRF='B'22.          ;TASK LOAD REQUEST FAILURE
S.CCRF='B'24.          ;TASK CHECKPOINT READ FAILURE
S.IOMG='B'26.          ;TASK EXIT WITH OUTSTANDING I/O
S.PRTY='B'28.          ;TASK MEMORY PARITY ERROR

```

```

;
; TASK TERMINATION NOTIFICATION MESSAGE CODES
;

```

```

T.NDNR='B'0           ;DEVICE NOT READY
T.NDSE='B'2           ;DEVICE SELECT ERROR
T.NCWF='B'4           ;CHECKPOINT WRITE FAILURE
T.NCRE='B'6           ;CARD READER HARDWARE ERROR
T.NDMO='B'8           ;DISMOUNT COMPLETE
T.NLDN='B'12.         ;LINK DOWN (NETWORKS)
T.NLUP='B'14.         ;LINK UP (NETWORKS)

```

```

.MACRO ABODFS
.ENDM
.ENDM

```

.MACRO CLKDFS,L,B

```

;+
; CLOCK QUEUE CONTROL BLOCK OFFSET DEFINITIONS
;
; CLOCK QUEUE CONTROL BLOCK
;
; THERE ARE FIVE TYPES OF CLOCK QUEUE CONTROL BLOCKS. EACH CONTROL BLOCK HAS
; THE SAME FORMAT IN THE FIRST FIVE WORDS AND DIFFERS IN THE REMAINING THREE
;
; THE FOLLOWING CONTROL BLOCK TYPES ARE DEFINED:
;=

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

```

C,MRKT='B'0           ;MARK TIME REQUEST
C,SCHD='B'2           ;TASK REQUEST WITH PERIODIC RESCHEDULING
C,SSHT='B'4           ;SINGLE SHOT TASK REQUEST
C,SYST='B'6           ;SINGLE SHOT INTERNAL SYSTEM SUBROUTINE (IDENT)
C,SYTK='B'8           ;SINGLE SHOT INTERNAL SYSTEM SUBROUTINE (TASK)

;
; CLOCK QUEUE CONTROL BLOCK TYPE INDEPENDENT OFFSET DEFINITIONS
;

      .ASECT

      .#0
C,LNK;'L' .BLKW 1     ;CLOCK QUEUE THREAD WORD
C,RQT;'L' .BLKB 1     ;REQUEST TYPE
C,EFN;'L' .BLKB 1     ;EVENT FLAG NUMBER (MARK TIME ONLY)
C,TCB;'L' .BLKW 1     ;TCB ADDRESS OR SYSTEM SUBROUTINE IDENTIFICATION
C,TIM;'L' .BLKW 2     ;ABSOLUTE TIME WHEN REQUEST COMES DUE

;
; CLOCK QUEUE CONTROL BLOCK-MARK TIME DEPENDENT OFFSET DEFINITIONS
;

      .#C,TIM+4       ;START OF DEPENDENT AREA
C,AST;'L' .BLKW 1     ;AST ADDRESS
C,SRC;'L' .BLKW 1     ;FLAG MASK WORD FOR 'BIS' SOURCE
C,DST;'L' .BLKW 1     ;ADDRESS OF 'BIS' DESTINATION

;
; CLOCK QUEUE CONTROL BLOCK-PERIODIC RESCHEDULING DEPENDENT OFFSET DEFINITIONS
;

      .#C,TIM+4       ;START OF DEPENDENT AREA
C,RSI;'L' .BLKW 2     ;RESCHEDULE INTERVAL IN CLOCK TICKS
C,UIC;'L' .BLKW 1     ;SCHEDULING UIC

;
; CLOCK QUEUE CONTROL BLOCK-SINGLE SHOT DEPENDENT OFFSET DEFINITIONS
;

      .#C,TIM+4       ;START OF DEPENDENT AREA
      .BLKW 2         ;TWO UNUSED WORDS
      .BLKW 1         ;SCHEDULING UIC

;
; CLOCK QUEUE CONTROL BLOCK-SINGLE SHOT INTERNAL SUBROUTINE OFFSET DEFINITIONS
;
; THERE ARE TWO TYPE CODES FOR THIS TYPE OF REQUEST;'L'
;
; TYPE 6=SINGLE SHOT INTERNAL SUBROUTINE WITH A 16 BIT VALUE AS AN IDENTIFIER
; TYPE 8=SINGLE SHOT INTERNAL SUBROUTINE WITH A TCB ADDRESS AS AN IDENTIFIER
;

      .#C,TIM+4       ;START OF DEPENDENT AREA
C,SUB;'L' .BLKW 1     ;SUBROUTINE ADDRESS
      .BLKW 2         ;TWO UNUSED WORDS
C,LGTH='B'           ;LENGTH OF CLOCK QUEUE CONTROL BLOCK
      .PSECT

      .MACRO CLKDFS
      .ENDM
      .ENDM

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

.MACRO DCBDFS,L,B

```

;+
;
; DEVICE CONTROL BLOCK
;
; THE DEVICE CONTROL BLOCK (DCB) DEFINES GENERIC INFORMATION ABOUT A DEVICE
; TYPE AND THE LOWEST AND HIGHEST UNIT NUMBERS. THERE IS AT LEAST ONE DCB
; FOR EACH DEVICE TYPE IN A SYSTEM. FOR EXAMPLE, IF THERE ARE TELETYPES IN A
; SYSTEM, THEN THERE IS AT LEAST ONE DCB WITH THE DEVICE NAME 'TT'. IF PART
; OF THE TELETYPES WERE INTERFACED VIA DL11-A'S AND THE REST VIA A DH11, THEN
; THERE WOULD BE TWO DCB'S, ONE FOR ALL DL11-A INTERFACED TELETYPES, AND ONE
; FOR ALL DH11 INTERFACED TELETYPES. A SIMILAR SITUATION WOULD ARISE IF A
; SYSTEM CONTAINED TWO RK11 DISK CONTROLLERS. ONE DCB WOULD BE REQUIRED
; FOR EACH CONTROLLER.
;-

```

.ASECT

```

.=0
D.LNK:'L' .BLKW 1 ;LINK TO NEXT DCB
D.UCB:'L' .BLKW 1 ;POINTER TO FIRST UNIT CONTROL BLOCK
D.NAM:'L' .BLKW 1 ;GENERIC DEVICE NAME
D.UNIT:'L' .BLKB 1 ;LOWEST UNIT NUMBER COVERED BY THIS DCB
                .BLKB 1 ;HIGHEST UNIT NUMBER COVERED BY THIS DCB
D.UCBL:'L' .BLKW 1 ;LENGTH OF EACH UNIT CONTROL BLOCK IN BYTES
D.DSP:'L' .BLKW 1 ;POINTER TO DRIVER DISPATCH TABLE
D.MSK:'L' .BLKW 1 ;LEGAL FUNCTION MASK CODES 0-15.
                .BLKW 1 ;CONTROL FUNCTION MASK CODES 0-15.
                .BLKW 1 ;NOP'ED FUNCTION MASK CODES 0-15.
                .BLKW 1 ;ACP FUNCTION MASK CODES 0-15.
                .BLKW 1 ;LEGAL FUNCTION MASK CODES 16.-31.
                .BLKW 1 ;CONTROL FUNCTION MASK CODES 16.-31.
                .BLKW 1 ;NOP'ED FUNCTION MASK CODES 16.-31.
                .BLKW 1 ;ACP FUNCTION MASK CODES 16.-31.

```

.PSECT

```

;+
; DRIVER DISPATCH TABLE OFFSET DEFINITIONS
;-

```

```

D.VINI='B'0 ;DEVICE INITIATOR
D.VCAN='B'2 ;CANCEL CURRENT I/O FUNCTION
D.VOUT='B'4 ;DEVICE TIMEOUT
D.VPWF='B'6 ;POWERFAIL RECOVERY

```

```

.MACRO DCBDFS,X,Y
.ENDM
.ENDM

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

```

        .MACRC F11DFS
;
; VOLUME CONTROL BLOCK
;
        .ASECT
;#0
V.TRCT: .BLKW 1 ;TRANSACTION COUNT
V.IFWI: .BLKW 1 ;INDEX FILE WINDOW
V.FCB: .BLKW 2 ;FILE CONTROL BLOCK LIST HEAD
V.IBLB: .BLKB 1 ;INDEX BIT MAP 1ST LBN HIGH BYTE
V.IBSZ: .BLKB 1 ;INDEX BIT MAP SIZE IN BLOCKS
        .BLKW 1 ;INDEX BITMAP 1ST LBN LOW BITS
V.FMAX: .BLKW 1 ;MAX NO. OF FILES ON VOLUME
V.WISZ: .BLKB 1 ;DFLT SIZE OF WINDOW IN NO. OF RTRV PTRS
        .BLKW 1 ;VALUE IS < 128.
V.SBCL: .BLKB 1 ;STORAGE BIT MAP CLUSTER FACTOR
V.SBSZ: .BLKW 1 ;STORAGE BIT MAP SIZE IN BLOCKS
V.SBLB: .BLKB 1 ;STORAGE BIT MAP 1ST LBN HIGH BYTE
V.FIEX: .BLKB 1 ;DEFAULT FILE EXTEND SIZE
        .BLKW 1 ;STORAGE BIT MAP 1ST LBN LOW BITS
V.VOWN: .BLKW 1 ;VOLUME OWNER'S UIC
V.VPRO: .BLKW 1 ;VOLUME PROTECTION
V.VCHA: .BLKW 1 ;VOLUME CHARACTERISTICS
V.FPRO: .BLKW 1 ;VOLUME DEFAULT FILE PROTECTION
V.VFSQ: .BLKW 1 ;VOLUME FILE SEQUENCE NUMBER
V.FRBK: .BLKB 1 ;NUMBER OF FREE BLOCKS ON VOLUME HIGH BYTE
V.LRUC: .BLKB 1 ;COUNT OF AVAILABLE LRU SLOTS IN FCB LIST
        .BLKW 1 ;NUMBER OF FREE BLOCKS ON VOLUME LOW BITS
V.LGTH: ;SIZE IN BYTES OF VCB
;
; FILE CONTROL BLOCK
;
        .ASECT
;#0
F.LINK: .BLKW 1 ;FCB CHAIN POINTER
F.FNUM: .BLKW 1 ;FILE NUMBER
F.FSEQ: .BLKW 1 ;FILE SEQUENCE NUMBER
        .BLKW 1 ;UNUSED
F.FOWN: .BLKW 1 ;FILE OWNER'S UIC
F.FPRO: .BLKW 1 ;FILE PROTECTION CODE
F.UCHA: .BLKB 1 ;USER CONTROLLED CHARACTERISTICS
F.SCHA: .BLKB 1 ;SYSTEM CONTROLLED CHARACTERISTICS
F.HDLB: .BLKW 2 ;FILE HEADER LOGICAL BLOCK NUMBER
        .BLKW 2 ;BEGINNING OF STATISTICS BLOCK
        .BLKW 2 ;LBN OF VIRTUAL BLOCK 1 IF CONTIGUOUS
        .BLKW 2 ;0 IF NON CONTIGUOUS
F.SIZE: .BLKW 2 ;SIZE OF FILE IN BLOCKS
F.NACS: .BLKB 1 ;NO. OF ACCESSES
F.NLCK: .BLKB 1 ;NO. OF LOCKS
        .BLKW 1 ;SIZE OF STATICS BLOCK
F.STAT: .BLKW 1 ;STATUS BITS FOR FCB CONSISTING OF
        .BLKW 1 ;SET IF FILE ACCESSED FOR WRITE
        .BLKW 1 ;SET IF FCB IS IN DIRECTORY LRU
        .BLKW 1 ;SET IF DIRECTORY EOF NEEDS UPDATING
        .BLKW 1 ;SET IF TRYING TO FORCE DIRECTORY CONTIG
        .BLKW 1 ;DIRECTORY EOF BLOCK NUMBER
        .BLKW 1 ;1ST WORD OF DIRECTORY NAME
        .BLKW 1 ;UNUSED
F.LGTH: ;SIZE IN BYTES OF FCB

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

```

)
; WINDOW
)
    .ASECT
    =0
W.CTL: .BLKW 1 ;LOW BYTE = # OF MAP ENTRIES ACTIVE
;HIGH BYTE CONSISTS OF THE FOLLOWING BITS
    WI.RDV=400 ;READ VIRTUAL BLOCK ALLOWED IF SET
    WI.WRV=1000 ;WRITE VIRTUAL BLOCK ALLOWED IF SET
    WI.EXT=2000 ;EXTEND ALLOWED IF SET
    WI.LCK=4000 ;SET IF LOCKED AGAINST SHARED ACCESS
    WI.DLK=10000 ;SET IF DEACCESS LOCK ENABLED
    WI.BPS=100000 ;BYPASS ACCESS INTERLOCK IF SET
W.VBN: .BLKB 1 ;HIGH BYTE OF 1ST VBN MAPPED BY WINDOW
W.WISZ: .BLKB 1 ;SIZE IN RTRV PTRS OF WINDOW (7 BITS)
        .BLKW 1 ;LOW ORDER WORD OF 1ST VBN MAPPED
W.FCB: .BLKW 1 ;FILE CONTROL BLOCK ADDRESS
W.RTRV: ;OFFSET TO 1ST RETRIEVAL POINTER IN WINDOW

    .PSECT
    .MACRO HDRDFS
    .ENDM
    .ENDM
    .MACRO HDRDFS,L,B

```

```

)+
; TASK HEADER OFFSET DEFINITIONS
)-

```

```

    .ASECT
    =0
H.CSP:'L',.BLKW 1 ;CURRENT STACK POINTER
H.HDLN:'L',.BLKW 1 ;HEADER LENGTH IN BYTES
H.PCBT:'L',.BLKW 4 ;TASK PARTITION DESCRIPTOR
H.PCBC:'L',.BLKW 3*4 ;COMMON PARTITION DESCRIPTORS
        .BLKW 1 ;BOUNDRY WORD FOR PCB ADDRESSES (ALWAYS=0)
H.DSW:'L',.BLKW 1 ;TASK DIRECTIVE STATUS WORD
H.FCS:'L',.BLKW 1 ;FCS IMPURE POINTER
H.FORT:'L',.BLKW 1 ;FORTRAN IMPURE POINTER
H.OVLY:'L',.BLKW 1 ;OVERLAY IMPURE POINTER
H.RSVD:'L',.BLKW 1 ;RESERVED POINTER LOCATION
H.EFLM:'L',.BLKW 4 ;EVENT FLAG MASK WORDS
H.CUIC:'L',.BLKW 1 ;CURRENT TASK UIC
H.DUIC:'L',.BLKW 1 ;DEFAULT TASK UIC
H.IPSI:'L',.BLKW 1 ;INITIAL PROCESSOR STATUS WORD (PS)
H.IPC:'L',.BLKW 1 ;INITIAL PROGRAM COUNTER (PC)
H.ISP:'L',.BLKW 1 ;INITIAL STACK POINTER (SP)
H.ODVA:'L',.BLKW 1 ;ODT SST VECTOR ADDRESS
H.ODVL:'L',.BLKW 1 ;ODT SST VECTOR LENGTH
H.TKVA:'L',.BLKW 1 ;TASK SST VECTOR ADDRESS
H.TKVL:'L',.BLKW 1 ;TASK SST VECTOR LENGTH
H.PFVA:'L',.BLKW 1 ;POWER FAIL AST CONTROL BLOCK ADDRESS
H.FPVA:'L',.BLKW 1 ;FLOATING POINT AST CONTROL BLOCK ADDRESS
H.RCVA:'L',.BLKW 1 ;RECIEVE AST CONTROL BLOCK ADDRESS
        .BLKW 1 ;RESERVED WORD
H.FPSA:'L',.BLKW 1 ;POINTER TO FLOATING POINT/EAE SAVE AREA
        .BLKW 1 ;RESERVED WORD
H.GARD:'L',.BLKW 1 ;POINTER TO HEADER GUARD WORD
H.NLUN:'L',.BLKW 1 ;NUMBER OF LUN'S
H.LUN:'L',.BLKW 2 ;START OF LOGICAL UNIT TABLE
    .PSECT

    .MACRO HDRDFS
    .ENDM
    .ENDM

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

.MACRO HWDDFS,L,B

)+
; HARDWARE REGISTER ADDRESSES AND STATUS CODES
)-

| | |
|-----------------|--|
| MPCSR='B'177746 | ;ADDRESS OF PDP-11/70 MEMORY PARITY REGISTER |
| MPAR='B'172100 | ;ADDRESS OF FIRST MEMORY PARITY REGISTER |
| PIRQ='B'177772 | ;PROGRAMMED INTERRUPT REQUEST REGISTER |
| PR0='B'0 | ;PROCESSOR PRIORITY 0 |
| PR1='B'40 | ;PROCESSOR PRIORITY 1 |
| PR4='B'200 | ;PROCESSOR PRIORITY 4 |
| PR5='B'240 | ;PROCESSOR PRIORITY 5 |
| PR6='B'300 | ;PROCESSOR PRIORITY 6 |
| PR7='B'340 | ;PROCESSOR PRIORITY 7 |
| PS='B'177776 | ;PROCESSOR STATUS WORD |
| SWR='B'177570 | ;CONSOLE SWITCH AND DISPLAY REGISTER |
| TPS='B'177564 | ;CONSOLE TERMINAL PRINTER STATUS REGISTER |

)+
; EXTENDED ARITHMETIC ELEMENT REGISTERS
)-

.IF DF ESSEAE

| | |
|--------------|----------------------|
| AC='B'177302 | ;ACCUMULATOR |
| MQ='B'177304 | ;MULTIPLIER=QUOTIENT |
| SC='B'177310 | ;SHIFT COUNT |

.ENDC

)+
; MEMORY MANAGEMENT HARDWARE REGISTERS AND STATUS CODES
)-

.IF DF MSSMGE

| | |
|------------------|---------------------|
| KDSAR0='B'172360 | ;KERNEL D PAR 0 |
| KSDSR0='B'172320 | ;KERNEL D PDR 0 |
| KISAR0='B'172340 | ;KERNEL I PAR 0 |
| KISAR6='B'172354 | ;KERNEL I PAR 6 |
| KISAR7='B'172356 | ;KERNEL I PAR 7 |
| KISDR0='B'172300 | ;KERNEL I PDR 0 |
| KISDR6='B'172314 | ;KERNEL I PDR 6 |
| KISDR7='B'172316 | ;KERNEL I PAR 7 |
| SISDR0='B'172200 | ;SUPERVISOR I PDR 0 |
| UDSAR0='B'177660 | ;USER D PAR 0 |
| UDSDR0='B'177620 | ;USER D PDR 0 |
| UISAR0='B'177640 | ;USER I PAR 0 |
| UISAR4='B'177650 | ;USER I PAR 4 |
| UISAR5='B'177652 | ;USER I PAR 5 |
| UISAR6='B'177654 | ;USER I PAR 6 |
| UISAR7='B'177656 | ;USER I PAR 7 |
| UISDR0='B'177600 | ;USER I PDR 0 |
| UISDR4='B'177610 | ;USER I PDR 4 |
| UISDR5='B'177612 | ;USER I PDR 5 |
| UISDR6='B'177614 | ;USER I PDR 6 |
| UISDR7='B'177616 | ;USER I PDR 7 |

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

```

UBMPR='B'170200      ;UNIBUS MAPPING REGISTER 0
CMODE='B'140000      ;CURRENT MODE FIELD OF PS WORD
PMODE='B'30000       ;PREVIOUS MODE FIELD OF PS WORD
SR0='B'177572        ;SEGMENT STATUS REGISTER 0
SR3='B'172516        ;SEGMENT STATUS REGISTER 3

```

.ENDC

```

;+
; FEATURE SYMBOL DEFINITIONS
;-

```

```

FE,EXT='B'1          ;11/70 EXTENDED MEMORY SUPPORT
FE,MUP='B'2          ;MULTI-USER PROTECTION SUPPORT

```

```

.MACRO HWDDFS
.ENDM
.ENDM

```

.IIF NDF SSSYDF , .LIST

.MACRO LCBDFS,L,B

```

;+
; LOGICAL ASSIGNMENT CONTROL BLOCK
;
; THE LOGICAL ASSIGNMENT CONTROL BLOCK (LCB) IS USED TO ASSOCIATE A
; LOGICAL NAME WITH A PHYSICAL DEVICE UNIT. LCB'S ARE LINKED TOGETHER
; TO FORM THE LOGICAL ASSIGNMENTS OF A SYSTEM. ASSIGNMENTS MAY BE ON
; A SYSTEM WIDE OR LOCAL (TERMINAL) BASIS.
;-

```

.ASECT

```

.=0
L.LNK:'L' .BLKW 1      ;LINK TO NEXT LCB
L.NAM:'L' .BLKW 1      ;LOGICAL NAME OF DEVICE
L.UNIT:'L' .BLKB 1     ;LOGICAL UNIT NUMBER
L.TYPE:'L' .BLKB 1     ;TYPE OF ENTRY (0=SYSTEM WIDE)
L.UCB:'L' .BLKW 1      ;TI UCB ADDRESS
L.ASG:'L' .BLKW 1      ;ASSIGNMENT UCB ADDRESS
L.LGTH='B' -L.LNK      ;LENGTH OF LCB

```

.PSECT

```

.MACRO LCBDFS,X,Y
.ENDM
.ENDM

```


SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

.MACRO PCBDFS

)+
; PARTITION CONTROL BLOCK OFFSET DEFINITIONS
)-

```

.ASECT
.#0
P.LNK: .BLKW 1 ;LINK TO NEXT PARTITION PCB
P.NAM: .BLKW 2 ;PARTITION NAME IN RAD50
P.SUB: .BLKW 1 ;POINTER TO NEXT SUBPARTITION
P.MAIN: .BLKW 1 ;POINTER TO MAIN PARTITION
P.REL: .BLKW 1 ;STARTING PHYSICAL ADDRESS OF PARTITION
P.SIZE: .BLKW 1 ;SIZE OF PARTITION IN BYTES
P.BLKS: .BLKW 1 ;SIZE OF PARTITION IN 32W BLOCKS (SYSTEM ONLY)
P.WAIT: .BLKW 1 ;PARTITION WAIT QUEUE LISTHEAD (2 WORDS)
P.SWSZ: .BLKW 1 ;PARTITION SWAP SIZE (SYSTEM ONLY)
P.BUSY: .BLKB 2 ;PARTITION BUSY FLAGS
P.TCB: .BLKW 1 ;TCB ADDRESS OF OWNER TASK
P.NAPR: .BLKB 1 ;NUMBER OF APR'S TO LOAD
P.STAT: .BLKB 1 ;PARTITION STATUS FLAGS

```

.IF DF MSSMGE

```

P.PDR: .BLKW 1 ;CONTENTS OF LAST PDR TO BE LOADED
P.HDR: .BLKW 1 ;POINTER TO HEADER CONTROL BLOCK

```

.IFF

```

P.HDR=P.REL ;POINTER TO HEADER CONTROL BLOCK

```

.ENDC

```

P.LGTH=, ;LENGTH OF PARTITION CONTROL BLOCK
.PSECT

```

)+
; PARTITION STATUS BYTE BIT DEFINITIONS
)-

```

PS.COM=200 ;LIBRARY OR COMMON BLOCK (1=YES)
PS.PIC=100 ;POSITION INDEPENDENT LIBRARY OR COMMON (1=YES)
PS.SYS=40 ;SYSTEM CONTROLLED PARTITION (1=YES)
PS.DRV=20 ;DRIVER IS LOADED IN PARTITION (1=YES)
PS.APR=7 ;STARTING APR NUMBER MASK

```

.MACRO PCBDFS
.ENDM
.ENDM

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

.MACRO PKTDFS,L,B

;+
; ASYNCHRONOUS SYSTEM TRAP CONTROL BLOCK OFFSET DEFINITIONS
;-

.ASECT

```
.#0
      .BLKW 1           ;AST QUEUE THREAD WORD
A,CBL;'L' .BLKW 1     ;LENGTH OF CONTROL BLOCK IN BYTES
A,BYT;'L' .BLKW 1     ;NUMBER OF BYTES TO ALLOCATE ON TASK STACK
A,AST;'L' .BLKW 1     ;AST TRAP ADDRESS
A,NPR;'L' .BLKW 1     ;NUMBER OF AST PARAMETERS
A,PRM;'L' .BLKW 1     ;FIRST AST PARAMETER
```

;+
; I/O PACKET OFFSET DEFINITIONS
;-

.ASECT

```
.#0
I,LNK;'L' .BLKW 1     ;I/O QUEUE THREAD WORD
I,PRI;'L' .BLKB 1     ;REQUEST PRIORITY
I,EFN;'L' .BLKB 1     ;EVENT FLAG NUMBER
I,TCB;'L' .BLKW 1     ;TCB ADDRESS OF REQUESTOR
I,LN2;'L' .BLKW 1     ;POINTER TO SECOND LUN WORD
I,UCB;'L' .BLKW 1     ;POINTER TO UNIT CONTROL BLOCK
I,FCN;'L' .BLKW 1     ;I/O FUNCTION CODE
I,IOSB;'L' .BLKW 1     ;VIRTUAL ADDRESS OF I/O STATUS BLOCK
      .BLKW 1           ;I/O STATUS BLOCK RELOCATON BIAS
      .BLKW 1           ;I/O STATUS BLOCK ADDRESS
I,AST;'L' .BLKW 1     ;AST SERVICE ROUTINE ADDRESS
I,PRM;'L' .BLKW 1     ;RESERVED FOR MAPPING PARAMETER #1
      .BLKW 6           ;PARAMETERS 1 TO 6
I,LGTH='B' .          ;LENGTH OF I/O REQUEST CONTROL BLOCK
```

.PSECT

.MACRO PKTDFS
.ENDM
.ENDM

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

.MACRO SCBDFS,L,B

STATUS CONTROL BLOCK

THE STATUS CONTROL BLOCK (SCB) DEFINES THE STATUS OF A DEVICE CONTROLLER. THERE IS ONE SCB FOR EACH CONTROLLER IN A SYSTEM. THE SCB IS POINTED TO BY UNIT CONTROL BLOCKS. TO EXPAND ON THE TELETYPE EXAMPLE ABOVE, EACH TELETYPE INTERFACED VIA A DL11-A WOULD HAVE A SCB SINCE EACH DL11-A IS AN INDEPENDENT INTERFACE UNIT. THE TELETYPES INTERFACED VIA THE DH11 WOULD ALSO EACH HAVE AN SCB SINCE THE DH11 IS A SINGLE CONTROLLER BUT MULTIPLEXES MANY UNITS IN PARALLEL.

.ASECT

```

;177772
,RCNT:'L' .BLKB 1 ;NUMBER OF REGISTERS TO COPY ON ERROR
,ROFF:'L' .BLKB 1 ;OFFSET TO FIRST DEVICE REGISTER
,BMSV:'L' .BLKW 1 ;SAVED I/O ACTIVE BITMAP AND POINTER TO EMB
,BMSK:'L' .BLKW 1 ;DEVICE I/O ACTIVE BIT MASK
,LHD:'L' .BLKW 2 ;CONTROLLER I/O QUEUE LISTHEAD
,PRI:'L' .BLKB 1 ;DEVICE PRIORITY
,VCT:'L' .BLKB 1 ;INTERRUPT VECTOR ADDRESS /4
,CTM:'L' .BLKB 1 ;CURRENT TIMEOUT COUNT
,ITM:'L' .BLKB 1 ;INITIAL TIMEOUT COUNT
,CON:'L' .BLKB 1 ;CONTROLLER INDEX
,STS:'L' .BLKB 1 ;CONTROLLER STATUS (0=IDLE,1=BUSY)
,CSR:'L' .BLKW 1 ;ADDRESS OF CONTROL STATUS REGISTER
,PKT:'L' .BLKW 1 ;ADDRESS OF CURRENT I/O PACKET
,FRK:'L' .BLKW 1 ;FORK/TIME REQUEST BLOCK LINK WORD
      .BLKW 1 ;FORK-PC/TIME-QUEUE REQUEST TYPE
      .BLKW 1 ;FORK-R5/TIME-REQUEST IDENTIFICATION
      .BLKW 1 ;FORK-R4/TIME-LOW ORDER TIME
,CCB:'L' .BLKW 1 ;FORK-UNUSED/TIME-HIGH ORDER TIME/CHANNEL CONTROL BLK
      .BLKW 1 ;FORK-UNUSED/TIME-SUBROUTINE ADDRESS
,MPR:'L' .BLKW 6 ;11/70 EXTENDED MEMORY UNIBUS DEVICE C-BLOCK

```

.PSECT

STATUS CONTROL BLOCK PRIORITY BYTE CONDITION CODE STATUS BIT DEFINITIONS

```

;EIP='B'1 ;ERROR IN PROGRESS (1=YES)
;ENB='B'2 ;ERROR LOGGING ENABLED (0=YES)
;LOG='B'4 ;ERROR LOGGING AVAILABLE (1=YES)
;ARE=10 ;SPARE BIT

```

```

.MACRO SCBDFS,X,Y
.ENDM
.ENDM

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

.MACRO TCBDfs,L,B

```

;+
; TASK CONTROL BLOCK OFFSET AND STATUS DEFINITIONS
;
; TASK CONTROL BLOCK
;=

```

.ASECT

```

.#0
T.LNK;'L' .BLKW 1 ;UTILITY LINK WORD
T.PRI;'L' .BLKB 1 ;TASK PRIORITY
T.IOC;'L' .BLKB 1 ;I/O PENDING COUNT
T.TCB;'L' .BLKW 1 ;POINTER TO T.LNK OF TCB ITSELF
T.NAM;'L' .BLKW 2 ;TASK NAME IN RAD50
T.RCVL;'L' .BLKW 2 ;RECEIVE QUEUE LISTHEAD
T.ASTL;'L' .BLKW 2 ;AST QUEUE LISTHEAD
T.EFLG;'L' .BLKW 2 ;TASK LOCAL EVENT FLAGS 1-32
T.UCB;'L' .BLKW 1 ;UCB ADDRESS FOR PSEUDO DEVICE 'TI'
T.TCBL;'L' .BLKW 1 ;TASK LIST THREAD WORD
T.STAT;'L' .BLKB 3 ;TASK STATUS WORD AND EXTENSION BYTE
T.LBN;'L' .BLKB 3 ;LBN OF TASK LOAD IMAGE
T.LDV;'L' .BLKW 1 ;UCB ADDRESS OF LOAD DEVICE
T.PCB;'L' .BLKW 1 ;PCB ADDRESS OF TASK PARTITION
T.MXSZ;'L' .BLKW 1 ;MAXIMUM SIZE OF TASK IMAGE (MAPPED ONLY)
T.ACTL;'L' .BLKW 1 ;ADDRESS OF NEXT TASK IN ACTIVE LIST
T.LGTH='B' ;LENGTH OF TASK CONTROL BLOCK
T.EXT='B'.-T.LGTH ;LENGTH OF TCB EXTENSION
.PSECT

```

```

;+
; TASK STATUS DEFINITIONS
;
; TASK STATUS WORD
;=

```

```

TS.EXE='B'100000 ;TASK IS IN EXECUTION (0='B'YES)
TS.RDN='B'40000 ;I/O RUN DOWN IN PROGRESS (1='B'YES)
TS.DST='B'20000 ;AST RECOGNITION DISABLED (1='B'YES)
TS.MSG='B'10000 ;ABORT MESSAGE BEING OUTPUT (1='B'YES)
TS.PMD='B'4000 ;DUMP TASK ON SYNCHRONOUS ABORT (0=YES)
TS.STP='B'2000 ;TASK STOPPED FOR TERMINAL INPUT (1=YES)
TS.REM='B'1000 ;REMOVE TASK ON EXIT (1='B'YES)
TS.ACP='B'400 ;ANCILLARY CONTROL PROCESSOR (1='B'YES)
TS.AST='B'200 ;AST IN PROGRESS (1='B'YES)
TS.CHK='B'100 ;TASK IS CHECKPOINTABLE (0='B'YES)
TS.BFX='B'40 ;TASK BEING FIXED IN MEMORY (1='B'YES)
TS.FXD='B'20 ;TASK FIXED IN MEMORY (1='B'YES)
TS.OUT='B'10 ;TASK IS OUT OF MEMORY (1='B'YES)
TS.CKP='B'4 ;TASK IS CHECKPOINTED (1='B'YES)
TS.CKR='B'2 ;CHECKPOINT REQUESTED (1='B'YES)
TS.CKD='B'1 ;CHECKPOINT DISABLED (1='B'YES)

```

```

;+
; TASK BLOCKING STATUS MASK
;=

```

TS.BLK='B'TS.CKP!TS.CKR!TS.EXE!TS.MSG!TS.OUT!TS.RDN!TS.STP ;

```

;+
; TASK STATUS BYTE EXTENSION
;=

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

```

,HLT='B'200 ;TASK IS BEING HALTED (1='B'YES)
,PRV='B'100 ;TASK IS PRIVILEGED (1='B'YES)
,ABO='B'40 ;TASK MARKED FOR ABORT (1='B'YES)
,MCR='B'20 ;TASK REQUESTED AS EXTERNAL MCR FUNCTION (1='B'YES)
,SPN='B'10 ;SAVED TS,SPN ON AST IN PROGRESS
,SPN='B'4 ;TASK SUSPENDED (1='B'YES)
,WFR='B'2 ;SAVED TS,WFR ON AST IN PROGRESS
,WFR='B'1 ;TASK IN WAITFOR STATE (1='B'YES)

```

```

.MACRO TCBDFS
.ENDM
.ENDM

```

```

.MACRO UCBDfs,L,B

```

UNIT CONTROL BLOCK

THE UNIT CONTROL BLOCK (UCB) DEFINES THE STATUS OF AN INDIVIDUAL DEVICE UNIT AND IS THE CONTROL BLOCK THAT IS POINTED TO BY THE FIRST WORD OF AN ASSIGNED LUN. THERE IS ONE UCB FOR EACH DEVICE UNIT OF EACH DCB. THE UCB'S ASSOCIATED WITH A PARTICULAR DCB ARE CONTIGUOUS IN MEMORY AND ARE POINTED TO BY THE DCB. UCB'S ARE VARIABLE LENGTH BETWEEN DCB'S BUT ARE OF THE SAME LENGTH FOR A SPECIFIC DCB. TO FINISH THE TELETYPE EXAMPLE ABOVE, EACH UNIT ON BOTH INTERFACES WOULD HAVE A UCB.

.ASECT

```

;0
,DCB;'L' .BLKW 1 ;BACK POINTER TO DCB
,RED;'L' .BLKW 1 ;POINTER TO REDIRECT UNIT UCB
,CTL;'L' .BLKB 1 ;CONTROL PROCESSING FLAGS
,STS;'L' .BLKB 1 ;UNIT STATUS
,UNIT;'L' .BLKB 1 ;PHYSICAL UNIT NUMBER
,ST2;'L' .BLKB 1 ;UNIT STATUS EXTENSION
,CW1;'L' .BLKW 1 ;FIRST DEVICE CHARACTERISTICS WORD
,CW2;'L' .BLKW 1 ;SECOND DEVICE CHARACTERISTICS WORD
,CW3;'L' .BLKW 1 ;THIRD DEVICE CHARACTERISTICS WORD
,CW4;'L' .BLKW 1 ;FOURTH DEVICE CHARACTERISTICS WORD
,SCB;'L' .BLKW 1 ;POINTER TO SCB
,ATT;'L' .BLKW 1 ;TCB ADDRESS OF ATTACHED TASK
,BUF;'L' .BLKW 1 ;RELOCATION BIAS OF CURRENT I/O REQUEST
, .BLKW 1 ;BUFFER ADDRESS OF CURRENT I/O REQUEST
,CNT;'L' .BLKW 1 ;BYTE COUNT OF CURRENT I/O REQUEST
,ACP='B'U,CNT+2 ;ADDRESS OF TCB OF MOUNTED ACP
,VCB='B'U,CNT+4 ;ADDRESS OF VOLUME CONTROL BLOCK
,CBF='B'U,CNT+2 ;CONTROL BUFFER RELOCATION AND ADDRESS
,UIC='B'U,CNT+<9,*2> ;TERMINAL UIC (TERMINALS ONLY)
.PSECT

```

DEVICE TABLE STATUS DEFINITIONS

DEVICE CHARACTERISTICS WORD 1 (U,CW1) DEVICE TYPE DEFINITION BITS.

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

```

DV,REC='B'1           ;RECORD ORIENTED DEVICE (1=YES)
DV,CCL='B'2           ;CARRIAGE CONTROL DEVICE (1=YES)
DV,TTY='B'4           ;TERMINAL DEVICE (1=YES)
DV,DIR='B'10          ;FILE STRUCTURED DEVICE (1=YES)
DV,SDI='B'20          ;SINGLE DIRECTORY DEVICE (1=YES)
DV,SQD='B'40          ;SEQUENTIAL DEVICE (1=YES)
DV,SWL='B'4000        ;UNIT SOFTWARE WRITE LOCKED (1=YES)
DV,PSE='B'10000       ;PSEUDO DEVICE (1=YES)
DV,COM='B'20000       ;DEVICE IS MOUNTABLE AS COM CHANNEL (1=YES)
DV,F11='B'40000       ;DEVICE IS MOUNTABLE AS F11 DEVICE (1=YES)
DV,MNT='B'100000      ;DEVICE IS MOUNTABLE (1=YES)

```

```

;+
; TERMINAL DEPENDENT CHARACTERISTICS WORD 2 (U,CW2) BIT DEFINITIONS
;-

```

```

U2,DH1='B'100000     ;UNIT IS A DH11/DJ11 (1=YES)
U2,DJ1='B'40000      ;UNIT IS A DJ11 (1=YES)
U2,RMT='B'20000      ;UNIT IS REMOTE (1=YES)
U2,LOG='B'400        ;USER LOGGED ON TERMINAL (0=YES)
U2,LWC='B'200        ;LOWER CASE TO UPPER CASE CONVERSION (1=YES)
U2,OFF='B'100        ;OUTPUT IS TURNED OFF (1=YES)
U2,PND='B'40         ;OUTPUT BYTE PENDING (1=YES)
U2,AT,='B'20         ;MCR COMMAND AT, BEING PROCESSED (1=YES)
U2,PRV='B'10         ;UNIT IS A PRIVILEGED TERMINAL (1=YES)
U2,L39='B'4          ;UNIT IS A LA309 TERMINAL (1=YES)
U2,VT5='B'2          ;UNIT IS A VT05B TERMINAL (1=YES)
U2,SLV='B'1          ;UNIT IS A SLAVE TERMINAL (1=YES)

```

```

;+
; RH11-RS03/RS04 CHARACTERISTICS WORD 2 (U,CW2) BIT DEFINITIONS
;-

```

```

U2,R04='B'100000     ;UNIT IS A RS04 (1=YES)

```

```

;+
; RH11-TU16 CHARACTERISTICS WORD 2 (U,CW2) BIT DEFINITIONS
;-

```

```

U2,7CH='B'10000     ;UNIT IS A 7 CHANNEL DRIVE (1=YES)

```

```

;+
; UNIT CONTROL PROCESSING FLAG DEFINITIONS
;-

```

```

UC,ALG='B'200        ;BYTE ALIGNMENT ALLOWED (1=NO)
UC,NPR='B'100        ;DEVICE IS AN NPR DEVICE (1=YES)
UC,QUE='B'40         ;CALL DRIVER BEFORE QUEUING (1=YES)
UC,PWF='B'20         ;CALL DRIVER AT POWERFAIL ALWAYS (1=YES)
UC,ATT='B'10         ;CALL DRIVER ON ATTACH/DETACH (1=YES)
UC,KIL='B'4          ;CALL DRIVER AT I/O KILL ALWAYS (1=YES)
UC,LGH='B'3          ;TRANSFER LENGTH MASK BITS

```

```

;+
; UNIT STATUS BIT DEFINITIONS
;-

```

SYSTEM DATA STRUCTURES AND SYMBOLIC DEFINITIONS

```

US,BSY='B'200          ;UNIT IS BUSY (1=YES)
US,MNT='B'100          ;UNIT IS MOUNTED (0='B'YES)
US,FOR='B'40           ;UNIT IS MOUNTED AS FOREIGN VOLUME (1=YES)
US,MDM='B'20           ;UNIT IS MARKED FOR DISMOUNT (1=YES)

)+
; UNIT STATUS EXTENSION BIT DEFINITIONS
)-

US,OFL='B'1           ;UNIT OFFLINE (1=YES)
US,RED='B'2           ;UNIT REDIRECTABLE (0=YES)

)+
; CARD READER DEPENDENT UNIT STATUS BIT DEFINITIONS
)-

US,ABO='B'1           ;UNIT IS MARKED FOR ABORT IF NOT READY (1=YES)
US,MDE='B'2           ;UNIT IS IN 029 TRANSLATION NODE (1=YES)

)+
; FILES-11 DEPENDENT UNIT STATUS BITS
)-

US,WCK='B'10          ;WRITE CHECK ENABLED (1=YES)

)+
; TERMINAL DEPENDENT UNIT STATUS BIT DEFINITIONS
)-

US,DSB='B'10         ;UNIT IS DISABLED (1=YES)
US,CRW='B'4          ;UNIT IS WAITING FOR CARRIER (1=YES)
US,ECH='B'2          ;UNIT HAS ECHO IN PROGRESS (1=YES)
US,OUT='B'1          ;UNIT IS EXPECTING OUTPUT INTERRUPT (1=YES)

)+
; LPS11 DEPENDENT UNIT STATUS BIT DEFINITIONS
)-

US,FRK='B'2          ;FORK IN PROGRESS (1=YES)
US,SHR='B'1          ;SHAREABLE FUNCTION IN PROGRESS (0='B'YES)

      .MACRO UCBDfs,X,Y
      .ENDM
      .ENDM

```

APPENDIX G

EXAMPLE SYSGEN

The following is an actual console listing from a SYSGEN performed on the RK disk release kit. The target system is a 64K PDP-11/40 with FIS and the following peripherals:

- . 2 RK05 disk drives
- . 1 RP03 disk drive
- . 2 RX01 disk drives
- . 1 LP05 line printer
- . 2 TS03 magtape drives
- . 2 DL11 asynchronous line interfaces
- . 1 ICS-11 industrial control subsystem

The Executive features selected include support for dynamic memory allocation for system-controlled partitions, checkpointing during terminal input wait, and Executive-level, round-robin scheduling of tasks.

The SYSGEN was performed on a PDP-11/45 with 64K of memory and 2 RK disks.

DEVICE CT00: NOT IN CONFIGURATION

DEVICE CT01: NOT IN CONFIGURATION

```
RSX-11M V02 BL12 28K
>RED DK0:=SY0:
>MOU DK0:
>@[1,2]STARTUP
>@ <EOF>
>TIM 15:38 8/19/75
>@SYSGEN
>#
># SYSGEN PART 1 <VERSION 02>
>#
># COPYRIGHT (C) 1975, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
>#
># DETERMINE SYSTEM FEATURES AND ASSEMBLE THE EXECUTIVE
>#
>#
># IF YOU ARE PLANNING TO INCLUDE ICS/ICR-11 OR UDC11 SUPPORT YOU
># SHOULD CONSULT THE LATEST RELEASE NOTES BEFORE PROCEEDING FURTHER.
>#
>* DO YOU WISH TO CONTINUE? [Y/N]:Y
>#
># LONG DIALOGUE PRINTS A DESCRIPTION OF EVERY STEP IN THIS
># SYSGEN COMMAND FILE. ON THE OTHER HAND, SHORT DIALOGUE
># PROVIDES VIRTUALLY NO EXPLANATORY TEXT.
```


EXAMPLE SYSGEN

```

>#
>* DO YOU WANT LONG DIALOGUE? [Y/N]:Y
>* ARE YOU BUILDING AN RSX11S SYSTEM? [Y/N]:N
>* ARE YOU BUILDING A MAPPED SYSTEM? [Y/N]:Y
>* ARE YOU RUNNING ON A MACHINE WITH AT LEAST 24K WORDS? [Y/N]:Y
>* WILL YOUR SYSTEM INCLUDE ICS/ICR-11 SUPPORT? [Y/N]:Y
>#
># INSTALL THE NECESSARY TASKS
>#
>SET /UIC=[1,50]
>INS PIP
>#
># DELETE FILES FROM PAST SYSGENS
>#
>#     NOTE: ON VIRGIN DISKS, NONE OF THE FILES WE TRY TO
>#     DELETE WILL EXIST. PIP WILL GIVE ERROR MESSAGES
>#     THAT SHOULD INDICATE THAT THE FILE DOES NOT EXIST.
>#
>SET /UIC=[11,20]
>PIP RSXASM.CMD/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,20]RSXASM.CMD/*/*
>PIP RSXBLD.CMD/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,20]RSXBLD.CMD/*/*
>PIP *.OBJ/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,20]*.OBJ/*/*
>PIP *.UDC/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,20]*.UDC/*/*
>PIP *.ICR/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,20]*.ICR/*/*
>SET /UIC=[11,24]
>PIP RSXASM.CMD/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,24]RSXASM.CMD/*/*
>PIP RSXBLD.CMD/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,24]RSXBLD.CMD/*/*
>PIP *.OBJ/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,24]*.OBJ/*/*
>PIP *.UDC/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,24]*.UDC/*/*
>PIP *.ICR/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,24]*.ICR/*/*
>SET /UIC=[11,30]
>PIP UDCOM.LST/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,30]UDCOM.LST/*/*
>PIP ICTAB.LST/*/*/DE,ICOM.LST/*/*
PIP -- NO SUCH FILE(S)
SY:[11,30]ICTAB.LST/*/*
PIP -- NO SUCH FILE(S)
SY:[11,30]ICOM.LST/*/*
>SET /UIC=[11,34]
>PIP UDCOM.LST/*/*/DE
PIP -- NO SUCH FILE(S)
SY:[11,34]UDCOM.LST/*/*
>PIP ICTAB.LST/*/*/DE,ICOM.LST/*/*
PIP -- NO SUCH FILE(S)
SY:[11,34]ICTAB.LST/*/*

```

EXAMPLE SYSGEN

```
PIP -- NO SUCH FILE(S)
SY:[11,34]ICOM.LST;*
>SET /UIC=[11,10]
>PIP SYSTB.MAC;*/DE
PIP -- NO SUCH FILE(S)
SY:[11,10]SYSTB.MAC;*
>PIP RSXMC.MAC;*/DE
PIP -- NO SUCH FILE(S)
SY:[11,10]RSXMC.MAC;*
>PIP ICTAB.MAC;*/DE
PIP -- NO SUCH FILE(S)
SY:[11,10]ICTAB.MAC;*
>
>| NOW WE RUN THE SYSGEN PROGRAM TO SELECT THE EXECUTIVE
>| FEATURES AND DEVICES WE WANT IN THE NEW SYSTEM
>|
>| NOTE: IF YOU ARE RUNNING ON A 16K WORD MACHINE YOU SHOULD
>| SPECIFY THAT NO ASSEMBLY LISTINGS BE GENERATED.
>| IF YOU ARE RUNNING ON A MACHINE AT LEAST 24K WORDS
>| YOU MAY GET ASSEMBLY LISTINGS, HOWEVER THE FOLLOWING
>| CONDITIONS APPLY:
>| 1) RK SYSTEM DISK - DIRECT LISTINGS TO LP: OR DK1:
>| 2) RPO2/03, RPO4 SYSTEM DISK - DIRECT LISTINGS TO LP: OR SY:
>|
>RUN *SGN
```

BEGIN SGN

EVERY QUERY INCLUDES REQUIRED ANSWER OPTIONS. OPTIONS ARE:

[Y/N] FOR YES/NO

[DDU] IF A DEVICE-UNIT IS REQUIRED

[O] IF REQUIRED NUMBER IS ASSUMED OCTAL

[D] IF REQUIRED NUMBER IS ASSUMED DECIMAL

THE OPTIONS WHICH APPLY TO A GIVEN QUERY ARE IMPLIED IN THE QUERY. A CARRIAGE RETURN WILL DEFAULT AN ANSWER TO NO FOR [Y/N] AND ZERO FOR A NUMERIC. NO DEFAULT APPLIES FOR THE DEVICE-UNIT.

THE NUMERIC DEFAULT, [D] OR [O], CAN BE OVERRIDDEN BY PREFIXING NUMBERS TO BE ACCEPTED AS OCTAL WITH A POUND SIGN (#) OR SUFFIXING THOSE TO BE ACCEPTED AS DECIMAL WITH A PERIOD.

SOME QUERIES SUBSEQUENT TO KEY QUERIES HAVE PRESTORED REPLIES. THESE REPLIES CAN BE OVERRIDDEN BY TERMINATING A REPLY TO A KEY QUERY WITH ALTMODE.

ANSWERS WHICH ARE IN ERROR ARE IMMEDIATELY FLAGGED BY AN ERROR MESSAGE DISPLAY# SGN WILL WAIT TO ACCEPT THE CORRECTED ANSWER. SGN PROVIDES LONG OR SHORT DIALOG OPTIONS. SHORT DIALOG LISTS THE QUERY ONLY. LONG DIALOG PROVIDES EXPLANATORY TEXT WITH EACH QUERY. THE DIALOG PROPER NOW COMMENCES.

LONG DIALOG RESULTS IN THE DISPLAY OF EXPLANATORY TEXT PRECEDING EACH QUERY. SHORT DIALOG OMITTS THE TEXT. LONG DIALOG IS AVAILABLE ON A PER QUERY BASIS BY ENTERING ESCAPE OR ALTMODE FOLLOWING THE DISPLAY OF THE QUERY.

```
LONG DIALOGUE DESIRED? [Y/N]:N
ASSEMBLY LISTING FILES DESIRED? [Y/N]:N
TASK BUILDER MAP DESIRED? [Y/N]:Y
WHAT IS TO BE THE LISTING DEVICE? [DDU]:SY
SPOOL MAP FILE? [Y/N]:N
```

EXAMPLE SYSGEN

BEGIN EXECUTIVE SERVICE OPTIONS

ARE YOU BUILDING AN RSX-11S SYSTEM? [Y/N]:N
**DO YOU WANT FILES-11 ACP SUPPORT? [Y/N]:Y
**DO YOU WANT CHECKPOINTING? [Y/N]:Y
DO YOU WANT TASKS TO BE CHECKPOINTABLE DURING TERMINAL INPUT? [Y/N]:Y
DO YOU WANT MEMORY MANAGEMENT UNIT SUPPORT? [Y/N]:Y
DO YOU WANT DYNAMIC MEMORY ALLOCATION SUPPORT? [Y/N]:Y
DO YOU WANT AUTOMATIC MEMORY COMPACTION? [Y/N]:N
DO YOU WANT ADDRESS CHECKING? [Y/N]:Y
**DO YOU WANT I/O RUNDOWN? [Y/N]:Y
DO YOU WANT NETWORK ACP SUPPORT? [Y/N]:N
DO YOU WANT AST SUPPORT? [Y/N]:Y
**DO YOU WANT SUPPORT FOR EXTERNAL MCR FUNCTIONS? [Y/N]:Y
**DO YOU WANT TASK TERMINATION AND DEVICE NOT READY MESSAGES? [Y/N]:Y
DO YOU WANT POWERFAIL RECOVERY? [Y/N]:Y
**DO YOU WANT GET PARTITION PARAMETERS DIRECTIVE? [Y/N]:Y
DO YOU WANT GET SENSE SWITCHES DIRECTIVE? [Y/N]:N
**DO YOU WANT GET TASK PARAMETERS DIRECTIVE? [Y/N]:Y
DO YOU WANT SEND/RECEIVE DIRECTIVES? [Y/N]:Y
*DO YOU WANT INSTALL, REQUEST, AND REMOVE ON EXIT SUPPORT? [Y/N]:Y
*DO YOU WANT LOGICAL DEVICE ASSIGNMENT SUPPORT? [Y/N]:Y
DO YOU WANT TERMINAL-HOST SYNCHRONIZATION SUPPORT? [Y/N]:N
DO YOU WANT SETTABLE CASE CONVERSION FOR TERMINAL INPUT? [Y/N]:N
DO YOU WANT TRANSPARENT TERMINAL READ/WRITE SUPPORT? [Y/N]:Y
DO YOU WANT EXECUTIVE LEVEL ROUND ROBIN SCHEDULING? [Y/N]:Y
HOW MANY CLOCK TICKS ARE TO EXPIRE BETWEEN SCHEDULE INTERVALS? [D]:6
WHAT IS THE HIGHEST PRIORITY CLASS TO BE CONSIDERED? [D]:150
WHAT IS THE LOWEST PRIORITY CLASS TO BE CONSIDERED? [D]:1
ARE YOU PLANNING TO INCLUDE A USER WRITTEN DRIVER? [Y/N]:N
DO YOU WANT TO INCLUDE THE EXECUTIVE DEBUGGING TOOL? [Y/N]:N
DO YOU WANT REPORT AT SYSTEM CRASHES? [Y/N]:N
DO YOU WANT PANIC DUMP ROUTINE? [Y/N]:N
**WHAT IS THE SIZE OF THE DYNAMIC STORAGE REGION IN WORDS? [D]:2048
DO YOU WANT ROTATING PATTERN IN DATA LIGHTS? [Y/N]:N

END EXECUTIVE SERVICE OPTIONS

BEGIN PROCESSOR OPTIONS

WHAT IS THE SIZE OF PHYSICAL MEMORY IN 1024 WORD BLOCKS? [D]:64
DO YOU WANT FLOATING POINT PROCESSOR SUPPORT? [Y/N]:N
DO YOU WANT FIS SUPPORT? [Y/N]:Y
DO YOU HAVE A PROGRAMMABLE CLOCK? [Y/N]:N
IS YOUR LINE FREQUENCY 50 CYCLE? [Y/N]:N
DO YOU WANT KW11-Y WATCHDOG TIMER SUPPORT? [Y/N]:N
DO YOU WANT PARITY MEMORY SUPPORT? [Y/N]:N

END PROCESSOR OPTIONS

BEGIN PERIPHERAL OPTIONS

HOW MANY AD01-D A/D CONVERTERS DO YOU HAVE? [D]:0
HOW MANY AFC11 A/D CONVERTERS DO YOU HAVE? [D]:0
HOW MANY AR11 LABORATORY PERIPHERAL SYSTEMS DO YOU HAVE? [D]:0
HOW MANY CM/CR11 CARD READERS DO YOU HAVE? [D]:0
HOW MANY TA11 DUAL CASSETTES DO YOU HAVE? [D]:0
HOW MANY RJ/RWP04 DISK PACK CONTROLLERS DO YOU HAVE? [D]:0
HOW MANY RF11 FIXED HEAD DISK CONTROLLERS DO YOU HAVE? [D]:0
HOW MANY RK11 CARTRIDGE DISK CONTROLLERS DO YOU HAVE? [D]:1
DO YOU WANT WRITE CHECK SUPPORT? [Y/N]:Y
WHAT IS THE VECTOR ADDRESS OF THE NEXT RK11? [D]:220
WHAT IS ITS CSR ADDRESS? [D]:177404
HOW MANY DRIVES DOES IT HAVE? [D]:2

EXAMPLE SYSGEN

HOW MANY RP11-C/E DISK PACK CONTROLLERS DO YOU HAVE? [D]:1
 WHAT IS THE VECTOR ADDRESS OF THE NEXT RP11-C/E? [O]:254
 WHAT IS ITS CSR ADDRESS? [O]:176714
 HOW MANY DRIVES DOES IT HAVE? [D]:1
 IS THE NEXT DRIVE AN RPRO2? [Y/N]:N
 HOW MANY RJ/RWS03-04 FIXED HEAD DISK CONTROLLERS DO YOU HAVE? [D]:0
 HOW MANY TC11 DECTAPE CONTROLLERS DO YOU HAVE [D]:0
 HOW MANY RX11 FLEXIBLE DISK CONTROLLERS DO YOU HAVE? [D]:1
 WHAT IS THE VECTOR ADDRESS OF THE NEXT RX11? [O]:264
 WHAT IS ITS CSR ADDRESS? [O]:177170
 HOW MANY DRIVES DOES IT HAVE? [D]:2
 HOW MANY LP/LS/LV11 LINE PRINTERS DO YOU HAVE? [D]:1
 DO YOU WANT FAST PRINTER SUPPORT? [Y/N]:N
 WHAT IS THE VECTOR ADDRESS OF THE NEXT LP/LS/LV11? [O]:200
 WHAT IS ITS CSR ADDRESS? [O]:177514
 IS IT AN LS11 OR LP11-U/W? [Y/N]:Y
 HOW MANY LPS11 LABORATORY PERIPHERAL SYSTEMS DO YOU HAVE? [D]:0
 HOW MANY TJ/TWU16 MAGTAPE CONTROLLERS DO YOU HAVE? [D]:0
 HOW MANY TM/TMA11 MAGTAPE CONTROLLERS DO YOU HAVE? [D]:1
 WHAT IS THE VECTOR ADDRESS OF THE NEXT TM/TMA11? [O]:224
 WHAT IS ITS COMMAND REGISTER ADDRESS? [O]:172522
 HOW MANY DRIVES DOES IT HAVE? [D]:2
 HOW MANY PC11 PAPER TAPE READER/PUNCHES DO YOU HAVE? [D]:0
 HOW MANY PR11 PAPER TAPE READERS DO YOU HAVE (EXCLUDING PC11'S)? [D]:0
 HOW MANY DL11 LINE INTERFACES DO YOU HAVE (INCLUDING CONSOLE)? [D]:2
 WHAT IS THE VECTOR ADDRESS OF THE NEXT DL11? [O]:60
 WHAT IS ITS CSR ADDRESS? [O]:177560
 WHAT IS THE VECTOR ADDRESS OF THE NEXT DL11? [O]:310
 WHAT IS ITS CSR ADDRESS? [O]:176500
 HOW MANY DH11 ASYNCHRONOUS LINE MULTIPLEXERS DO YOU HAVE? [D]:0
 HOW MANY DJ11 ASYNCHRONOUS LINE MULTIPLEXERS DO YOU HAVE? [D]:0
 HOW MANY ICS/ICR-11 INDUSTRIAL SUBSYSTEMS DO YOU HAVE? [D]:1
 DO YOU WANT TASK ACTIVATION FROM UNSOLICITED INTERRUPTS? [Y/N]:YU\U
 WHAT IS THE VECTOR ADDRESS OF THE NEXT ICS/ICR-11? [O]:234
 WHAT IS ITS CSR ADDRESS? [O]:171776
 IS IT AN ICR-11? [Y/N]:Y
 HOW MANY A/D CONVERTOR MODULES DOES THIS SUBSYSTEM HAVE? [D]:2
 WHAT IS THE MODULE NUMBER OF THE NEXT A/D CONVERTOR? [D]:0
 HOW MANY EXPANSION MULTIPLEXERS ARE ASSOCIATED WITH IT? [D]:3
 WHAT IS THE MODULE NUMBER OF THE NEXT A/D CONVERTOR? [D]:7
 HOW MANY EXPANSION MULTIPLEXERS ARE ASSOCIATED WITH IT? [D]:0
 HOW MANY D/A CONVERTOR MODULES DOES THIS SUBSYSTEM HAVE? [D]:1
 WHAT IS THE MODULE NUMBER OF THE NEXT D/A CONVERTOR? [D]:6
 HOW MANY SINGLE-SHOT OUTPUT MODULES DOES THIS SUBSYSTEM HAVE? [D]:1
 WHAT IS THE MODULE NUMBER OF THE NEXT SINGLE-SHOT OUTPUT MODULE? [D]:9
 HOW MANY BI-STABLE OUTPUT MODULES DOES THIS SUBSYSTEM HAVE? [D]:1
 WHAT IS THE MODULE NUMBER OF THE NEXT BI-STABLE OUTPUT MODULE? [D]:10
 HOW MANY DIGITAL SENSE MODULES DOES THIS SUBSYSTEM HAVE? [D]:1
 WHAT IS THE MODULE NUMBER OF THE NEXT DIGITAL SENSE MODULE? [D]:5
 HOW MANY DIGITAL INTERRUPT MODULES DOES THIS SUBSYSTEM HAVE? [D]:1
 WHAT IS THE MODULE NUMBER OF THE NEXT DIGITAL INTERRUPT MODULE? [D]:4
 HOW MANY I/O COUNTER MODULES DOES THIS SUBSYSTEM HAVE? [D]:1
 WHAT IS THE MODULE NUMBER OF THE NEXT I/O COUNTER MODULE? [D]:8
 DO YOU WANT MODULE STATUS RESTORED ON POWER & ERROR RECOVERY? [Y/N]:Y
 HOW MANY SERIAL LINE ERRORS ARE ACCEPTABLE IN ONE SECOND? [D]:200
 HOW MANY UDC11 UNIVERSAL DIGITAL CONTROLLERS DO YOU HAVE? [D]:0
 HOW MANY DA11-B PARALLEL LINE INTERFACES DO YOU HAVE? [D]:0
 HOW MANY DL11-E ASYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:0
 HOW MANY DP11 SYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:0
 HOW MANY DQ11 SYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:0
 HOW MANY DU11 SYNCHRONOUS LINE INTERFACES DO YOU HAVE? [D]:0

END PERIPHERAL OPTIONS

EXAMPLE SYSGEN

```

***END SGN***
>
> AT THIS POINT WE RENAME THE ASSEMBLY COMMAND FILE
> AND THE SYSTEM BUILD COMMAND FILE TO
> [11,24]
>
>PIP [11,24]/RE=RSXASM.CMD;*,RSXBLD.CMD;*
>* DID YOU ANSWER THE SYSGEN QUESTIONS TO YOUR SATISFACTION? [Y/N]:Y
>* ARE YOU RUNNING AN RP02/03 OR RP04 AS THE SYSTEM DISK? [Y/N]:N
>* ARE YOU GENERATING ASSEMBLY LISTINGS ON DK1? [Y/N]:N
>
> NOW WE ASSEMBLE THE EXECUTIVE
>
>SET /UIC=[1,50]
>INS BIGMAC
>SET /UIC=[11,24]
>TIM
15:52:46 19-AUG-75
>MAC @RSXASM
>TIM
16:10:55 19-AUG-75
>
> NOW WE ASSEMBLE THE MODULES NECESSARY FOR TASKS TO ACCESS
> UDC11 OR ICS/ICR-11 I/O MODULE REGISTERS WITHIN THE I/O
> PAGE. I/O MODULE TYPES ACCESSED DIRECTLY ARE:
>
> UDC11:
>
> ANALOG OUTPUTS
> SINGLE SHOT DIGITAL OUTPUTS
> DIGITAL INPUTS
> COUNTER INPUTS
>
> ICS/ICR-11
>
> DIGITAL INPUT
> COUNTER INPUT
>
>* IS DIRECT ACCESS TO ICS/ICR I/O MODULES REQUIRED? [Y/N]:Y
>MAC [11,24]ICTAB.ICR,[11,34]ICTAB/-SP=[11,10]ICTAB
>MAC [11,24]ICOM.ICR,[11,34]ICOM/-SP=[11,10]RSXMC,ICOM
>REM ...MAC
>
> NOW WE BUILD THE CONCATENATED OBJECT MODULE FILE
> FOR THE EXECUTIVE.
>
>PIP RSX11M.OBS=*.OBJ
>PIP .OBJ/RE=RSX11M.OBS
>
> NOW WE COPY THE BUILD COMMAND FILE, THE ASSEMBLY PREFIX
> FILE, THE UDC OR ICS/ICR FILES AND THE CONCATENATED
> OBJECT MODULES TO SECONDARY STORAGE.
>
>* IS YOUR SECONDARY STORAGE DEVICE AN RK CARTRIDGE DISK? [Y/N]:Y
>
> PUT THE MAPPED OBJECT DISK IN DRIVE 1
> AND MAKE SURE THAT THE DRIVE IS WRITE ENABLED.
>
>* IS THE DISK IN DRIVE 1 READY? [Y/N]:Y
>MOU DK1:
>SET /UIC=[1,24]
>PIP DK1:/NV=[11,24]RSXBLD.CMD,RSX11M.OBJ
>PIP DK1:/NV=[11,24]ICOM.ICR,ICTAB.ICR
>PIP DK1:[200,200]/NV=[11,10]RSXMC.MAC
>DMD DK1:
>

```

EXAMPLE SYSGEN

```
REMAP.DK&IP -- DISMOUNT COMPLETE
>#
># DISMOUNT THE SYSTEM DISK AND MOUNT THE
># MAPPED OBJECT DISK
># IN DRIVE 0 AND BOOT IN THE SYSTEM ON THAT DISK
># WHEN THE SYSTEM IS UP, SET THE TIME AND DATE
># AND INITIATE THE INDIRECT COMMAND FILE
># [200,200]SYSGEN2.CMD . FOR EXAMPLE
>#
>#     >TIM 10:20 9/15/75
>#     >@SYSGEN2
>#
>SET /UIC=[200,200]
>@ <EOF>
>
```

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READER'S COMMENTS

NOTE: This form is for document comments only. Problems with software should be reported on a Software Problem Report (SPR) form

Did you find errors in this manual? If so, specify by page.

Did you find this manual understandable, usable, and well-organized? Please make suggestions for improvement.

Is there sufficient documentation on associated system programs required for use of the software described in this manual? If not, what material is missing and where should it be placed?

Please indicate the type of user/reader that you most nearly represent.

- Assembly language programmer
- Higher-level language programmer
- Occasional programmer (experienced)
- User with little programming experience
- Student programmer
- Non-programmer interested in computer concepts and capabilities

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