May 1979

This document describes the procedures used to generate a RSTS/E V7.0 system.

RSTS/E V7.0

System Generation Manual

Order No. AA-2669E-TC

OPERATING SYSTEM: RSTS/E 7.0

SOFTWARE VERSION: RSTS/E 7.0

To order additional copies of this document, contact the Software Distribution Center, Digital Equipment Corporation, Maynard, Massachusetts 01754

digital equipment corporation · maynard, massachusetts

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license, and may only be used or copied in accordance with the terms of such license.

No responsibility is assumed for the use or reliability of software on equipment that is not supplied by DIGITAL or its affiliated companies.

The postage-paid READER'S COMMENTS form on the last page of this document requests your critical evaluation to assist us in preparing future documentation.

The following are trademarks of Digital Equipment Corporation:

DEC	IAS
DECnet	MASSBUS
DECsystem-10	PDP
DECSYSTEM-20	RSTS
DECtape	RSX
DECUS	UNIBUS
DIBOL	VAX
DIGITAL	VMS
FOCAL	

Contents

Chapter 5 Tailoring the Target System

Chapter 6 Building System Library Files and Optional Software

Tables

Commercial Engineering Publications typeset this manual using DIGITAL's TMS-11 Text Management System.

833ALL

Preface

This manual describes the procedures used to generate and install the software components for RSTS/E V7.0, the PDP-11 Resource Sharing Time Sharing System/Extended.

The manual also presents information needed to install RSTS/E layered products software, to change system characteristics, to optimally arrange system components, and to correct hardware and software problems. The material is of interest to those at an installation who are responsible for hardware and software policy and procedure. Certain information is also of interest to field service engineers, software support representatives, and system managers who are responsible for solving operational problems and for maintaining published changes to system software.

Before attempting to generate a RSTS/E system, you should be familiar with the RSTS/E software, with the hardware on which RSTS/E will run, and with any published changes (patches) to system software. For more information on RSTS/E documentation for standard and optional software, consult the *RSTS/E Documentation Directory*. For information on hardware supplied with RSTS/E, consult the user documents that accompanied the system.

Procedures for generating and installing diagnostic and optional software are described in other manuals provided with that software.

Documentation Conventions

This manual uses the following symbology conventions.

- LF — The LF symbol indicates pressing the LINE FEED key.
- RET — The RET symbol indicates pressing the RETURN key.
- ESC — The ESC symbol indicates pressing the ESCAPE key (shown as ALT MODE on some terminals).
- CTRL/x — The CTRL/x symbol indicates holding down the CTRL key while typing the character "x". It is usually echoed as ^x. In this manual the letter "x" represents the capital letters C and Z (i.e., CTRL/C and CTRL/Z).

Color highlighting in examples indicates user input. Unless otherwise noted, user input is terminated by pressing the RET key.

Chapter 1
System Generation Overview

This chapter presents an overview of the RSTS/E V7.0 system generation process. The process begins when the person responsible for generating the system collects the software components required for system generation, and ends when the system is completely generated and installed, ready for general time-sharing usage.

The remaining sections in this chapter describe the structure of the System Generation Manual. Included are overviews of all chapters and appendices, some basic terms used throughout the manual, a flowchart of the system generation process and a summary of the steps you take to generate a RSTS/E system.

The step-by-step summary is included to make the system generation process easy to follow. Use this guide, along with the chapters detailing the 40 steps involved in the SYSGEN process, for a complete understanding of the RSTS/E V7.0 System Generation procedure.

1.1 Structure of the Manual

The remaining chapters describe in detail the steps you must take to generate a RSTS/E system. The 40 steps that you take to generate your system are illustrated in the System Generation Flowchart, Figure 1–1. The chapters are:

Chapter 2. Bootstrapping the Distribution Medium. Steps 1–2

The first steps in system generation are to collect the software you need, then use the hardware bootstrap loader to bootstrap the initialization code into memory from the RSTS/E distribution medium. Chapter 2 describes the distribution medium bootstrap procedures. DIGITAL distributes RSTS/E on 7-track magnetic tape (800 bpi), 9-track magnetic tape (800 and 1600 bpi), and RK05, RL01, RK06, and RK07 disk cartridge. The distribution media contain the initialization code, other programs, and data files needed to generate and tailor a RSTS/E system.

Chapter 3. Tailoring the SYSGEN System. Steps 3–11

After you bootstrap the distribution medium, you must use the initialization options to design the SYSGEN system for your installation. The SYSGEN system supports a minimal number of each standard RSTS/E device — four RK05 units, two units of each other disk type, two units of each type of magnetic tape, two keyboards (the console keyboard and one pseudo keyboard), one line printer, etc. During the tailoring procedure, you use options that perform the following functions:

1. Initialize RSTS/E disks (DSKINT option).
2. Copy SYSGEN system files from the distribution medium to the system disk (COPY option).
3. Correct the system code (PATCH option), if necessary.
4. Specify non-standard hardware configuration (HARDWR option), if necessary.
5. Install the SYSGEN monitor (INSTALL option).
6. Allocate system files for the SYSGEN system (REFRESH option).
7. Set system defaults (DEFAULT option).
8. Specify characteristics (SET option) of device units (e.g., line printer), if necessary.
9. Start the SYSGEN system (START option).

If the console terminal for your system is not a standard type, you may need to set its fill factor during generation before using any other option. Use the FILL option to do so. Refer to Section 3.15 for a description of the FILL option.

In addition to the listed options, the initialization code includes four other options, which enable you to bootstrap devices, load stand-alone programs, enable the console terminal, and use SAVE/RESTORE to back up a RSTS/E disk. These options are not generally required during the tailoring of a SYSGEN system; however, it is strongly recommended that you use the SAVE/RESTORE program to make a copy of the system disk that you create as a result of the system generation process.

Chapter 4. Generating the RSTS/E Target System. Steps 12–16

After tailoring and starting the SYSGEN system, your next step is to generate a Target system. The system generation process uses several programs that copy and edit files, ascertain the system configuration, assemble and link components of the RSTS/E Target Monitor. The distribution medium contains a program that copies the necessary files to the system generation disk and chains to another program, which asks the system configuration questions.

Answering the configuration questions involves declaring permanent settings in the RSTS/E Monitor code and BASIC–PLUS Run-Time System, and optionally patching the RSX Run-Time System if RSX or BASIC–PLUS–2 is to be the system default run-time system. These settings indicate the devices and optional software the system will support. Examples of configured elements include the device controllers in the RSTS/E Monitor and the mathematical functions in the BASIC–PLUS Run-Time System. The only way to change the configuration is to regenerate the system. Configuring a system is different from tailoring a system. When you tailor a RSTS/E system, you specify variable factors for the RSTS/E Monitor. You can change the tailored elements within their configured limits any time the initialization code is running.

After answering the configuration questions, the next step is to run a batch stream which generates and patches the Target monitor and BASIC–PLUS Run-Time System. Then the SYSGEN system is shut down.

Chapter 5. Tailoring the Target System. Steps 17–24

Your next step is to tailor the Target system as described in Chapter 5. Using the same initialization options that you used to tailor the SYSGEN system, you do the following:

1. Initialize, then copy RSTS/E files to disk (DSKINT and COPY option).
2. Specify the hardware configuration (HARDWR option), if necessary.
3. Install the Target monitor (INSTALL option).

4. Allocate the system files (REFRESH option).
5. Set system defaults (DEFAULT option).
6. Specify characteristics for device units (SET option), if necessary.
7. Start time sharing with the Target monitor (START option).

Chapter 6. Building System Library Files and Optional Software. Steps 25–40

DIGITAL supplies a library of system programs on the distribution kit. After tailoring the Target system, you can build the library. The build procedure copies the system programs to the system disk, then patches and compiles them. You can then use the library programs, if necessary, to build optional software packages, such as the FORTRAN IV and COBOL languages. You can also use the system library programs to produce files containing information for users and files containing commands to be issued at system start up. Next, create user accounts, then shut down the system. At this point you can change your run-time system to BASIC-PLUS-2 if you want it to be your system default run-time system. For your protection, now that you have generated your system, you should use the SAVE/RESTORE program to make a copy of your system disk. The final steps in the system generation process are to start time sharing, verify the system start-up control files, and store the distribution and recovery media. You can then make the RSTS/E system available for general use.

Chapter 7. Generating RSTS/E Software during Time Sharing.

You can generate additional RSTS/E Monitors, BASIC-PLUS Run-Time Systems, or both during time sharing using the RT11 Run-Time System. You need not use the SYSGEN monitor. After ensuring that all the system generation programs are on the system, you can run the SYSGEN.SAV program, which asks the configuration questions.

After you answer the configuration questions, you can use SYSBAT.SAV to process the batch file that generates the monitor and/or BASIC-PLUS Run-Time System. After the batch run terminates, you can shut down the system at a convenient time and use the initialization code to install the new monitor or make the new run-time system the system default or use the UTILTY program to add it as an auxiliary run-time system.

Appendix A. System Generation Error Messages.

Errors that may occur during system generation are listed in this appendix. The four tables of error messages are:

1. Initialization code error messages.
2. Recoverable RT11 Run-Time System Errors.

3. RT11 Run-Time System Fatal Execution Errors.
4. Batch Error Messages.

The tables include recovery procedures for each error.

Appendix B. Disk Device Sizes, System Module Sizes, and BASIC–PLUS Module Sizes.

The tables in this appendix list the Disk Device, System Module and BASIC–PLUS Module Sizes. Also included in Appendix B is a table of System Module and BASIC–PLUS Module Sizes in decimal words. Use this chart for determining approximate memory sizes of RSTS/E software modules.

Appendix C. Address and Vector Assignments

Several devices have so called "Floating Addresses". This means that the presence or absence of any floating address device will affect the assignment of addresses to other floating address devices. Similarly, many devices have "Floating Vectors". According to standards, interrupt vectors must be assigned in a specific sequence and the presence of one type of device will affect the correct assignment of interrupt vectors for other devices. Finally, there are many devices that have fixed addresses and vectors. This appendix presents the algorithms for assignment of floating addresses and vectors. It also lists the fixed assignments for devices supported by RSTS/E.

Appendix D. RSTS/E System Library Control Files.

This appendix lists and defines the programs associated with the five system library control files that are issued with the RSTS/E distribution kit. The programs are copied by the BUILD program from the distribution medium, compiled, and placed in the system library account, during system generation. Of the five, BUILD.CTL is the only system library control file that you must add to your system; all RSTS/E systems require the programs contained in BUILD.CTL. To incorporate the system libraries you follow the procedures in Chapter 6 – Building System Library Files and Optional Software.

Appendix E. System Generation Examples.

This section contains two sample generations from bootstrapping the distribution medium through creating the recovery medium using the SAVE/RESTORE program. The first example demonstrates the generation of RSTS/E on a system which has a small system configuration. For those with larger systems, the second example shows how a RSTS/E system is generated for systems with large configurations.

1.2 Terminology

Terms found during system generation are:

Distribution Media: This refers to the disks or magnetic tapes on which DIGITAL supplies the system.

SYSGEN Disk: Copy the SYSGEN files to this disk and then perform the system generation using this as the system disk. Every RSTS/E system has a system disk that contains the following elements:

- a RSTS/E file structure
- the system initialization code
- a monitor Save Image Library (SIL)
- a system default run-time system
- an error message file
- a swapping file
- auxiliary system files (optional)

Target disk: This is the disk on which the Target system is placed. At some installations, the Target disk and the SYSGEN disk are the same.

Default Run-Time Systems: RT11 is the default run-time system for the SYSGEN system. RSTS/E run-time system defaults may be BASIC–PLUS, RSX, or BASIC–PLUS–2 (BP2COM). RSTS/E requires that the system default run-time system be a keyboard monitor, so that it can prompt the user at the terminal and accept command strings.

Patching: If you have an autopatch kit, you can use it during the creation of your system libraries (Chapter 6) to enhance or correct program code. You can patch the monitor off-line using INIT.SYS or on-line using the ONLPAT program. To apply patches manually, you must refer to the *RSTS/E Release Notes* or issues of the *RSTS/E Software Dispatch*.

1.3 Summary of the System Generation Process

Figure 1–1 flowcharts the entire system generation process. The summary sheets following Figure 1–1 provide a concise reference to the steps you use to generate a RSTS/E system.

Figure 1-1: System Generation Flow Chart

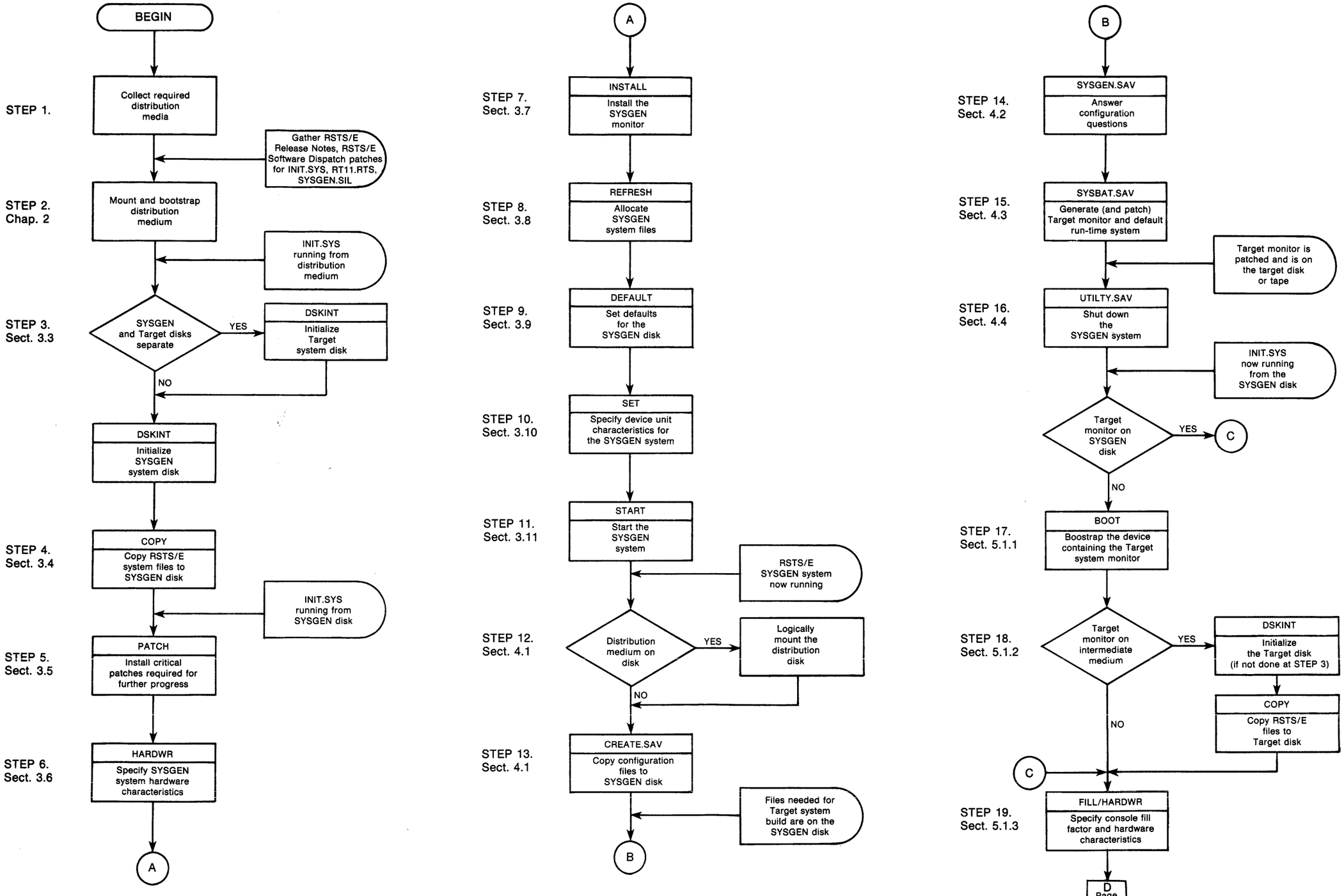
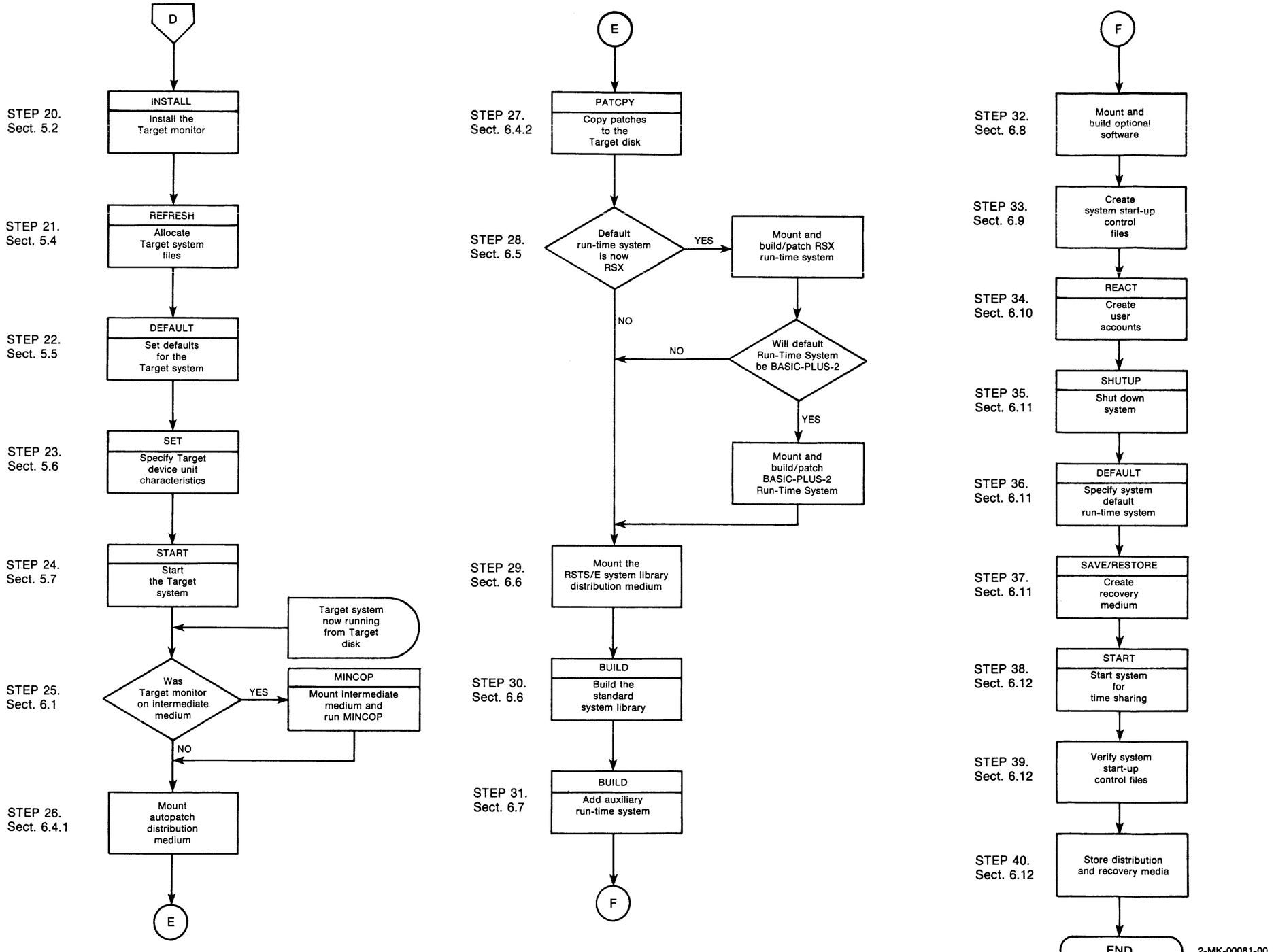


Figure 1-1: System Generation Flow Chart (Cont.)



Step 1. Collect Required Distribution Media

The RSTS/E System Generation Kit consists of the following disks and tapes:

Table 1-1: RSTS/E V7.0 System Generation Kits

DEC Order Number	Pack ID	Contents
7-Track Magnetic Tape Kit (800 bpi)		
AP-2772G-BC	____	System Generation
AP-2725G-BC	____	System Library I
AP-C726G-BC	____	System Library II
AP-C881B-BC	____	RSX Run-Time System and Library
AP-D047C-BC	____	RMS Run-Time System and Library
AP-H465A-BC	____	RSTS/E V7.0 Patch Kit "A"
9-Track Magnetic Tape Kit (800 bpi)		
AP-2773G-BC	____	System Generation
AP-2753G-BC	____	System Library I
AP-C725G-BC	____	System Library II
AP-C883B-BC	____	RSX Run-Time System and Library
AP-5226D-BC	____	RMS Run-Time System and Library
AP-H466A-BC	____	RSTS/E V7.0 Patch Kit "A"
9-Track Magnetic Tape Kit (1600 bpi)		
BB-H751G-BC	____	System Generation, System Library I, System Library II, RSX Run-Time System and Library
BB-H752G-BC	____	RMS Run-Time System and Library
BB-H753A-BC	____	RSTS/E V7.0 Patch Kit "A"
RK05 Disk Cartridge Kit		
AN-2771G-BC	SYSGNG	System Generation
AN-2751G-BC	SYSL1G	System Library I
AN-5444G-BC	SYSL2G	System Library II
AN-C885B-BC	RSXLBB	RSX Run-Time System and Library
AN-5227D-BC	RMSKIT	RMS Run-Time System and Library
AN-H467A-BC	PATCHA	RSTS/E V7.0 Patch Kit "A"
RK06 Disk Cartridge Kit		
AM-2774G-BC	SYSGNG	System Generation, RSX Run-Time System and Library
AM-5445G-BC	SYSL1G	System Library I, System Library II
AM-5228D-BC	RMSKIT	RMS Run-Time System and Library
AM-H468A-BC	PATCHA	RSTS/E V7.0 Patch Kit "A"
RK07 Disk Cartridge Kit		
AY-D526G-BC	SYSGNG	System Generation, System Library I, System Library II, RSX Run-Time System and Library
AY-D946C-BC	RMSKIT	RMS Run-Time System and Library
AY-H469A-BC	PATCHA	RSTS/E V7.0 Patch Kit "A"
RL01 Disk Cartridge Kit		
AX-D527G-BC	SYSGNG	System Generation, RSX Run-Time System and Library
AX-D528G-BC	SYSL1G	System Library I, System Library II
AX-D945C-BC	RMSKIT	RMS Run-Time System and Library
AX-H470A-BC	PATCHA	RSTS/E V7.0 Patch Kit "A"

Table 1-2: RSTS/E Optional Software Distribution Media

DEC Order Number	Pack ID	Distribution Media
DECNET/E V1.0		
AP-D424A-BC	——	7-Track Magnetic Tape
AP-C886A-BC	——	9-Track Magnetic Tape
AN-C887A-BC	DECNTA	RK05 Disk Cartridge
AM-C888A-BC	DECNTA	RK06 Disk Cartridge
AY-D742A-BC	DECNTA	RK07 Disk Cartridge
AX-D741A-BC	DECNTA	RL01 Disk Cartridge
DECNET/E V1.1		
AP-D424B-BC	——	7-Track Magnetic Tape
AP-C886B-BC	——	9-Track Magnetic Tape
AN-C887B-BC	DECNTB	RK05 Disk Cartridge
AM-C888B-BC	DECNTB	RK06 Disk Cartridge
AY-D742B-BC	DECNTB	RK07 Disk Cartridge
AX-D741B-BC	DECNTB	RL01 Disk Cartridge
RJ2780 V3.0		
AP-2635D-BC	——	7-Track Magnetic Tape
AP-2636D-BC	——	9-Track Magnetic Tape
AN-2633D-BC	ORCOAD	RK05 Disk Cartridge
AM-C729D-BC	ORCOAD	RK06 Disk Cartridge
AY-H340D-BC	ORCOAD	RK07 Disk Cartridge
AX-H339D-BC	ORCOAD	RL01 Disk Cartridge

Step 2. Mount and Bootstrap RSTS/E Distribution Medium

A. For magnetic tape distribution:

The operation of magnetic tape devices is described in the *RSTS/E System User's Guide*. To bootstrap the tape, proceed as follows:

- Mount the system generation tape on unit 0 with the write enable ring removed. See Table 1-1 for part numbers.

NOTE

The 9 track, 800 bpi magnetic tape bootstrap in the system initialization code will not use a TU16, TE16, TU45, or TU77 tape drive if a TU10, TE10, or TS03 drive is present. Therefore, if your system includes drives of both types (TU10/TE10/TS03 and TU16/TE16/TU45/TU77), bootstrap the 800 bpi distribution tape on the TU10, TE10, or TS03 drive. Similarly, the 1600 bpi magnetic tape bootstrap will not use a TU16, TE16, TU45 or TU77 tape drive if a tape is mounted and on-line on a TS04 drive.

- Ensure that the tape is at its load point. (The BOT indicator light comes on.) The computer does not bootstrap the device unless the tape is at its load point.

- Set the ON-LINE/OFF-LINE switch on the tape unit to ON-LINE and ensure that the RDY indicator is lit.
- Ensure that the console terminal is on-line.
- Follow the instructions in Chapter 2 for the type of hardware bootstrap device that is on the system.

B. For disk cartridge distribution:

To bootstrap the disk cartridge, proceed as follows:

- Insert the disk cartridge into a free unit. Part numbers are listed in Table 1–1.
- Ensure that the RDY light is on.
- Ensure that the WR PROT light is on.
- Ensure that the console terminal is on-line.
- Follow the instructions in Chapter 2 for the type of hardware bootstrap device that is on the system.

Step 3. Initialize SYSGEN (and Target) Disks

A. Follow this procedure to initialize the Target system disk if the following two conditions are true:

- You plan to use separate disks for the SYSGEN and Target systems.
- The Target system disk does not contain data that you need to preserve.

1. Physically mount the disk you plan to use as the Target system disk.
2. Use the DSKINT option to initialize the disk as a system disk. Note that initialization destroys any data on the disk. Table 1–3 summarizes the DSKINT option dialogue. Refer to Section 3.3 for complete information on the DSKINT option.
3. Dismount the newly initialized disk if you need the disk drive for the SYSGEN system disk.

B. Follow this procedure to initialize the SYSGEN system disk:

- Physically mount the disk that you will use as the SYSGEN system disk.
- Use the DSKINT option to initialize the disk as a system disk. Refer to Summary Table 1–3 or Section 3.3 for more information.

Table 1-3: Summary of DSKINT Option

Questions and Possible Responses
DD-MMM-YY? Current date. Press LINE FEED to accept the date printed.
HH:MM? Current time. Press LINE FEED to accept the time printed.
DISK? DF, DS, DK, DL, DM, DP, DR, DB
UNIT? 0–7 (asked for multi-unit controllers only). 0–3 for DL disks.
PLATTERS(n)? 1–8 for DF disks. Press LINE FEED to use the number in parentheses. (Asked for DF disks only.)
PACK ID? One to six alphanumeric characters.
PACK CLUSTER SIZE? 1, 2, 4, 8, or 16 for RF11, RS03, RS04, RK05, RL01, RL02, RK06, and RK07 disks. 2, 4, 8, or 16 for RP02 and RP03 disks. 4, 8, or 16 for RM02, RM03, RP04, and RP05 disks. 8 or 16 for RP06 disks.
SATT.SYS BASE? A number (in blocks) from 1 to the disk size minus 1. Press LINE FEED to let DSKINT place SATT.SYS near the center of the disk.
MFD PASSWORD? One to six alphanumeric characters.
MFD CLUSTER SIZE? A power of two not less than the pack cluster size and not greater than 16.
PRE-EXTEND DIRECTORIES? Y, N. Type Y to have DSKINT extend accounts [0,1], [1,1], and [1,2] to the maximum size when they are created.
PUB, PRI, OR SYS? PUB for a public disk. PRI for a private disk. SYS for a system disk.
CREATE LIBRARY ACCOUNT? Y, N. (N skips the next three questions.)
LIBRARY PASSWORD? One to six alphanumeric characters.
LIBRARY UFD CLUSTER SIZE? A power of two not less than the pack cluster size and not greater than 16. The library UFD cluster size must be at least 4 and normally is 16.
LIBRARY ACCOUNT BASE? A number (in blocks) from 1 to the disk size minus 1. Press LINE FEED to let DSKINT place the library near the center of the disk.

(continued on next page)

Table 1-3: Summary of DSKINT Option (Cont.)

Questions and Possible Responses
DATE LAST MODIFIED? Y, N. Type Y or press LINE FEED to retain in the disk directory the date on which files were last modified.
NEW FILES FIRST? Y, N. Type N or press LINE FEED to place new files at the end of the directory for the account in which they were created. DIGITAL recommends this response.
USE PREVIOUS BAD BLOCK INFO? Y, N. Type Y or press LINE FEED to have the new bad block file created using information from the existing bad block file. DIGITAL recommends this response.
FORMAT? Y, N. Type Y to write hardware timing and sense data on the disk.
PATTERNS? 1–8. Append X to specify up to eight of your own patterns in addition to the standard patterns.
YOUR PATTERN? An octal word from 1 to 177777. Press LINE FEED to indicate no more patterns. (Asked only if you appended X to the previous response.)
PROCEED (Y or N)? Y, N

Step 4. Copy System Files to SYSGEN Disk

Use the COPY option to copy RSTS/E system files from the distribution medium to the SYSGEN system disk. After COPY transfers these files, the initialization code automatically bootstraps from the disk that now contains the RSTS/E files. Summary Table 1–4 contains questions and appropriate responses for the use of COPY. For further information on the COPY option, refer to Section 3.4.

Table 1-4: Summary of COPY Option

Questions and Possible Responses
DD-MMM-YY? Current date. Press LINE FEED to accept the date printed.
HH:MM? Current time. Press LINE FEED to accept the time printed.
TO WHICH DISK? DF, DS, DK, DL, DM, DP, DR, DB
UNIT? 0–7 (asked for multi-unit controllers only). 0–3 for DL disks.

Step 5. Install Patches Required for Further Progress

a. Gather the *RSTS/E Release Notes*, issues of the *RSTS/E Software Dispatch*, and any other published patches your system requires.

b. Apply manually those patches to INIT.SYS (the initialization code), the SYSGEN monitor, and the RT11 Run-Time System that are identified in the *RSTS/E Release Notes* or issues of the *RSTS/E Software Dispatch* as critical and indicate that they must be applied before starting the SYSGEN system. Follow the instructions in the published patches for patching the system initialization code, SYSGEN monitor, and the RT11 Run-Time System. Refer to Section 3.5 for further information on the PATCH option.

c. If the instructions in the published patch direct you to reboot the system after applying the patch, use the BOOT option (described in Section 3.12) to do so.

Step 6. Specify SYSGEN System Hardware Characteristics

Follow this procedure if one or both of the following conditions are true:

- You are installing new hardware and need to ascertain the configuration. (Usually, DIGITAL Field Service personnel do this.)
- At system installation, a DIGITAL Field Service representative had to make changes to the hardware configuration, and these changes must also be applied to the configuration tables you are now generating.

Use the HARDWR option to check the hardware configuration. For new hardware, list the hardware configuration and correct it if necessary. If you are regenerating an existing system, make any changes necessary for this system. Summary Table 1–5 contains information on the HARDWR option and its suboptions. For complete information, refer to Section 3.6.

Table 1–5: Summary of HARDWR Option

Suboption	Questions and Possible Responses
	HARDWR SUBOPTION? LI[ST] DI[SABLE] EN[ABLE] CS[R] VE[CTOR] DM TU[58] UN[ITS] RE[SET] EX[IT] CTRL/C. You can abbreviate the suboption names to their first 2 characters. EXIT applies any pending changes and CTRL/C does not. Both suboptions return you to the OPTION: prompt. Any questions that you invoke by specifying a particular suboption are listed and explained under the related suboption heading.
LIST	The LIST suboption does not ask questions.
DISABLE	CONTROLLER TO DISABLE? Controller name. Type ? for a list of controller names.

(continued on next page)

Table 1-5: Summary of HARDWR Option (Cont.)

Suboption	Questions and Possible Responses
ENABLE	CONTROLLER TO ENABLE? Controller name. Type ? for a list of controller names.
CSR	CONTROLLER WITH NON-STANDARD ADDRESS? Controller name. Type ? for a list of controller names. NEW CONTROLLER ADDRESS? Type an even octal address greater than 160000. Type RE to remove a non-standard address. Type CTRL/Z to return to the HARDWR SUBOPTION question without specifying a new address.
VECTOR	CONTROLLER WITH NON-STANDARD VECTOR? Controller name. Type ? for a list of controller names. NEW VECTOR ADDRESS? Type an even octal address from 0 to 774. Type RE to remove a non-standard vector. Type CTRL/Z to return to HARDWR SUBOPTION? without specifying a new vector.
DM	DH FOR DMn (xxx)? Type the DH11 unit number. Press LINE FEED to accept the current setting of xxx. Type CTRL/Z to return to the HARDWR SUBOPTION question.
TU58	DL FOR DDn (xxx)? Type the DL11 unit number. Press LINE FEED to accept the current setting of xxx. Type CTRL/Z to return to the HARDWR SUBOPTION question.
UNITS	Specify the type of disk that will be brought on-line later. DISK TO SET UNITS FOR? Type DS, DK, DL, DM, DP, DR, DB. UNIT? 0–7 (asked for multi-unit controllers only). 0–3 for DL disks. TYPE OF THIS UNIT? Type name of disk, e.g., RK06. Press LINE FEED to specify the type of disk currently on that unit. Type REMOVE to let the initialization code disable the unit whenever it is not found. DUAL-PORTED? Y, N. Asked only for DR or DB disks. INTERLEAVED? Y, N. Asked only for DS disks.
RESET	The RESET suboption does not ask questions.
HERTZ	NEW AC LINE HERTZ? Type 50 or 60.
SWITCH	SWITCH REGISTER? Type ENABLE, DISABLE, or VOLATILE.

Step 7. Install the SYSGEN Monitor

Use the INSTALL option to install the SYSGEN monitor. Type SYSGEN in response to the question SIL? Refer to Section 3.7 for further information on the INSTALL option.

Step 8. Allocate SYSGEN System Files

Use the REFRESH option to allocate the necessary files. Summary Table 1–6 contains questions and possible responses for this use of REFRESH. Refer to Section 3.8 for further information on REFRESH.

Table 1–6: Summary of REFRESH Option

Suboption	Questions and Possible Responses
	DD-MMM-YY? Current date. Press LINE FEED to accept the date printed. HH:MM? Current time. Press LINE FEED to accept the time printed. DISK? DF, DS, DK, DL, DM, DP, DR, DB. Press the LINE FEED key to REFRESH the system disk. UNIT? 0–7 (asked for multi-unit controllers only). 0–3 for DL disks. CLEAN? Y to clean the disk. N or LINE FEED to omit the cleaning operation. REFRESH SUBOPTION? LIST, CHANGE, FILE, or BADS. Any questions that you invoke by specifying a particular suboption are listed and explained under the related suboption heading. Type EXIT or press LINE FEED to return to the OPTION: prompt.
LIST	The LIST suboption does not ask questions.
CHANGE	filnam.ext CHANGES? Y, N. Type CTRL/Z to return to the REFRESH SUBOPTION question. Asked for the following files, in this order: SWAP.SYS, SWAP0.SYS, SWAP1.SYS, SWAP3.SYS, OVR.SYS, ERR.SYS, BUFF.SYS, and CRASH.SYS. If you answer Y to FILNAM.EXT CHANGES? for any file, the CHANGE suboption asks the DELETE, SIZE, and BASE questions for that file. After you have answered the FILNAM.EXT CHANGES question for each of the listed files, the suboption asks the OTHER FILES question. DELETE? Y, N (Asked only if the file exists.) Type CTRL/Z to return to FILNAM.EXT CHANGES? for the current file.

(continued on next page)

Table 1-6: Summary of REFRESH Option (Cont.)

Suboption	Questions and Possible Responses
CHANGE (cont.)	SIZE? A decimal number of blocks. For the SYSGEN system, the size of SWAP.SYS must be at least 224 blocks. Type CTRL/Z to return to FILNAM.EXT CHANGES? for the current file. For some files, such as OVR.SYS, ERR.SYS, BUFF.SYS, and CRASH.SYS, pressing LINE FEED sets an appropriate default size. BASE? The decimal number of the logical block at which you prefer to place the first block of the file. Type 0 to place the file at the first available space on the disk. For an existing file, type OLD or press LINE FEED to retain the file at its current starting location, or the next available space if unable to place it at its current location. When creating a new file, type OLD or press LINE FEED to place the file at the first available space on the disk (same as typing 0). Type CTRL/Z to return to the FILNAM.EXT CHANGES question for the current file. OTHER FILES? Type a filename and extension to change another file in account [0,1]. The suboption then asks the DELETE, SIZE and BASE questions. Type N or press LINE FEED to omit changes to other files.
FILE	FILE NAME? Filename and extension FILE EXISTS, DELETE IT? Y, N. Type CTRL/Z to return to the FILE NAME question. SIZE? A decimal number of blocks. Type CTRL/Z to return to the FILE NAME question. BASE? The decimal number of the logical block at which you prefer to place the first block of the file. Type 0 to place the file at the first available space on the disk. For an existing file, type OLD or press LINE FEED to retain the file at its current starting location, or the next available space if unable to place it at its current location. When creating a new file, type OLD or press LINE FEED to place the file at the first available space on the disk (same as typing 0). Type CTRL/Z to return to the FILE NAME question. DELETABLE? Y, N. Press LINE FEED for no change. Type CTRL/Z to return to the FILE NAME question.
BADS	BADS? Type LIST for a list of bad blocks in the bad block file. Type ADD to add bad blocks to the bad block file. Type EXIT or press LINE FEED to return to the REFRESH SUBOPTION question. BLOCK NUMBER? (Asked only if you answered ADD to the BADS question.) Type a logical block number (in decimal) between 1 and the disk size minus 1. REALLY ADD LOGICAL BLOCK nn TO BADB.SYS? Y, N

Step 9. Set Defaults for the SYSGEN System

Use the DEFAULT option to set system defaults. Summary Table 1–7 contains the questions and appropriate responses for use of the DEFAULT option for the SYSGEN system. Refer to Section 3.9 for further information on the DEFAULT option.

Table 1–7: Summary of DEFAULT Option

Questions	Possible Responses
JOB MAX OR SWAP MAX CHANGES?	Y
NEW JOB MAX?	2
NEW SWAP MAX?	28
RUN-TIME SYSTEM?	RT11
ERROR MESSAGE FILE?	ERR
INSTALLATION NAME?	1–15 printable characters including spaces.
ANY MEMORY ALLOCATION CHANGES?	Y, N
TABLE SUBOPTION?	LI[ST], PA[RITY], RE[SET], LO[CK], UN[LOCK], RT[S], XB[UF], MA[P]. You can abbreviate the suboption names to their first 2 characters. Type EXIT or press LINE FEED to proceed to the CRASH DUMP question.
CACHE CLUSTER SIZE <n>?	1, 2, 4, or 8. The size in blocks of one cache cluster. Press LINE FEED to accept the default value indicated by n.
CRASH DUMP?	Y, N
MAGTAPE LABELLING DEFAULT?	DOS
PREFERRED CLOCK?	P, L. Specify either Programmable Real-Time Clock or Line-Time Clock depending on system configuration.
INTERRUPT FREQUENCY?	50–100 (multiple of 50). Asked only if you answer P to the previous question.
DATE FORMAT?	ALPHABETIC or NUMERIC
TIME FORMAT?	AM/PM or 24-HOUR
POWER FAIL DELAY?	1 to 300

Step 10. Specify Device Unit Characteristics for the SYSGEN System

Use the SET option to specify configuration characteristics for the SYSGEN monitor. Summary Table 1–8 contains the questions and possible responses for the SET option. Refer to Section 3.10 for further information on the SET option.

Table 1-8: Summary of SET Option

Suboption	Questions and Possible Responses
	SET OPTION? LIST, MODEM, LOCAL, LP, DISABLE, ENABLE, PRIV, UNPRIV. Any questions that you invoke by specifying a particular suboption are listed and explained under the related suboption heading. Type EXIT or press LINE FEED to return to the OPTION: prompt.
LIST	DEVICE? Type a device name, device name and unit number, device name and two unit numbers for a range of devices (for example, KB1-6). Press LINE FEED to list all devices.
MODEM and LOCAL	KB? Type a decimal number between 0 and the highest numbered keyboard or a range of decimal keyboard numbers.
LP	UNIT? Decimal unit number. Not asked if only one is configured.
	TYPE (xx)? LP, LV, LS, or LA180, or a list of characteristics. Press LINE FEED to accept the setting in parentheses. Press RETURN to print the characteristics associated with LP, LV, LS, and LA180.
	WIDTH (n)? Type a decimal number between 1 and 254 or press LINE FEED to accept the setting in parentheses. Common widths are 80 and 132 characters.
	LOWER CASE (x)? Y, N. Press LINE FEED to accept the setting in parentheses.
ENABLE	DEVICE? Type a device name or a device name followed by unit number. Type ALL to enable all devices.
	UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to enable all units of a device. This question is not asked if you specify a unit number in response to the previous question.
DISABLE	DEVICE? Type a device name or device name followed by a unit number.
	UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to disable all units of a device. This question is not asked if you specify a unit number in response to the previous question.
PRIV	DEVICE? Type a device name or device name followed by a unit number.
	UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to restrict access to all units of the device.
UNPRIV	DEVICE? Type a device name or device name followed by a unit number. Type ALL to allow access to all devices.
	UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to allow access to all units of the device.

Step 11. Start the SYSGEN System

Use the START option to start the SYSGEN system. To invoke the option, type START or ST. Refer to Section 3.11 for information on start-up messages and errors. The SYSGEN system is configured for many devices that may not exist on your computer. Therefore, the initialization code disables the non-existent devices when it starts the system.

If your distribution medium is magnetic tape, proceed to Step 13. Otherwise, logically mount your disk distribution medium as described in Step 12.

Step 12. Logically Mount the Distribution Disk

Mount your distribution medium on a free unit and ensure that it is write-locked. If your distribution medium is disk cartridge, type the following command to logically mount the disk:

```
.MOUNT dev:SYSGNG/RO
```

where dev is the device name and unit number on which the distribution disk cartridge is physically mounted. There is no need to logically mount a magnetic tape distribution medium.

Step 13. Copy Configuration Files to SYSGEN Disk

Run the CREATE.SAV program, which includes a batch stream that transfers the SYSGEN program and several other programs to the system disk. Type the following command after the dot (.) prompt is printed on your terminal:

```
.R dev:CREATE.SAV
```

Substitute for dev the name of the distribution medium (MT, MS, MM, DK, DL, or DM) and the unit number on which it is mounted.

Step 14. Answer System Configuration Questions

The SYSGEN program automatically suggests answers to the configuration questions by printing a response (RES) in one of the three forms in Table 1–9.

Table 1–9: Automatic Answer Formats

Answer	Reason
RES	The program has ascertained that RES is the correct answer.
#RES#	The program assumes that RES is the correct answer.
#??#	The program does not know and cannot guess the correct answer.

Answer the configuration questions, referring to Sections 4.2 if necessary. Table 1–10 lists the possible responses to the configuration questions. Table 1–11 summarizes the short form questions.

Table 1–10: Possible Responses to Configuration Questions

Response	Meaning
<string>	<string> is the correct answer.
(RET)	Print the long, explanatory form of the question.
(LF)	Accept the automatic answer for the question. Not valid if the automatic answer is #??#.
(ESC)	Return to the preceding question or to the first question in this sequence.

Table 1–11: Summary of Short Form Configuration Questions

Questions and Possible Responses
FORM? S, L. Answer S for short form or L for long form. Since you can always see the long form of the question by pressing RETURN, typing S is usually the best response.
SAME SYSTEM? Y, N. Answer Y if you are generating a system for the current machine.
DISTRIBUTION MEDIUM? MT, MS, MM, DK, DL, DM, SY. Specify the distribution medium type. If you are regenerating on-line, specify SY to use system generation files already on the system disk. (If the system generation files are already on the system disk, they would only be there if you specified N to the DELETE FILES question.)
OUTPUT MEDIUM? DF, DK, DL, DM, DP, DR, DB, MT, MS, MM, SY. Answer SY if the SYSGEN disk will be the Target disk. Otherwise, answer one of the disk types to specify what kind of disk the Target system will be written to, unless you have only one unit of that type and you are already using it as the SYSGEN disk. In that case specify one of the magnetic tape types for output of the Target system. You can later (in steps 17 and 18) copy the Target system files to the final disk.
PACK ID? Pack ID specified when output disk was initialized.

(continued on next page)

Table 1-11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
DELETE FILES? Y, N. Answer Y to delete SYSGEN system files from the SYSGEN disk after use. If you type N, you will be able to perform an on-line system generation, using SY: as your distribution medium. Type Y and some of the files needed to perform an on-line system generation will be deleted. You will then not be able to perform an on-line generation unless you again mount the distribution medium.
LP FOR SYSGEN? Y, N. Answer Y if you want maps printed during the system generation process. If the answer to this question is N and the answer to DELETE FILES? is Y, the maps are not deleted.
GENERATE MONITOR? Y, N. If N, the next question is GENERATE BASIC-PLUS?
MONITOR NAME? 1 to 6 alphanumeric characters. The RSTS/E Monitor Save Image Library (SIL) file has the extension .SIL. Do not type the name of a SIL that is already on the Target disk.
ASSEMBLY LISTINGS? Y, N. Asked only if the answer to LP FOR SYSGEN? is Y. The automatic answer is Y if the answer to DELETE FILES? is Y.
MONITOR PATCHING? Y, N. If answer is N, next three questions are skipped.
PATCH FILE MEDIUM? DK, DL, DM, DP, DR, DB, MT, MS, MM, SY. Specify distribution medium or device type where the patch files are contained.
PACK ID? Pack ID of patch file disk. Asked only when PATCH FILE MEDIUM is disk.
PATCH FILE NAME? File specification. Default is: $MONITR.CMD.
GENERATE BASIC-PLUS? Y, N. If you answer N, the next question is RSX AS DEFAULT RTS.
BASIC-PLUS RTS NAME? 1 to 6 alphanumeric characters. BASIC-PLUS Run-Time System file has the extension .RTS. Do not type the name of a run-time system that is already on the Target disk.
BASIC-PLUS PATCHING? Y, N. If answer is N, next three questions are skipped.

(continued on next page)

Table 1–11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
PATCH FILE MEDIUM? DF, DS, DK, DL, DM, DP, DR, DB, MT, MS, MM, SY. Specify distribution medium or device type where the patch files are contained.
PACK ID? Pack ID of patch file disk. Asked only when PATCH FILE MEDIUM is disk.
PATCH FILE NAME? File specification. Default is: $BASIC.CMD.
RSX AS DEFAULT RTS? Y, N. If N, the next question is KL11, LC11, DL11A, DL11B'S. Type Y if you want RSX or BASIC–PLUS–2 (BP2COM) as system default run-time system.
RSX PATCHING? Y, N. If you answer N, the next three questions are skipped.
PATCH FILE MEDIUM? DK, DL, DM, DP, DR, DB, MT, MS, MM, or SY. Specify distribution medium or device type where patch files are contained.
PACK ID? Pack ID of patch file disk. Asked only when PATCH FILE MEDIUM is disk.
PATCH FILE NAME? File specification. Default is $RSXRTS.CMD.
KL11, LC11, DL11A, DL11B'S? 1 to 16. Include the console terminal in your count.
DL11C, DL11D'S 0 to 31. Do not inlcude DL11's used to interface TU58 DECtape II controllers.
DC11'S? 0 to 32
DL11E'S? 0 to 31. After this question, SYSGEN returns to the KL11, LC11, DL11A, DL11B'S question if you have configured any combination of DL11C, DL11D, or DL11E interfaces that total more than 31.
DJ11'S 0 to 16. If you answer 0, the next question is DH11'S.
DJ11 UNIT xx LINES ENABLED? 0 to 16. SYSGEN repeats this question for each DJ11 unit configured.

(continued on next page)

Table 1-11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
DH11'S? 0 to 16. If you answer 0, the next question is DZ11'S.
DH11 UNIT xx LINES ENABLED? 0 to 16. SYSGEN repeats this question for each DH11 unit configured.
DATASET SUPPORT FOR DH11'S? Y, N
DZ11'S 0 to 16. If you answer 0, the next question is PSEUDO KEYBOARDS.
DZ11 UNIT xx LINES ENABLED? 0 to 8. SYSGEN repeats this question for each DZ11 unit configured.
DATASET SUPPORT FOR DZ11'S? Y, N
PSEUDO KEYBOARDS? 1 to 127. If you have configured more than 128 terminals (including the console terminal and pseudo keyboards), SYSGEN returns to the KL11, LC11, DL11A, DL11B'S question.
2741 SUPPORT? Y, N. Asked only if you configured one or more DL11D, DL11E, DC11, DH11, or DZ11 interfaces. If you answer N, SYSGEN goes to the MULTI-TERMINAL SERVICE question.
SINGLE LINE 2741 SUPPORT? Y, N. Asked only if you configured DL11D, DL11E, or DC11 interfaces.
2741 SUPPORT ON DH'S? Y, N. Asked only if you configured one or more DH11'S.
2741 SUPPORT ON DZ'S? Y, N. Asked only if you configured one or more DZ11'S.
2741 CODES(S)? CORR, EBCD, SBCD, C360. Any combination of the four codes is legal.
MULTI-TERMINAL SERVICE? Y, N
ECHO CONTROL? Y, N
ONE-LINE STATUS REPORT? Y, N. Type Y to include "Mini-SYSTAT" option. The current job state can then be displayed during time sharing by typing CTRL/T.
RF/RS11'S? Y, N

(continued on next page)

Table 1-11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
RS03/RS04'S? 0 to 8
RK05'S? 0 to 8. If the controller exists, the automatic answer is 8. If the answer is 0 or 1, SYSGEN skips the next question. Remember to count RK05F disks as two RK05 units.
OVERLAPPED SEEK? Y, N. Type Y to use the overlapped seek driver to increase the efficiency of disk I/O at the expense of some memory.
RL01/RL02'S? 0 to 4. If you answer 0 or 1, SYSGEN skips the next question.
OVERLAPPED SEEK? Y, N. Type Y to use the overlapped seek driver to increase the efficiency of disk I/O at the expense of some memory.
RK06/RK07'S 0 to 8. If you answer 0 or 1, SYSGEN skips the next question.
OVERLAPPED SEEK? Y, N. Type Y to use the overlapped seek driver to increase the efficiency of disk I/O at the expense of some memory.
RP02/RP03'S? 0 to 8. If the controller exists, the automatic answer is 8. If you answer 0 or 1, SYSGEN skips the next question.
OVERLAPPED SEEK? Y, N. Type Y to use the overlapped seek driver to increase the efficiency of disk I/O at the expense of some memory.
RM02/RM03'S 0 to 8. If you answer 0 or 1, SYSGEN skips the next question.
OVERLAPPED SEEK? Y, N. Type Y to use the overlapped seek driver to increase the efficiency of disk I/O at the expense of some memory.
RP04/RP05/RP06'S? 0 to 8. If you answer 0 or 1, SYSGEN skips the next question.
OVERLAPPED SEEK? Y, N. Type Y to use the overlapped seek driver to increase the efficiency of disk I/O at the expense of some memory.
TU16/TE16/TU45/TU77'S? 0 to 8. If the controller exists, the automatic answer is 8.

(continued on next page)

Table 1-11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
TU10/TE10/TS03'S? 0 to 8. If the controller exists, the automatic answer is 8.
TS04'S 0 to 8
DECTAPES? 0 to 8. If the controller exists, the automatic answer is 8.
TU58'S 0 to 8. If the controller exists, the automatic answer is 8.
PRINTERS? 0 to 8
RX01/RX02'S 0 to 8. If a controller exists, the automatic answer is 8.
CR11/CM11 CARD READER? Y, N
CD11 CARD READER? Y, N
CARD DECODE? 029, 026, 1401, ANSI. SYSGEN skips this question if you answered N to the two previous questions.
P.T. READER? Y, N
P.T. PUNCH? Y, N
DMC11'S? 0 to 8. If you answer 0, SYSGEN skips the next six questions.
DECNET NETWORK SUPPORT? Y, N. If you answer N, SYSGEN skips the next two questions.
DECNET/E DISTRIBUTION MEDIUM? MT, MS, MM, DK, DL, DM, SY. Indicate /A after device name to specify DECnet/E V1.0; otherwise, DECnet/E V1.1 is assumed.
DECNET/E PATCHING? Y, N. SYSGEN skips the next three questions if you answer N to this question.
PATCH FILE MEDIUM? DF, DS, DK, DL, DM, DP, DR, DB, MT, MS, MM, SY. Specify distribution medium or device type where patch files are contained.

(continued on next page)

Table 1-11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
PACK ID? Pack ID of patch file disk. Asked only when patch file medium is disk.
PATCH FILE NAME? File Specification. Default is: $DECNTB.CMD or $DECNTA if you specified /A to the DISTRIBUTION MEDIUM question.
KMC11's 0–16. If 0, the next two questions are skipped.
KMC IBM PROTOCOL SUPPORT? Y, N. If you answer N, the next question is skipped.
SIMULTANEOUS LINKS? 0 to 16. Asked only if you typed Y to the KMC IBM PROTOCOL question. Each KMC11 can control one DUP11 synchronous line interface to the 3271 host. Specify the number of simultaneous KMC/3271 links you want.
EXTENDED BUFFERING FOR LP? Y, N. Asked only if you answered 1 or more to the PRINTERS question.
2780 SUPPORT? Y, N. If you answer N, SYSGEN skips the next five questions. Answer Y if you are using the RSTS/2780 software.
2780 INTERFACE? DP, DU, DUP
2780 DISTRIBUTION MEDIUM? MT, MS, MM, DK, DL, DM, SY
2780 PATCHING? Y, N. If you answer N, SYSGEN skips the next two questions.
PATCH FILE MEDIUM? DF, DS, DK, DL, DM, DP, DR, DB, MT, MS, MM, SY. Specify distribution medium or device type where patch files are contained.
PATCH FILE NAME? File specification. Default is: $RJ2780.CMD.
LARGE FILES Y, N. Answer Y if you want support of files larger than 65535 blocks.
MAXIMUM JOBS? 1 to 63
SMALL BUFFERS? 30 to 999. The automatic answer is 9 times the configured job maximum plus 80, but no more than 500.

(continued on next page)

Table 1-11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
SYSTEM WIDE LOGICALS? 5 to 50
MONITOR STATISTICS? Y, N. Answer Y to include the Monitor Statistics Code.
FIP BUFFERING? Y, N. Type Y to generate directory caching for your system. If you answer N, SYSGEN skips the next question.
EXTENDED DATA BUFFERING? Y, N. Answer Y to allow data files to be placed in the system's data buffer (cache).
DISK DRIVER PHASE? Y, N. Answer Y to put disk drivers into a separate phase of the monitor.
RESIDENT LIBRARIES? Y, N. Answer Y to support resident libraries, such as RMS.
RSX DIRECTIVES? Y, N. Type Y to include monitor emulation of RSX directives, which are required for support of the RMS Resident Libraries.
RESIDENT DISK HANDLING? Y, N
RESIDENT SEND/RECEIVE? Y, N. If DECnet/E is included this question is skipped.
RESIDENT SIMPLE SYS CALLS? Y, N
RESIDENT FILE DELETE/RENAME? Y, N
RESIDENT LOGIN/ATTACH/ATTRIBUTE? Y, N
RESIDENT CATALOG/LOOKUP? Y, N
The remaining questions are asked only when you are generating BASIC-PLUS.
FPP? Y, N. If you answer Y, SYSGEN skips the next question.
FIS? Y, N

(continued on next page)

Table 1-11: Summary of Short Form Configuration Questions (Cont.)

Questions and Possible Responses
MATH PRECISION? 2, 4 LOG FUNCTIONS? Y, N TRIG FUNCTIONS? Y, N PRINT USING? Y, N MATRICES? Y, N STRING ARITHMETIC? Y, N

Step 15. Generate (and Patch) Target Monitor and Default Run-Time System

A. Type the following command to start the execution of the batch process:

```
.R SYSBAT
```

B. When the batch processor asks you to mount a disk or tape, or to enable a line printer, do so. Answer its UNIT question by typing the unit number on which you mounted the disk or tape or the unit number of the line printer you enabled. Only line printer unit 0 is legal, and only units 0 and 1 of magnetic tapes and disks are legal, except that DK units 0–3 are legal.

A control file (SYSGEN.CTL) was created as a result of your responses to the configuration dialogue questions that are described in Table 1–11. SYSBAT is a batch processor that will now process this control file and subsequently print a log of the batch stream on your terminal.

Step 16. Shut Down the SYSGEN System

Run the UTILTY program and issue the NO LOGINS and SHUTUP commands, as follows:

```
.R UTILTY.SAV
*NO LOGINS
*SHUTUP
```

The shutdown procedure automatically loads and bootstraps the system initialization code from the current system device. Remove the distribution medium and store it in a safe place.

Step 17. Bootstrap the Device Containing the Target System Monitor

Follow this procedure only if the batch stream wrote the Target system monitor on a device other than the SYSGEN system disk.

Use the BOOT initialization option to bootstrap the initialization code from the device containing the Target system monitor. Respond to the BOOT option prompt as follows:

```
BOOT DEVICE: xxn
```

Substitute the two character mnemonic of the device that contains the Target monitor for xx and the unit number on which it is mounted for n.

Step 18. Initialize, then Copy Files to Target Disk

Follow this procedure only if the batch stream wrote the Target system monitor on a magnetic tape or on a disk (intermediate Target medium) that is different from the Target system disk (final Target disk) and you bootstrapped it as described in step 17.

A. If you have not already initialized the Target system disk, use the DSKINT option now to do so. Summary Table 1–12 contains the DSKINT question and possible responses. Refer to Section 3.3 for further information on DSKINT.

B. Use the COPY option to copy the Target system files from the intermediate Target tape or disk to the final Target system disk. Summary Table 1–13 contains the COPY option questions and possible responses.

   To copy all run-time systems from the system tape or disk to the Target system disk you must type: dev/A in reponse to the COPY option question: TO WHICH DISK?

Table 1–12: Summary of DSKINT Option

Questions and Possible Responses
DD-MMM-YY? Current date. Press LINE FEED to accept the date printed.
HH:MM? Current time. Press LINE FEED to accept the time printed.
DISK? DF, DS, DK, DL, DM, DP, DR, DB
UNIT? 0–7 (asked for multi-unit controllers only). 0–3 for DL disks.
PLATTERS(n)? 1–8 for DF disks. Press LINE FEED to use the number in parentheses. (Asked for DF disk only.)

(continued on next page)

Table 1–12: Summary of DSKINT Option (Cont.)

Questions and Possible Responses
PACK ID? One to six alphanumeric characters. PACK CLUSTER SIZE? 1, 2, 4, 8, or 16 for RF11,RS03, RS04, RK05, RL01, RL02, RK06, and RK07 disks. 2, 4, 8, or 16 for RP02 and RP03 disks. 4, 8, or 16 for RM02, RM03, RP04 and RP05 disks. 8 or 16 for RP06 disks. SATT.SYS BASE? A number (in blocks) from 1 to the disk size minus 1. Press LINE FEED to let DSKINT place SATT.SYS near the center of the disk. MFD PASSWORD? One to six alphanumeric characters. MFD CLUSTER SIZE? A power of two not less than the pack cluster size and not greater than 16. PRE-EXTEND DIRECTORIES? Y, N. Type Y to have DSKINT extend accounts [0,1], [1,1], and [1,2] to their maximum size when they are created. PUB, PRI, OR SYS? PUB for public disk. PRI for private disk. SYS for system disk. CREATE LIBRARY ACCOUNT? Y, N. (N skips the next three questions.) LIBRARY PASSWORD? One to six alphanumeric characters. LIBRARY UFD CLUSTER SIZE? A power of two not less than the pack cluster size and not greater than 16. The library UFD cluster size must be at least 4 and is normally 16. LIBRARY ACCOUNT BASE? A number (in blocks) from 1 to the disk size minus 1. Press LINE FEED to let DSKINT place the library near the center of the disk. DATE LAST MODIFIED? Y, N. Type Y or press LINE FEED to retain in the disk directory the data on which files were last modified. NEW FILES FIRST? Y, N. Type N or press LINE FEED to place new files at the end of the directory for the account in which they were created. DIGITAL recommends this response.

(continued on next page)

Table 1-12: Summary of DSKINT Option (Cont.)

Questions and Possible Responses
FORMAT? Y, N. Type Y to write hardware timing and sense data on the disk. PATTERNS? 1-8. Append X to specify up to eight of your own patterns in addition to the standard patterns. YOUR PATTERN? An octal word from 1 to 177777. Press LINE FEED to indicate no more patterns. (Asked only if you appended X to the previous response.) PROCEED (Y or N)? Y, N

Table 1-13: Summary of COPY Option

Questions and Possible Responses
DD-MMM-YY? Current date. Press LINE FEED to accept the date printed. HH:MM? Current time. Press LINE FEED to accept the time printed. TO WHICH DISK? DF, DS, DK, DL, DM, DP, DR, DB UNIT? 0-7 (asked for multi-unit controllers only). 0-3 for DL disks.

Step 19. Specify Console Fill Factor and Hardware Characteristics for Target Disk

Follow the procedures in this step only if the batch stream wrote the Target system monitor on a device other than the SYSGEN system disk.

A. If necessary, use the FILL option to set the console terminal fill characteristics. Summary Table 1-14 contains the possible fill characteristics. Refer to Section 3.15 for further information on the FILL option.

B. If the DIGITAL field service engineer who installed your system informed you of any necessary hardware controller changes, use the HARDWR option to make those changes. Summary Table 1-15 contains the HARDWR option questions and possible responses. Refer to Section 3.6 for further information on the HARDWR option.

Table 1-14: Recommended Console Terminal Fill Characteristics

Fill Characteristic	Terminal
0	ASR33, KSR33, VT05, LA30, VT50, VT52, LA36, VT100, LA120, LA34, LA38
1	ASR35, KSR35
3	VT05B
LA30S	LA30S

Table 1-15: Summary of HARDWR Option

Suboption	Questions and Possible Responses
	HARDWR SUBOPTION? LI[ST], DI[SABLE], EN[ABLE], CS[R], VE[CTOR], TU[58], DM, UN[ITS], RE[SET], EX[IT], CTRL/C. You can abbreviate the names to their first 2 characters. EXIT applies all pending changes and CTRL/C does not; both return you to the OPTION: prompt. Any questions that you invoke by specifying a particular suboption are listed and explained under the related suboption heading.
LIST	The LIST Suboption does not ask questions.
DISABLE	CONTROLLER TO DISABLE? Controller name. Type ? for a list of controller names.
ENABLE	CONTROLLER TO ENABLE? Controller name. Type ? for a list of controller names.
CSR	CONTROLLER WITH NON-STANDARD ADDRESS? Controller name. Type ? for a list of controller names. NEW CONTROLLER ADDRESS? Type an even octal address greater than 160000. Type REMOVE to remove a non-standard address. Type CTRL/Z to return to HARDWR SUBOPTION? without specifying a new address.
VECTOR	CONTROLLER WITH NON-STANDARD VECTOR? Controller name. Type ? for a list of controller names. NEW VECTOR ADDRESS? Type an even octal address from 0 to 774. Type REMOVE to remove a non-standard vector. Type CTRL/Z to return to HARDWR SUBOPTION? without specifying a new vector.
DM	DH FOR DMn (xxx)? Type the DH11 unit number. Press LINE FEED to accept the current setting of xxx. Type CTRL/Z to return to the HARDWR SUBOPTION question.
TU58	DL FOR DDn (xxx)? Type the DL11 unit number. Press LINE FEED to accept the current setting of xxx. Type CTRL/Z to return to the HARDWR SUBOPTION question.

(continued on next page)

Table 1-15: Summary of HARDWR Option (Cont.)

Suboption	Questions and Possible Responses
UNITS	Specify the type of disk that will be brought on-line later. DISK TO SET UNITS FOR? Type DS, DK, DL, DM, DP, DR, DB. UNIT? Type 0–7 (asked for multi-unit controllers only). 0–3 for DL disks. TYPE OF THIS UNIT? Type name of disk, e.g., RK06. Press LINE FEED to specify the type of disk currently on that unit. DUAL-PORTED? Y, N. Asked only for DR or DB disks. INTERLEAVED? Y, N. Asked only for DS disks.
RESET	RESET does not ask questions.
HERTZ	NEW AC LINE HERTZ? Type 50 or 60.
SWITCH	SWITCH REGISTER? Type ENABLE, DISABLE, or VOLATILE.

Step 20. Install the Target Monitor

Use the INSTALL option to install the Target monitor. In response to the SIL question, type the name you specified to the MONITOR NAME configuration question. Refer to Section 3.7 for further information on the INSTALL option.

Step 21. Allocate Target System Files

Use the REFRESH option to ensure that system files are correctly allocated. If the SYSGEN and Target disks are the same, you may need only to list the file status table to be sure of the allocation. If the batch process wrote the Target system on another device, you must now allocate and position all files on the Target system. Summary Table 1–16 contains the REFRESH option questions and responses. Refer to Section 3.8 for further information on the REFRESH option.

Table 1-16: Summary of REFRESH Option

Suboption	Questions and Possible Responses
	DD-MMM-YY? Current date. Press LINE FEED to accept the date printed. HH:MM? Current time. Press LINE FEED to accept the time printed. DISK? DF, DS, DK, DL, DM, DP, DR, or DB. Press LINE FEED to REFRESH the system disk.

(continued on next page)

Table 1-16: Summary of REFRESH Option (Cont.)

Suboption	Questions and Possible Responses
	UNIT? 0–7 (asked for multi-unit controllers only). 0–3 for DL disks. CLEAN? Y to clean the disk. Type N or press LINE FEED to omit the cleaning operation. REFRESH SUBOPTION? LI[ST], CH[ANGE], FI[LE], or BA[DS]. Type EXIT or press LINE FEED to return to the OPTION: prompt.
LIST	The LIST suboption does not ask questions.
CHANGE	filnam.ext CHANGES? Y, N. Type CTRL/Z to return to the REFRESH SUBOPTION question. Asked for the following files, in this order: SWAP.SYS, SWAP0.SYS, SWAP1.SYS, SWAP3.SYS, OVR.SYS, ERR.SYS, BUFF.SYS, and CRASH.SYS. If you answer Y to FILNAM.EXT CHANGES? for any file, the CHANGE suboption asks the DELETE, SIZE, and BASE, questions for that file. After you have answered the FILNAM.EXT CHANGES queston for each of the listed files, the suboption asks the OTHER FILES question. DELETE? Y, N. (Asked only if the file exists.) Type CTRL/Z to return to FILNAM.EXT CHANGES? for the current file. SIZE? A decimal number of blocks. Type CTRL/Z to return to FILNAM.EXT CHANGES? for the current file. BASE? The decimal number of the logical block at which you prefer to place the first block of the file. Type 0 to place the file at the first available space on the disk. For an existing file, type OLD or press LINE FEED to retain the file at its current starting location, or the next available space if unable to place it at its current location. When creating a new file, type OLD or press LINE FEED to place the file at the first available space on the disk (same as typing 0). Type CTRL/Z to return to the FILNAM.EXT CHANGES question for the current file. OTHER FILES? Type a filename and extension to change another file in account [0,1]. The suboption then asks the DELETE, SIZE, and BASE questions. Type N or press LINE FEED to omit changes to other files.
FILE	FILE NAME? Filename and extension. FILE EXISTS, DELETE IT? Y, N. Type CTRL/Z to return to the FILE NAME question. SIZE? A decimal number of blocks. Type CTRL/Z to return to the FILE NAME question.

Table 1-16: Summary of REFRESH Option (Cont.)

Suboption	Questions and Possible Responses
FILE (cont.)	BASE? The decimal number of the logical block at which you prefer to place the first block of the file. Type 0 to place the file at the first available space on the disk. For an existing file, type OLD or press LINE FEED to retain the file at its current starting location, or the next available space if unable to place it at its current location. When creating a new file, type OLD or press LINE FEED to place the file at the first available space on the disk (same as typing 0).Type CTRL/Z to return to the FILE NAME question. DELETABLE? Y, N. Press LINE FEED for no change. Type CTRL/Z to return to the FILE NAME question.
BADS	BADS? Type LIST for a list of bad blocks in the bad block file. Type ADD to add bad blocks to the bad block file. Type EXIT or press LINE FEED to return to the REFRESH SUBOPTION question. BLOCK NUMBER? (Asked only if you answered ADD to the BADS question.) Type a logical block number (in decimal) between 1 and the disk size minus 1. REALLY ADD LOGICAL BLOCKnn TO BADB.SYS? Y, N

Step 22. Set Defaults for the Target System

Use the DEFAULT option to set defaults for the new monitor. Summary Table 1-17 contains DEFAULT option questions and responses. Refer to Section 3.9 for further information on the DEFAULT option.

Table 1-17: Summary of DEFAULT Option

Suboption	Questions and Possible Responses
	JOB MAX OR SWAP MAX CHANGES? Y, N NEW JOB MAX? Decimal number from 1 to configured job maximum. NEW SWAP MAX? 8 to 31. Allocate at least 16K words. RUN-TIME SYSTEM? Name of the run-time system that you prefer as the system default. ERROR MESSAGE FILE? Name of the error message file that you prefer as the system default. INSTALLATION NAME? 1-15 printable characters including spaces.

(continued on next page)

Table 1-17: Summary of DEFAULT Option (Cont.)

Suboption	Questions and Possible Responses
	ANY MEMORY ALLOCATION CHANGES? Y, N TABLE SUBOPTION? LI[ST], PA[RITY], RE[SET], LO[CK], UN[LOCK], RT[S], XB[UF], MA[P]. You can abbreviate the suboption names to their first 2 characters. Type EXIT or press LINE FEED to proceed to the CRASH.DUMP question. Any questions that you may invoke by specifying a particular suboption are listed and explained under the related suboption heading.
LIST, PARITY, and RESET	These suboptions do not ask any questions.
LOCK	LOCK ADDRESS IS? Address or range of addresses.*
UNLOCK	UNLOCK ADDRESS IS? Address or range of addresses.*
RTS	NEW RUN TIME SYSTEM ADDRESS IS? Starting address.*
XBUF	EXTENDED BUFFER SPACE ADDRESS RANGE IS? Address or range of adresses.*
MAP	SIZE OF MAPPED XBUF(N)K? Zero to size of XBUF in K words. CACHE CLUSTER SIZE <n> 1, 2, 4, or 8. The size in blocks of one cache cluster. Press LINE FEED to accept the default value indicated by n. CRASH DUMP? Y, N MAGTAPE LABELLING DEFAULT? If the distribution medium is magnetic tape, type DOS. If the distribution medium is disk, type DOS or ANSI. PREFERRED CLOCK? P, L. Specify either Programmable Real-Time Clock or Line-Time Clock depending on system configuration. INTERRUPT FREQUENCY? 50–1000 (multiple of 50). Asked only if you answer P to the previous question. DATE FORMAT? ALPHABETIC or NUMERIC. TIME FORMAT? AM/PM or 24-HOUR. POWER FAIL DELAY? 1 to 300

*An address typed in response to these questions can be expressed either as an absolute octal address or as a decimal integer followed by the letter K. To specify a range of addresses, type two addresses in either format, separated by a hyphen, or an address, a plus sign, and decimal size in K words. Legal addresses are, for example, 00577777, 21K, 00130000–00137777, 18K+6, and 18K–23K.

Step 23. Specify Target Device Unit Characteristics

Use the SET option to set modem control for keyboards, enable and disable device units, establish line printer characteristics, and set device assignment privileges. Summary Table 1–18 contains SET option questions and possible responses. Refer to Section 3.10 for further information on the SET option.

Table 1–18: Summary of SET Option

Suboption	Questions and Possible Responses
	SET SUBOPTION? LI[ST], MO[DEM], LO[CAL], LP, DI[SABLE], EN[ABLE], PR[IV], UN[PRIV]. You can abbreviate the suboption names to their first 2 characters. Type EXIT or press LINE FEED to return to the OPTION: prompt.
LIST	DEVICE? Type a device name, device name and unit number, device name, and two unit numbers for a range of devices (for example, KB1–6). Press LINE FEED to list all devices.
MODEM and LOCAL	KB? Type a decimal number between 0 and the highest numbered keyboard or a range of decimal keyboard numbers.
LP	UNIT? Decimal unit number. Not asked if only one is present.
	TYPE (xx)? LP, LV, LS, or LA180 or a list of characteristics. Press LINE FEED to accept the setting in parentheses. Press RETURN to print the characteristics associated with LP, LV, LS, and LA180.
	WIDTH(n)? Type a decimal number between 1 and 254 or press LINE FEED to accept the setting in parentheses. Common widths are 80 and 132 columns.
	LOWER CASE (x)? Y, N. Press LINE FEED to accept the setting in parentheses.
ENABLE	DEVICE? Type a device name or a device name followed by unit number. Type ALL to enable all devices.
	UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to enable all units of a device. This question is not asked if you specify a unit number in response to the previous question.
DISABLE	DEVICE? Type a device name or device name followed by a unit number.
	UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to disable all units of a device. This question is not asked if you specify a unit number in response to the previous question.

(continued on next page)

Table 1-18: Summary of SET Option (Cont.)

Suboption	Questions and Possible Responses
PRIV	DEVICE? Type a device name or device name followed by a unit number. UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to restrict access to all units of the device.
UNPRIV	DEVICE? Type a device name or device name followed by a unit number. Type ALL to allow access to all devices. UNIT? Type a unit number in decimal or two unit numbers separated by a hyphen. Type ALL to allow access to all units of the device.

Step 24. Start the Target System

Use the START option to start time sharing. The START option asks several of the DEFAULT option questions. When you answer these questions, you can override the defaults for the current time-sharing session. These questions are summarized with the DEFAULT questions in Table 1-19. Refer to Section 3.11 for further information on the START option.

Table 1-19: Summary of DEFAULT Option

Suboption	Questions and Possible Responses
	JOB MAX OR SWAP MAX CHANGES? Y, N. If you answer NO, the next two questions are skipped. NEW JOB MAX? Decimal number from 1 to the configured job maximum. NEW SWAP MAX? 8 to 31. Specify at least 16K words; however, if you included RSX monitor emulation during the configuration dialogue, then you should specify 31K words. RUN-TIME SYSTEM? Name of the run-time system that you prefer as the system default. ERROR MESSAGE FILE? Name of the error message file that you prefer as the system default. INSTALLATION NAME? 1-15 alphanumeric characters including spaces. ANY MEMORY ALLOCATION CHANGES? Y, N. If you answer N, the next question is CRASH DUMP. TABLE SUBOPTION? LI[ST], PA[RITY], RE[SET], LO[CK], UN[LOCK], RT[S], XB[UF], MA[P]. You can abbreviate the suboption names to their first 2 characters. Type EXIT or press LINE FEED to proceed to the CRASH DUMP question.

(continued on next page)

Table 1-19: Summary of DEFAULT Option (Cont.)

Suboption	Questions and Possible Responses
LIST, PARITY, and RESET	This suboption does not ask any questions.
LOCK	LOCK ADDRESS IS? Address or range of addresses.*
UNLOCK	UNLOCK ADDRESS IS? Address or range of addresses.*
RTS	NEW RUN TIME SYSTEM ADDRESS IS? Starting address.*
XBUF	EXTENDED BUFFER SPACE ADDRESS RANGE IS? Address or range of adresses.*
MAP	SIZE OF MAPPED XBUF(N)K? Zero to size of XBUF in K words. CACHE CLUSTER SIZE <n>? 1, 2, 4, or 8. The size in blocks of one cache cluster. Press LINE FEED to accept the default value indicated by n. CRASH DUMP? Y, N MAGTAPE LABELLING DEFAULT? Type DOS or ANSI. PREFERRED CLOCK? P, L DATE FORMAT? ALPHABETIC or NUMERIC. TIME FORMAT? AM/PM or 24-HOUR. POWER FAIL DELAY? 1 to 300

*An address typed in response to any of these questions can be expressed either as an absolute octal address or as a decimal integer followed by the letter K. To name a range of addresses, type two addresses in the specified format, separated by a hyphen, or an address, a plus sign, and decimal size in K words. Legal addresses are, for example, 00577777, 21K, 00130000-00137777, 18K+6, and 18K-23K.

Step 25. Transfer Files to Target Disk

You may have decided earlier in the system generation procedure to place the Target system on an intermediate disk or magnetic tape. This means you generated the Target system on a medium that you planned not to be your final Target system medium. There are times when it is advantageous to generate the Target system onto magnetic tape or a small disk (RK05), then transfer it to your final Target medium, often a larger disk. Follow these procedures only if you created an intermediate Target system on disk or magnetic tape. You must now transfer the information to the final Target medium.

Step 25A. Mount the Intermediate Target Medium.

1. If the Target medium is magnetic tape, mount it and go to Step 25B.
2. If the Target medium is disk, physically mount, then logically mount the disk using the following command:

```
MOUNT dev:packid/RO
```

   where dev is the device name and unit number of the intermediate Target disk. Go to Step 25B.

Step 25B. Run the MINCOP Program.

Type RUN dev:$MINCOP, then press RETURN. MINCOP begins to transfer the files and prints copy messages on the console terminal to indicate the successful completion of each copy procedure.

Step 26. Mount Autopatch Distribution Medium

Refer to Section 6.4.

Step 27. Copy Patches to Target Disk's Public Structure

Refer to Section 6.4.

Follow this procedure if the autppatch distribution medium is tape or disk that will not be mounted during the BUILD procedure.

Step 28. BUILD and PATCH System Default Run-Time System

Follow this procedure if the default run-time system is not BASIC-PLUS.

A. Mount, build, and patch RSX.RTS.

B. If the default run-time system will be BASIC-PLUS-2, then mount, build, and patch BASIC-PLUS-2. If not, proceed to Step 29.

Refer to Section 6.5.

Step 29. Mount the System Library Distribution Medium

A. For magnetic tape distribution:

   Ensure that the write enable ring is removed.

   Mount the magnetic tape on a free unit.

   Ensure that the BOT and FILE PROT indicators are lit.

   Set the ON-LINE/OFF-LINE switch to ON-LINE. Ensure that the READY light comes on.

B. For disk cartridge distribution:

Mount the disk cartridge on a free unit.

Move the LOAD/RUN switch (on the RK05) or the STOP/RUN switch (on the RK06 and RK07) on the drive to the RUN position; press the LOAD switch to the in position for RL01's.

Ensure that the READY indicator comes on.

Ensure that the WR PROT indicator is lit.

Type the following command, replacing dev with the device name and unit number of the disk:

```
MOUNT dev:SYSL1G/RO
```

```
MOUNT dev: SYSGNG/RO
```
(for RK07 distribution only)

Refer to Section 6.6.

Step 30. BUILD and PATCH RSTS/E System Library

Refer to Section 6.6.

Step 31. Add Auxiliary Run-Time Systems and Patch Them

Refer to Section 6.7.

Step 32. Build and Patch Optional Software.

Refer to Section 6.8.

Step 33. Create System Message and Start-Up Control Files

Refer to Section 6.9.

Step 34. Create User Accounts

Refer to Section 6.10.

Step 35. Shut Down Target System

Refer to Section 6.11.

Step 36. Specify System Default Run-Time System.

Refer to Section 6.11.

Step 37. Create Recovery Medium.

Refer to Section 6.11

Step 38. Start System for Time Sharing

Refer to Section 6.12.

Step 39. Verify System Start-Up Control Files.

Refer to Section 6.12.

Step 40. Store Distribution and Recovery Media.

Refer to Section 6.12.

Chapter 2
Bootstrapping the Distribution Medium

The distribution medium is the tape or disk on which DIGITAL supplies the RSTS/E system. To bootstrap the distribution medium, use the switches on the Central Processing Unit (CPU) to initiate a hardware loader that contains machine instructions for reading the first record of the distribution medium into memory. This record, called a bootstrap record, is a program that loads additional program code from the distribution medium into memory and executes that code. The code then prints a message on the console terminal marking the successful completion of the bootstrap procedure. For example:

```
Enabling only console, disks, and tapes.
RSTS V7.0 (MT0)
Option:
```

For the bootstrap operation to succeed, the distribution medium must be on-line and ready; the medium accessed must contain a proper bootstrap record; the console terminal must be on-line. The following two sections describe the bootstrap procedures for each of the distribution media. Section 2.3 details hardware bootstrap procedures.

2.1 Bootstrapping Magnetic Tape Distribution

The operation of the magnetic tape devices is described in the *RSTS/E System User's Guide*. To bootstrap the magnetic tape, proceed as follows:

Physically mount the system generation tape on unit 0 with the write enable ring removed.

NOTE

The 9 track, 800 bpi magnetic tape bootstrap in the system initialization code will not use a TU16, TE16, TU45, or TU77 tape drive if a TU10, TE10, or TS03 drive is present. Therefore, if your system includes drives of both types (TU10/TE10/TS03 and TU16/TE16/TU45/TU77), bootstrap the 800 bpi distribution tape on the TU10, TE10, or TS03 drive. Similarly, the 1600 bpi magnetic tape bootstrap will not use a TU16, TE16, TU45 or TU77 tape drive if a tape is mounted and on-line on a TS04 drive.

Ensure that the tape is at its load point. (The BOT indicator light comes on.) The computer does not bootstrap the device unless the tape is at its load point.

Set the ON-LINE/OFF-LINE switch on the tape unit to ON-LINE and ensure that the RDY indicator is lit.

Ensure that the console terminal is on-line.

Follow the bootstrap instructions in Section 2.3 for the type of hardware bootstrap device that is on the system.

2.2 Bootstrapping Disk Distribution

To bootstrap the disk cartridge, proceed as follows:

Insert the disk cartridge in a free unit.

Ensure that the RDY light is on.

Ensure that the WR PROT light is on.

Ensure that the console terminal is on-line.

Follow the instructions in Section 2.3 for the type of hardware bootstrap device that is on the system.

2.3 Hardware Bootstrap Procedures

Bootstrapping a device involves using the Central Processor Unit (CPU) console switches to access and initiate a hardware loader. The hardware loader contains machine instructions for reading a special record from the device.

The record, called a bootstrap record, is transferred into memory and executes a specially designed software program. For the bootstrap operation to succeed, the device accessed must be on-line and ready; the medium accessed must contain a proper bootstrap record; and the console terminal must be on-line.

The PDP-11 console switches and their use are described in the Processor Handbook. The bootstrap procedure that you should use depends upon the type of hardware bootstrap device on the system. Table 2–1 summarizes the addresses needed to bootstrap each device. The detailed procedures to bootstrap a device are presented according to the types of hardware bootstrap devices available.

Table 2–1: Summary of Hardware Bootstrap Addresses

	Bootstrap Type								
Device to Bootstrap	**BM873-YA**	**BM873-YB***	**MR11-DB**	**BM792-YB**	**M9301-YA**	**M9301-YB**	**M9301-YC**	**M9301-YF**	**M9312**
RF11 Disk	773000	773136	773100	777462					
RS03/RS04 Disk					DS	DS	100	DS	DS
RK05 disk cartridge Unit 0	773010	773030	773110	777406	DK	DK	30	DK	DK
RP02 or RP03 disk pack unit 0	773100	773350	773154	776716	DP	DP	40	DP	DP
RP04, RP05, or RP06 disk pack unit 0		773320				DB	70	DB	DB
RK05 disk (unit n)		773032			DKn	DKn	30+n	DKn	DKn
RL01/RL02 disk (unit n)									DLn
RK06 disk (unit n)								DMn	DMn
RK07 disk (unit n)									DMn
RP02 or RP03 disk pack (unit n)		773352			DPn	DPn	40+n	DPn	DPn
RP04, RP05, RP06, RM02, RM03, or disk (unit n)		773322				DBn	70+n	DBn	DBn
TU10/TE10 and TS03 magnetic tape	773050	773110	773136	**	MT	MT	10	MT	MTn
TU16/TE16/TU45/ TU77 magnetic tape		773150				MM	60	MM	MMn
TS04 magnetic tape									MSn

* To bootstrap a nonzero disk unit, set the address in the Switch Register, press the LOAD ADRS switch, set the unit number in the Switch Register, and press the START switch.
** To bootstrap a TU10/TE10 or TS03 magnetic tape, use the loading routine described in Section 2.3.11.

2.3.1 BM873–YA Procedure

If the BM873–YA Restart/Loader is on the system, perform the following steps.

Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.

Set the CPU Switch Register to one of the following values.

773000 for RF11 disk
773010 for RK05 Disk Cartridge
773100 for RP02 or RP03 disk pack
773050 for TU10/TE10/TS03 magnetic tape

Press the CPU LOAD ADRS switch.

Press the CPU START switch.

2.3.2 BM873–YB Procedure

If the BM873–YB Restart/Loader is on the system, perform the following steps.

Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.

Set the CPU Switch Register to one of the following values.

773136 for RF11 disk
773030 for RK05 disk cartridge
773350 for RP02 or RP03 disk pack
773320 for RP04, RP05, RP06, RM02, or RM03 disk pack
773032 for RK05 disk unit specified in the Switch Register
773352 for RP02 or RP03 disk unit specified in the Switch Register
773322 for RP04, RP05, RP06, RM02, or RM03 disk unit specified in Switch Register
773110 for TU10/TE10/TS03 magnetic tape
773150 for TU16/TE16/TU45/TU77 magnetic tape

Press the CPU LOAD ADRS switch.

If necessary, set the CPU Switch Register to the unit number of the disk drive being bootstrapped.

Press the CPU START switch.

2.3.3 H324 Pushbutton Panel Procedure

If the system includes the H324 Pushbutton Panel option for the BM873 Restart/Loader, perform the following steps.

Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.

While holding down the UNLOCK switch, press the appropriate switch to bootstrap the desired device. The DIGITAL field service engineer who installed the computer should have informed you of the device that each switch bootstraps.

Press the CPU START switch.

2.3.4 MR11-DB Procedure

If the MR11-DB Bulk Storage Loader is on the system, perform the following steps.

Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.

Set the CPU Switch Register to one of the following values.

773100 for RF11 disk
773110 for RK05 disk cartridge
773154 for RP03 disk pack
773136 for TU10/TE10/TS03 magnetic tape

Press the CPU LOAD ADRS switch.

Press the CPU START switch.

2.3.5 BM792-YB Procedure

If the BM792-YB Hardware Loader is on the system, perform the following steps.

Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.

Set the CPU Switch Register to 773100.

Press the CPU LOAD ADRS switch.

Set the CPU Switch Register to one of the following values.

777462 for RF11 disk
777406 for RK05 disk cartridge
776716 for RP03 disk pack

Press the CPU START switch.

2.3.6 M9301-YA and M9301-YB Procedures

If the M9301-YA or M9301-YB Bootstrap Terminator is on the system, perform the following steps.

While holding down the CTRL switch, press the BOOT switch on the front of the computer.

The bootstrap prints the contents (in octal) of registers R0, R4, and the Stack Pointer, and the Program Counter at the console terminal. It then prints a prompting $ character.

In response to the $ character, type the 2-character device code and the unit number of the device to be bootstrapped. Terminate your response by pressing RETURN. Table 2-2 describes the device codes.

Table 2-2: Device Codes for M9301-YA and M9301-YB Bootstraps

Device	Code
TU10/TE10/TS03 magnetic tape	MT
*TU16/TE16/TU45/TU77 magnetic tape	MM
RK05 Disk Cartridge	DK
RP02/RP03 Disk Pack	DP
*RP04/RP05/RP06/RM02/RM03 Disk Pack	DB
*RS03/RS04 Fixed Head Disk	DS
*M9301-YB Bootstrap Terminator only.	

2.3.7 M9301-YC Procedure

If the M9301-YC bootstrap is on the system, perform the following steps.

Move the CPU ENABLE/HALT switch to its HALT position and back to its ENABLE position.

Set the start address of 17765000 in the console switches.

Press the CPU LOAD ADDR switch.

Set the device unit number in switches 0 through 2.

Set the device code for the device to be bootstrapped in switches 3 through 6. Table 2-3 lists the device codes.

Table 2-3: Device Codes for M9301-YC Bootstrap

Device	Code
TU10/TE10/TS03 Magnetic Tape	1
RK05 Disk Cartridge	3
RP02/RP03 Disk Pack	4
TU16/TE16/TU45/TU77 Magnetic Tape	6
RP04/RP05/RP06/RM02/RM03 Disk Pack	7
RS03/RS04 Fixed Head Disk	10

Ensure that switches 7 through 21 are off (down).

Press the CPU START switch.

NOTE

Before the M9301-YC boostrap actually bootstraps the system, it performs CPU tests, instruction and addressing tests, and memory and cache tests. If a hardware failure is detected, the diagnostic program halts. The lights contain the ROM address of the halt. If this occurs, call the DIGITAL field service engineer.

It may, however, be possible to continue with the bootstrap operation if the lights contain the address 1773764, which indicates a cache failure. To continue in this case, press CONT. This is the ONLY case in which it is possible to continue bootstrapping after the diagnostic program detects an error.

2.3.8 M9301-YF Procedure

If the M9301-YF Bootstrap Terminator is on the system, perform the following steps.

While holding down the CTRL switch, press the BOOT switch on the front of the computer.

The bootstrap prints the contents (in octal) of registers R0, R4, the Stack Pointer, and R5 at the console terminal. It then prints a prompting $ character.

In response to the $ character, type the 2-character device code and the unit number of the device to be bootstrapped. Terminate your response by pressing RETURN. Table 2-4 lists the device codes.

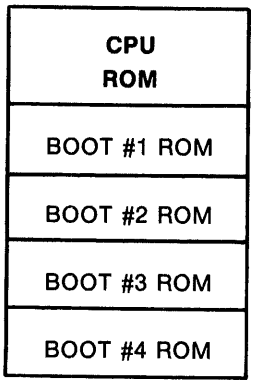
Table 2-4: Device Codes for M9301-YF Bootstrap

Device	Code
TU10/TE10/TS03 Magnetic Tape	MT
TU16/TE16/TU45/TU77 Magnetic Tape	MM
RK05 Disk Cartridge	DK
RK06/RK07 Disk Cartridge	DM
RP02/RP03 Disk Pack	DP
RP04/RP05/RP06/RM02/RM03 Disk Pack	DB
RS03/RS04 Fixed Head Disk	DS

2.3.9 M9312 Procedure

The M9312 Bootstrap Module has five sockets that accommodate one CPU ROM and up to four peripheral boot ROMs. Each CPU and boot device has a unique ROM developed for it. The CPU ROM plugs into a specific socket location within the module. The peripheral ROMs, however, may be placed in any of the four peripheral socket locations as long as the sockets are filled in sequential order with no vacancies between loaded ROM sockets. Since a particular peripheral ROM has a different boot start address in each of the four sockets, it is sometimes important to know the locations of the ROMs in the bootstrap module. The ROM configuration is a diagram of where specific boot ROMs are located. This information must be known before the bootstrap procedure can begin. The following sections explain how to determine the ROM configuration if it is not known and how to bootstrap a device when the ROM configuration is known. Figure 2–1 is a diagram of the ROM arrangement for the M9312 Bootstrap Module.

Figure 2–1: M9312 ROM Arrangement



If the M9312 Bootstrap/Terminator is on the system, perform one of the following procedures:

- If you have the M9312 console emulator on your system, follow the procedures in Section 2.3.9.1 (PDP-11/60's and PDP-11/70's usually do not have console emulators). If that procedure does not work, perform the next step to verify that you have a console emulator.
- If you have a CPU equipped with switch registers and *do not know* what devices the M9312 will boot, perform the procedures in Section 2.3.9.2.
- If you have a CPU equipped with switch registers, *know* what device ROMs are on the M9312 Bootstrap Module, but do not have a console emulator, follow the procedures in Section 2.3.9.3.
- If you do not have the M9312 Botstrap/Terminator Module on your system and need to boot the RL01, RL02, or the RK07 disk device, perform the manual load routine described in Section 2.3.10.

2.3.9.1 Using the M9312 Console Emulator — The M9312 console emulator can be initiated in two ways depending on the type of CPU (pushbutton or switch register) on the system.

1. *Pushbutton* boot using the M9312 console emulator.

   While holding down the CTRL button, press the BOOT button on the CPU.

   The bootstrap prints the contents (in octal) of registers R0, R4, the Stack Pointer, and R5 at the console terminal. It then prints a prompting @ character.

   In response to the @ character, type the 2-character device code and the unit number of the device to be bootstrapped. Terminate your response by pressing RETURN. If the unit number is not entered, it is assumed to be zero. Table 2-7 contains the device codes.

   Successful completion of these pushbutton bootstrap procedures produce header information on the console terminal, similar to the following example:

```
Enabling only console, disks, and tapes

RSTS V7.0 (MT0)

Option:
```

   Begin the system generation process in Chapter 3--Tailoring the SYSGEN System.

2. *Switch register* boot using the M9312 console emulator.

   - Move the CPU console Enable/Halt switch to its Halt position then back to its Enable position.
   - Set the CPU switch register to 765020.
   - Press the start switch. The bootstrap prints the contents (in octal) of registers R0, R4, the Stack Pointer, and R5 at the console terminal. It then prints a prompting @ character.

     In response to the @ character type the 2-character device code and the unit number of the device to be bootstrapped. Terminate your response by pressing RETURN.* If the unit number is not entered, it is assumed to be zero. Table 2-7 contains the device codes.

     Successful completion of the switch register bootstrap procedure produces header information on the console terminal, similar to the example given for the pushbutton bootstrap. After the message appears, begin the system generation process in Chapter 3--Tailoring the SYSGEN System.

2.3.9.2 Determining the M9312 Bootstrap ROM Configuration — If you *do not know the M9312 ROM configuration*, it can be determined by using Tables 2-5 and 2-7 and performing the instructions that follow Table 2-5.

*The @ sign returns at this point if the correct boot ROM was not installed, or if a nonexistent device code is entered. If the contents of the registers R0, R4, the Stack Pointer, and R5 appear before the @ sign, this indicates that at least one boot ROM socket is empty and can accommodate another boot ROM.

Table 2-5: ROM Locations

ROM Address	ROM Location
765774	Diagnostic ROM
773000	ROM 1
773200	ROM 2
773400	ROM 3
773600	ROM 4

Repeat the following steps for each of the ROM addresses shown in Table 2-5. After you have completed this process, you will know the M9312 bootstrap ROM configuration of your system. With this information, you can boot any device having a boot ROM in the M9312 Bootstrap Module.

Table 2-6: M9312 Bootstrap ROM Configuration

ROM Location	Bootable Device	Device Mnemonic
Diagnostic ROM		
ROM 1		
ROM 2		
ROM 3		
ROM 4		

- Select a six digit ROM address from Table 2-5.
- Set the CPU switches to the selected number.
- Press the LOAD ADRS switch to set the ROM address.
- Press the EXAM switch. The contents of the ROM address just loaded will appear in the CPU data register.
- Match the octal number represented in the CPU data register with the octal data number shown in Table 2-7.
- Locate in Table 2-7 the device mnemonic and the device name associated with the matching number. The ROM you have just investigated can boot the device(s) you located in Table 2-7. Write the retrieved device information from Table 2-7 with the appropriate ROM location in Table 2-6. For example, if you selected a six digit ROM address for ROM 1 from Table 2-5, place the device mnemonic and name you located in Table 2-7 with ROM 1 in Table 2-6. Documenting the ROM configuration in Table 2-6 will prevent performing the above procedure again.

Table 2–7: Device Name and Mnemonic

Device to Be Booted	Mnemonic	Unit	Octal Data
RL01	DL	0–3	042114
RK06/RK07	DM	0–7	042115
RX01	DX	0–1	042130
RX02	DY	0–1	042131
RS03/RS04	DS	0–7	042123
RP02/RP03	DP	0–7	042120
RP04/RP05/RP06	DB	0–7	
RM02/RM03	DB*		
RK03/RK05	DK	0–7	042113
TU55/TU56	DT	0–7	
TU16/TE16/TU45/TU77	MM	0–7	046515
TU10/TE10/TS03	MT	0–7	046524
TS04	MS	0–7	046523
Console Emul. CPU ROM	A0	N/A	040460
Diagnostic ROM PDP-11/60/70	B0	N/A	041060 177776** xxx777***

* Type DB rather than DR if you are booting the RM02 or RM03 disk.
** This is a continuation ROM of a multiple ROM boot.
*** Bad ROM or NO ROM present.

After you have determined the ROM configuration, perform the procedures in Section 2.3.9.1 if you find you have a console emulator; otherwise, perform the procedures in Section 2.3.9.3. The following section explains how to bootstrap with the M9312 module using a switch register controlled CPU.

2.3.9.3 Bootstrapping with the M9312 — The following procedure describes how a device is bootstrapped when the M9312 Bootstrap ROM configuration is known. The data you need to bootstrap a device appears in Table 2–8.

- Locate in Table 2–8 the name of the device to be booted.
- Determine from the ROM configuration (Table 2–6) the location (ROM 1/2/3/4) of the device boot ROM.
- Select the three digit Switch Register Code (SWR) from Table 2–8 for the particular ROM location.
- Move the CPU console Enable/Halt switch to its Halt position then back to its Enable position.

- Set the CPU switch register to 765744 (or 17765744 for PDP-11/70).
- Press the CPU LOAD ADRS switch.
- Set the Switch Register Code (SWR) selected from Table 2-8 in CPU switches 0-8 as shown in Table 2-9.
- Set the unit number of the boot device in CPU switches 9-11 (see Table 2-9).
- Press the CPU start switch.

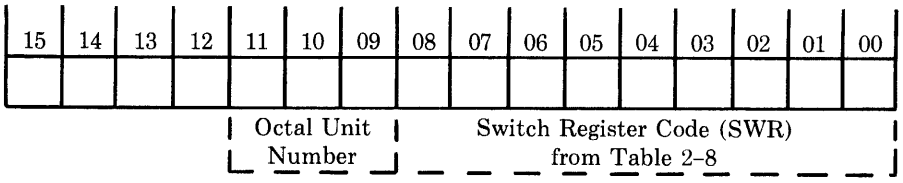
Successful completion of this process boots the device. A message, similar to the following example, appears on the console terminal. At this point, you may begin the system generation process in Chapter 3--Tailoring the SYSGEN System.

```
Enabling only console, disks, and tapes.

RSTS V7.0 (MT0)

Option:
```

Table 2-8: Switch Register Codes (SWR)

Device to Be Booted	Switch Register Code (SWR)			
	ROM 1	ROM 2	ROM 3	ROM 4
RL01/RL02	012	212	412	612
RK06/RK07	012	212	412	612
RX01	012	212	412	612
RX02	012	212	412	612
RS03/RS04	012	212	412	612
RP02/RP03	012	212	412	612
RP04/RP05/RP06	056	256	456	656
RM02/RM03	056	256	456	656
RK03/RK05	012	212	412	612
TU56	042	242	442	642
TU16/TE16/TU45/TU77	012	212	412	612
TU10/TE10/TS03	012	212	412	612

Table 2-9: Console Switch Register Settings



2.3.10 Load Program Bootstrap for the RL01/RL02 and RK07

To bootstrap an RL01, RL02, or RK07 device when the system does not have the M9312 Bootstrap Module, you must manually enter a bootstrap load routine using the CPU console. The following procedure describes the manual

load process using the PDP-11/34. A similar procedure is followed using the CPU LOAD ADRS, DEP, and EXAM switches for the PDP-11/70 computer.

- While holding down the CTRL button, press the HLT/SS button on the CPU.
- Set address 1000 in the console register by using the numbered console buttons.
- Press the LAD (load address) button.
- Press the CLR button to clear the register.
- Load the *contents*, that appear below, into memory using the numbered buttons and the DEP button. Press the CLR button after you have placed the contents in the CPU register and pressed the DEP button.

	RL01/RL02 Bootstrap Routine	**RK07 Bootstrap Routine**
Address	Contents	Contents
1000:	12700	12700
1002:	174400	177440
1004:	12760	12760
1006:	13	0*
1010:	4	10
1012:	12701	12701
1014:	4**	2003***
1016:	10110	10110
1020:	105710	105710
1022:	100376	100376
1024:	12760	12760
1026:	177601	177400
1030:	4	2
1032:	5721	62701
1034:	10110	16
1036:	105710	10110
1040:	100376	105710
1042:	12760	100376
1044:	177400	5710
1046:	6	100001
1050:	5060	0
1052:	4	5007
1054:	62701	
1056:	6	
1060:	10110	
1062:	105710	
1064:	100376	
1066:	5710	
1070:	100001	
1072:	0	
1074:	5007	

*Select drive number 0-7 for the RK07
**Load 4 for unit 0, 404 for unit 1, 1004 for unit 2, and 1404 for unit 3.
***Load 3 for RK06.

After the contents are loaded, perform the following steps.

- Place address 1000 in the console register *again* by using the numbered buttons.
- Press the CPU LAD (load address) button to load the address.
- While holding the CTRL button down, press the START button on the CPU to boot the device.

You can verify the accuracy of the load routine by using the CPU EXAM button. Place address 1000 in the register and press the LAD button. Press the EXAM button to reveal the contents of address 1000. It should be 12700 for both the RL01/RL02 and RK07 routines. Continue to press the EXAM button to check the contents of the remaining addresses in the load routine. Use the LAD and the DEP buttons to correct any erroneous contents.

2.3.11 Load Program Bootstrap for the TU10, TE10, or TS03

To bootstrap a TU10/TE10/TS03 magnetic tape when the system does not have a bootstrap that handles it, you must manually enter a load routine into memory using the CPU Console Switch Register and the DEP switch.

To load the routine, perform the following steps.

Move the CPU Console ENABLE/HALT Switch to its HALT position and back to its ENABLE position.

Set the CPU Switch Register to 010000.

Press the CPU LOAD ADRS switch.

Load the following contents into memory using the Switch Register and DEP switch.

Address	Contents
010000	012700
010002	172524
010004	005310
010006	012740
010010	060011
010012	105710
010014	100376
010016	005710
010020	100767
010022	012710
010024	060003
010026	105710
010030	100376
010032	005710
010034	100777
010036	005007

Set the Console Switch Register to 010000.

Press the CPU LOAD ADRS switch.

Press the CPU START switch.

If the system reads the tape but halts at address 010034, the magnetic tape generated a parity error. Try another drive and make it unit 0. If the system appears to take no action and halts, verify the accuracy of the routine by using the CPU Console EXAM switch. Use the Switch Register and the DEP switch to correct any erroneous contents. Rewind the tape to its load point before executing the routine again. If no recovery is successful, you should have a DIGITAL field service representative check the device. If the hardware is working properly, you should use a new magnetic tape reel.

Chapter 3
Tailoring the SYSGEN System

After you bootstrap the distribution medium, your next step in system generation is to tailor the SYSGEN system for your installation. The initialization code includes options that you can use to tailor the SYSGEN system. The following sections describe the initialization options.

3.1 Overview of Initialization Options

When you bootstrap the RSTS/E distribution disk or tape, the RSTS/E system initialization code is loaded into memory. The RSTS/E system initialization code (INIT.SYS) creates the RSTS/E file structure, system files, and start-up conditions for RSTS/E time sharing. The initialization code allows you to start the special SYSGEN monitor, which you can then use to generate a Target RSTS/E system. When the Target system generation process is complete, you can shut down the SYSGEN system and use the initialization code again to install the Target system monitor and start time sharing.

The initialization code is one large stand-alone program with many functions. Initialization code routines (options) create a RSTS/E disk environment, install the monitor and run-time system, and set system defaults. Initialization routines also check the integrity of the system disk and load stand-alone programs. They allow you to patch system components, declare device characteristics, and disable hardware units and controllers.

Table 3–1 lists and describes briefly all the initialization options. The remaining portion of this chapter explains in detail the use of each option. Usually, you need not use all the options listed in Table 3–1 in tailoring the SYSGEN system.

Table 3-1: Initialization Options

Option Name	Abbreviation and Meaning
DSKINT	DS Initializes, optionally formats, and performs pattern checks on any disk. Writes minimum RSTS/E file structure and can create the library account [1,2].
COPY	CO Transfers required system files from the distribution medium to an initialized RSTS/E system disk.
PATCH	PA Alters RSTS/E system code to correct program errors and to add new program features. Can patch any file in account [0,1], including the initialization code (INIT.SYS), and any Save Image Library (SIL). Uses patches, published in the *RSTS/E Release Notes* or in monthly issues of the *RSTS/E Software Dispatch*, to make code changes.
HARDWR	HA Specifies device controller characteristics. Enables and disables device controllers, specifies non-standard addresses and vectors for device controllers, and specifies DM11-BB and DH11 associations.
INSTALL	IN Installs a RSTS/E Monitor. Designates the Save Image Library file to be used as the monitor for the SYSGEN or Target system.
REFRESH	RE Creates and positions system swapping files, adds bad blocks to the bad block file, BADB.SYS, and positions optional system files on the system disk or any auxiliary disk.
DEFAULT	DE Establishes or changes a monitor's start-up defaults such as the job and swap maximum, the default run-time system, and the error message files.
SET	SE Sets device characteristics on a unit-by-unit basis. Enables and disables use of device units, sets and resets modem control for keyboards, establishes and removes restrictions on the use of device units, and sets line printer characteristics.
START	ST Starts the RSTS/E system for SYSGEN or normal time sharing. Loads monitor tables, enables devices, and loads the default run-time system into memory. Can override previously set system defaults for one time-sharing session. Can also be initiated by pressing LINE FEED in response to the OPTION: prompt.
BOOT	BO Bootstraps a tape or disk device. Can load another operating system into memory from disk or tape. Can reload an altered copy of the initialization code after you have patched it on disk.
LOAD	LO Loads into memory and executes any stand-alone program located in account [0,1].

(continued on next page)

Table 3–1: Initialization Options (Cont.)

Option Name	Abbreviation and Meaning
UNISYS	UN Starts the RSTS/E system without enabling any terminal interfaces except the console terminal (KB0:). Can be used as a diagnostic tool when the system will not start.
FILL	FI Tells the terminal driver in the initialization code to insert the proper number of fill characteristics when printing on the console terminal.
SAVRES	SA Backs up (SAVE), reconstructs (RESTORE), copies (IMAGE) data disk to disk, and extracts (IDENTIFY) label information from a RSTS/E file-structured disk.
HELP	HE Prints a list of valid options.

3.2 Overview of the Tailoring Process

The user interface with the initialization code is a dialogue. Most questions in the dialogue have a long form and a short form. The initialization code automatically prints the short question. To receive the long form question, press the RETURN key in response to the short form question. Long form questions usually include information that may help you to answer the dialogue questions. For example, pressing RETURN in response to the DSKINT option's PACK CLUSTER SIZE question yields a list of valid pack cluster sizes for the disk you are initializing.

The initialization code dialogue begins with the OPTION: prompt and returns to this prompt after the execution of each option. Typing HELP in response to OPTION: gives you a list of valid responses, as in the following example.

```
Option: HELP

The valid RSTS initialization options are:
        DSKINT  Initialize disk to RSTS file structure
        COPY    Copy minimal system to disk
        PATCH   Patch a file
        HARDWR  Set controller characteristics
        INSTALL Install a monitor SIL
        REFRESH Manipulate files in [0,1]
        DEFAULT Set monitor defaults
        SET     Set device characteristics
        START   Start timesharing
        <LF>    Start timesharing (fast)
        BOOT    Bootstrap a device
        LOAD    Load a stand-alone program
        UNISYS  Disable all but console terminal
        FILL    Set console fill for INIT
        SAVRES  SAVE or RESTORE a RSTS/E disk
        HELP    Type this HELP message
Only the first two characters need be typed.
```

```
Option:
```

To request an option, type the first two or more characters of its name. The initialization code executes the requested option. You can type CTRL/C in response to any question during the execution of the option to abort execution and return to the OPTION: prompt.

Using the initialization options, perform the following steps to tailor the RSTS/E SYSGEN system:

1. DSKINT option – If you plan to put the SYSGEN and Target systems on separate disks, first mount and initialize the Target disk. Dismount it if you need the disk drive for the SYSGEN disk, then initialize the SYSGEN disk and leave it mounted.
2. COPY option – Copy system files from the distribution medium to the SYSGEN system disk. After COPY completes the system file transfer, it automatically bootstraps the SYSGEN system disk.
3. FILL option – If necessary, set the console fill factor. You may need to use this option if your console terminal is not an ASR33, KSR33, VT05, VT50, VT52, VT100, LA36, LA34, LA38, or LA120. The FILL option sets the console terminal fill factor used by the initialization code for the current system code. Fill characters are NULL characters used by each terminal for synchronization delays for outputting certain control characters (for example, form feed). The number of fill characters vary depending upon the terminal used.
4. PATCH option – If necessary, correct errors in the initialization code, the SYSGEN monitor, and the RT11 Run-Time System.
5. HARDWR option – If necessary, disable device controllers and specify non-standard UNIBUS addresses for device controllers.
6. INSTALL option – Install the file SYSGEN.SIL as the RSTS/E Monitor for system generation.
7. REFRESH option – Allocate swapping and other system files for the SYSGEN system.
8. DEFAULT option – Establish SYSGEN monitor defaults for job and swap maxima, the run-time system, the error message file, the installation name, the allocation of memory space, the crash dump facility, and the labelling format for magnetic tapes.
9. SET option – If necessary, disable device units, and set type, width, and case for line printer units.
10. START option – Start time sharing on the SYSGEN system.

After starting the SYSGEN system, proceed to Chapter 4 to configure the Target system. The following sections describe in detail how to use the options mentioned above.

3.3 Initializing Disks

Before using any disk under RSTS/E, you must initialize it. Initialization consists of formatting the disk (if it is not already formatted), performing pattern checks on the disk for bad blocks, and writing a RSTS/E file structure on the disk. Initialization is necessary for all disks. The exceptions are disks, such as swapping and non-RSTS/E disks, that should never be used file-structured.

NOTE

Initialization destroys the data on a disk. Therefore, do not initialize the distribution disk or any disk that contains important information such as a monitor SIL.

Formatting means writing the necessary timing and sense marks onto the disk and erasing any extraneous information. You must format the RK05, RK05F, RP02, RP03, RP04, RP05, and RP06 disks before using them on a RSTS/E system. Other removable disks, such as the RK06, RK07, RM02, and RM03, can be but do not need to be formatted since this procedure is performed at the factory; however, the RL01 and RL02 disks are formatted at the factory but cannot be formatted by DSKINT.

You can choose from one to eight patterns, that DIGITAL supplies, to check for bad blocks on a disk. DIGITAL recommends that you use all eight patterns. Specifying a large number of patterns increases the probability that all bad blocks will be found and decreases the possibility that you will lose information later by writing into a bad block. You can also specify up to eight patterns of your own. If you want to specify your own patterns, create patterns different than those supplied by DIGITAL. The octal and binary word values, provided by DIGITAL and used during DSKINT pattern checking are:

Pattern	Octal	Binary
1	000000	0 000 000 000 000 000
2	133333	1 011 011 011 011 011
3	177777	1 111 111 111 111 111
4	163126	1 110 011 001 010 110
5	052525	0 101 010 101 010 101
6	007417	0 000 111 100 001 111
7	021042	0 010 001 000 100 010
8	104210	1 000 100 010 001 000

If you do not want to run eight patterns, you should at least run two. Running only one pattern merely writes zeroes to the disk. Whereas, specifying two instructs DSKINT to write one pattern to check the disk and the other pattern clears all blocks to zero.

The minimal RSTS/E file structure contains a bootstrap block and two directories. The Master File Directory (MFD) account [1,1] contains entries for

itself and the system file account [0,1], the disk pack identification (pack ID), and the pack cluster size. In addition, it indicates whether the files on the disk are catalogued with information as to the date they were last accessed or the date they were last changed, whether new files are to be added at the beginning or at the end of a directory by default, and designates the disk as public or private. The User File Directory (UFD) for account [0,1] contains entries for the files SATT.SYS (Storage Allocation Table) and BADB.SYS (the "bad block file").

During disk initialization you can request the creation of the system library account [1,2] on the disk. If you are initializing a system disk, the disk initialization routines create the account [1,2] automatically.

3.3.1 Initializing a Disk for Optimal Performance

The disk initialization process allows you to set up a disk for optimal performance. When you specify pack, MFD, and library cluster sizes, and position the file SATT.SYS, you can set up the disk to reduce access time and head movement.

The disk pack cluster size must be a power of 2. It cannot be less than the device cluster size for the disk, which may be 1, 2, 4 or 8, nor greater than 16. The pack cluster size is the minimum number of disk blocks that the system can allocate to a file on the disk pack. It is thus the minimum account and file cluster size as well. A large pack cluster size can cause disk space to be wasted but can speed up file creation and access. For example, if the pack cluster size for a disk is 8, even a file that physically requires only 1 block is allocated 1 pack cluster or 8 disk blocks.

The MFD cluster size, which cannot be less than the pack cluster size nor greater than 16, is the cluster size for account [1,1]. This value limits the number of user accounts possible on the system to approximately 108 times the MFD cluster size. The number of user accounts which may be stored in the MFD is also affected by the number and size of files put in account [1,1]. DIGITAL recommends that the MFD cluster size be 16.

You must set the system library [1,2] cluster size to at least 4. A larger value may be necessary if you intend to store many files in account [1,2]. DIGITAL recommends that the library cluster size be 16. The maximum number of files allowed in this or any other account is approximately 72 times the UFD cluster size for the account. This estimate may not be accurate for accounts with large files or for systems that use RMS. Files with attributes, which are normally created only by RMS, consume additional directory space in the UFD. The maximum number of files with attributes that can be saved under an account is approximately 54 times the UFD cluster size for that account.

You have two options regarding the positioning of the file SATT.SYS:

1. Calculate a location for SATT.SYS, or
2. let DSKINT find a place for it.

For moving-head disks, it is advantageous to locate SATT.SYS near the center of the disk to reduce average seek times for the disk heads. If you allow DSKINT to find a place for SATT.SYS, it will try to position that file near the center of the disk. If you decide to position subsequent files at the same mid-point, the initialization code merely locates the files as close to the center as possible. That is, DSKINT places the files at the next available space beyond the mid-point.

DSKINT asks the PRE-EXTEND DIRECTORIES question during the initialization dialogue. If you accept its default, DSKINT will allocate seven directory clusters for each of the following accounts: [0,1], [1,1], and [1,2] (if created). Ordinarily, DSKINT allocates only one directory cluster for each directory you are creating and the monitor expands the directory when it is necessary. If you allow the monitor to expand the size of the directories on an as needed basis, it will allocate the next directory cluster in the next available position, possibly making the directory non-contiguous. If you use this option, DSKINT will attempt to allocate all 7 directory clusters adjacent to each other, which may improve directory search times.

3.3.2 Performing the Initialization

To initialize a disk, use the DSKINT initialization option. If you plan to put SYSGEN and Target systems on separate disks, first mount and initialize the Target disk. Dismount it if you need the disk drive for the SYSGEN disk. After initializing the Target disk (if necessary), initialize the SYSGEN disk. To reduce confusion, use different pack IDs for the SYSGEN disk, the Target disk, and the distribution disk if it is present. Leave the SYSGEN disk mounted. Note that you must initialize each half of an RK05F disk separately. Therefore, to initialize an RK05F, you must use the DSKINT option twice. Table 3–2 summarizes the DSKINT dialogue. After you answer the questions in the dialogue, DSKINT begins the initialization process.

NOTE

> During the DSKINT dialogue, you can type CTRL/Z in response to any prompt after DISK? to cause DSKINT to return to the previous prompt.

The first user-specified process that DSKINT performs is formatting. DSKINT prints STARTING FORMAT PASS when it begins formatting, and END FORMAT PASS when it completes formatting the disk. The time required for formatting depends on the size and type of disk involved.

When RP02 and RP03 disks are being initialized, the DSKINT dialogue includes two requests immediately after the STARTING FORMAT PASS MESSAGE:

```
SET FORMAT ENABLE SWITCH, THEN TYPE <LF>:
```

You must set the RP11 controller FORMAT ENABLE/NORMAL switch to ENABLE, then press LINE FEED.

```
SET FORMAT SWITCH TO NORMAL, THEN TYPE <LF>:
```

You must set the RP11 controller FORMAT ENABLE/NORMAL switch to NORMAL, then press LINE FEED.

After it formats the disk, DSKINT runs the pattern checks and counts the bad clusters. If DSKINT finds 161 or more bad clusters, it prints the message EXCESSIVE BAD CLUSTERS and returns the OPTION: prompt. Use a different disk. If the pack contains fewer than 161 bad clusters, DSKINT builds the RSTS/E file structure. When the building of the file structure is complete, DSKINT returns to the OPTION: prompt.

If any errors, that are detected during pattern checking, report a block and cluster number, DSKINT adds that cluster number (not the block number) to the bad block file (BADB.SYS). Recoverable errors are not added into BADB.SYS. Several DSKINT examples follow Table 3–2 which describes the DSKINT dialogue questions.

Table 3–2: DSKINT Dialogue Questions

Question and Description of Response
DD-MMM-YY? Type the current date in alphabetic or numeric format. The numeric date format is YY.MM.DD. Press LINE FEED to accept the date printed in the prompt.
HH:MM? Type the current time in 24–hour or AM/PM format. For example, 14:53 or 2:53 PM. Press LINE FEED to accept the time printed in the prompt.
DISK? Type two characters to indicate the type of disk being initialized. Acceptable entries are DF, DS, DK, DL, DM, DP, DR, or DB.
UNIT? For all disks except DF. Type the physical unit number on which the disk, DECpack, or disk pack resides. Acceptable entries are 0 through 3 for DL disks and 0 through 7 for other disks. For an RK05F, use DSKINT twice, once for each half of the disk (i.e., once for each of the two units).
PLATTERS(n)? For DF type disks only. The value n in the prompt is the number of platters that the initialization code found. Press LINE FEED to use n as the number of platters. Otherwise, type the number of platters connected to the RF11 controller. Acceptable entries are 1 through 8 for DF disks.
PACK ID? Type one to six alphanumeric characters to be used when logically mounting the disk. RSTS/E uses this pack ID as a system-wide logical name for the disk and internally as the password of system account [0,1].

(continued on next page)

Table 3-2: DSKINT Dialogue Questions (Cont.)

Question and Description of Response
PACK CLUSTER SIZE? Type the number of 256-word blocks that each cluster allocated on the disk will contain. Acceptable pack cluster sizes are 1, 2, 4, 8, or 16 for RS03, RS04, RK05, RK05F, RL01, RL02, RK06, and RK07 disks. For RP02 and RP03 disks, acceptable values are 2, 4, 8, or 16. For RM02, RM03, RP04, and RP05 disks, acceptable values are 4, 8, or 16. For RP06 disks, acceptable values are 8 or 16.
SATT.SYS BASE? Press LINE FEED to let DSKINT position the file near the center of the disk. It is generally advantageous to place the SATT.SYS file at the mid-point of removable disks. If you want to position the SATT.SYS file yourself, type the logical block number (from 1 to the device size minus 1) in decimal. DSKINT rounds this number up to the next pack cluster boundary. Refer to the text for an explanation. Appendix B contains a table of device sizes. You may want to locate SATT.SYS in a place other than the center if you only use the first half of the disk or need to create large contiguous files.
MFD PASSWORD? Type one to six alphanumeric characters, which become the password of account [1,1] on the disk.
MFD CLUSTER SIZE? Type the decimal number of 256-word blocks that each cluster allocated to the MFD will contain. The MFD cluster size must be a power of 2 greater than or equal to the pack cluster size and less than or equal to 16. The maximum number of user accounts that can be created is approximately 108 times the MFD cluster size. This setting is permanent; you can change it only by re-initializing the disk. DIGITAL recommends that the MFD cluster size be 16.
PRE-EXTEND DIRECTORIES? Y, N. Type Y to have DSKINT extend accounts [0,1], [1,1], and [1,2] to their maximum size when they are created.
PUB, PRI, OR SYS? Type PUB to designate the disk as public. Type PRI to designate the disk as private. Type SYS to initialize a system disk.
CREATE LIBRARY ACCOUNT? For PUB or PRI disks only. Type Y to create the account [1,2] on the disk. If you type N, DSKINT does not create the account and does not ask the next three questions.

(continued on next page)

Table 3–2: DSKINT Dialogue Questions (Cont.)

Question and Description of Response
LIBRARY PASSWORD? Type one to six alphanumeric characters to create the password for account [1,2].
LIBRARY UFD CLUSTER SIZE? Type the number of 256–word blocks allocated for each of the seven possible UFD clusters for the library account [1,2]. The number of files that can be stored under any account is approximately 72 times the UFD cluster size. The library UFD cluster size must be a power of 2. It cannot be less than the pack cluster size or greater than 16. DIGITAL recommends that the library UFD cluster size be 16.
LIBRARY ACCOUNT BASE? A number (in blocks) from 1 to the disk size minus 1. Press LINE FEED to let DSKINT place the library near the center of the disk.
DATE LAST MODIFIED? Type Y or press LINE FEED to retain in the disk directory the date on which files were last modified. Type N to retain the date on which files were last accessed.
NEW FILES FIRST? Type N or press LINE FEED to cause new files on this disk to be placed at the end of the directory for the account in which they are created. DIGITAL recommends this response. Type Y to cause new files on this disk to be added at the beginning of the directory for the account in which they are created.
USE PREVIOUS BAD BLOCK INFO? Type Y or press LINE FEED to have the new bad block file created using information from the existing bad block file. DIGITAL recommends this response. Type N to have DSKINT ignore the current bad block file when creating the new one.
FORMAT? Asked for DK, DM, DP, DR, and DB disks only. Type Y to write hardware timing and sense data on the disk. Type N to omit the formatting operation. If you type Y, DSKINT prints messages indicating the start and end of the format pass. You must format all new disk packs and cartridges (except RL01 and RL02 which are formatted at the factory and cannot be reformatted; RK06, RK07, and RM02 which are formatted at the factory but can be reformatted) before using them on a RSTS/E system. You should never format a disk that contains any important data; formatting destroys the data on the disk.

(continued on next page)

Table 3-2: DSKINT Dialogue Questions (Cont.)

Question and Description of Response
PATTERNS? To print the time required to execute each pattern for each type of disk, press RETURN. To specify the number of patterns to use in checking for bad blocks, type a number from one to eight. DIGITAL recommends that you run eight patterns. If you append an X to your response, DSKINT uses the specified number of DIGITAL's patterns and asks the next question. YOUR PATTERN? Asked only if the response to the last question ended with the letter X. (This capability is intended primarily for DIGITAL field service engineers.) Type an octal word between 1 and 177777, inclusive. The DSKINT option repeats the question until you have typed 8 patterns or pressed LINE FEED to indicate no more patterns. PROCEED (Y or N)? Type Y to proceed with the disk initialization. Type N to abort the initialization and return to the OPTION: prompt. This question allows you to double-check your responses to the dialogue questions and abort the initialization if you have made any errors.

3.3.3 Initializing a System Disk

In this example, you initialize the disk to be used as the SYSGEN system disk. The printout from the dialogue follows. Each line is marked with a letter and is explained in the subsequent text.

```
a  Option: DSKINT

b  14-May-79?
c  02:49 AM? 02:49 PM

d  Disk? DB0

   This disk pack appears to be a RSTS/E formatted
   disk with the following characteristics:

e  Pack ID :                    SAMPLE
   Pack cluster size :          8
   Pack is currently :          Private,
                                Update access date on writes.

f  Pack ID? SAMPLE2
g  Pack ID? SAMPL2
h  Pack cluster size? 4
i  SATT.SYS base?
j  MFD password? MFDNME
k  MFD password? SECRET
l  MFD cluster size? 16
m  Pre-extend directories <no>? Y
n  PUB, PRI, or SYS? SYS
o  Library password? SECRET
p  Library UFD cluster size? 16
```

```
q  Library account base?
r  Date last modified <yes>?
s  New files first <no>?
t  Use previous bad block info <yes>?
u  Format <no>? Y
v  Patterns? 8
w  Proceed (Y or N)? Y
   Starting format pass
   End format pass

x  Pattern # 8

   DBO Error     RPCS1  RPWC   RPDA   RPCS2  RPDS   RPER1  RPDC
                 004260 000000 005416 000100 010700 000000 000537
   Recoverable
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
   Recoverable

   Pattern # 7

   DBO Error     RPCS1  RPWC   RPDA   RPCS2  RPDS   RPER1  RPDC
                 144250 176553 010000 040300 150700 100000 000604
                 144250 176553 010000 040300 150700 100000 000604
                 144250 177553 010000 040300 150700 100000 000604
                 144250 177553 010000 040300 150700 100000 000604
    Block Cluster
   162526   40630

   Pattern # 6

   DBO Error     RPCS1  RPWC   RPDA   RPCS2  RPDS   RPER1  RPDC
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
    Block Cluster
   162108   40526
                 144250 176553 010000 040300 150700 100000 000604
                 144250 176553 010000 040300 150700 100000 000604
   Recoverable

   Pattern # 5

   DBO Error     RPCS1  RPWC   RPDA   RPCS2  RPDS   RPER1  RPDC
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100100 000603
    Block Cluster
   162108   40526
                 144250 176553 010000 040300 150700 100000 000604
                 144250 176553 010000 040300 150700 100000 000604
                 144250 177553 010000 040300 150700 100000 000604
   162526   40630

   Pattern # 4

   DBO Error     RPCS1  RPWC   RPDA   RPCS2  RPDS   RPER1  RPDC
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
    Block Cluster
   162108   40526
```

```
   Pattern # 3

   DB0 Error     RPCS1  RPWC   RPDA   RPCS2  RPDS   RPER1  RPDC
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
    Block Cluster
   162108   40526
                 144250 176553 010000 040300 150700 100000 000604
                 144250 177553 010000 040300 150700 100000 000604
                 144250 177553 010000 040300 150700 100000 000604
   162526   40630

   Pattern # 2

   DB0 Error     RPCS1  RPWC   RPDA   RPCS2  RPDS   RPER1  RPDC
                 144250 174326 003005 040300 150700 100100 000601
                 144250 174326 003005 040300 150700 100000 000601
   Recoverable
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
                 144250 177553 010000 040300 150700 100000 000603
    Block Cluster
   162108   40526
                 144250 176553 010000 040300 150700 100000 000604
                 144250 177553 010000 040300 150700 100000 000604
                 144250 177553 010000 040300 150700 100000 000604
   162526   40630

   Pattern # 1

y  Option:
```

The letters that prefix the explanations that follow are keyed to identifying letters located within the previous DSKINT example. Follow the lettered steps through this sequence of steps.

a. Specify the DSKINT option by typing DSKINT. Typing at least the first two letters of DSKINT will also invoke this option.

b. Press LINE FEED to accept the date printed by DSKINT since the date is correct. If it had been incorrect, you would have typed the current date in the indicated format.

c. Correct the time by entering the hours and minutes but also indicate that the time is in the afternoon by typing PM.

d. Type DB0 which represents the mnemonic name and the unit number of the RP06 that you want to DSKINT. If you had not included the unit number in your response, DSKINT would have printed the UNIT question. You respond to the UNIT question with the unit number of the device on which the SYSGEN disk is mounted. DSKINT prints this question for DS, DK, DL, DM, DP, DR, and DB disks. For an RS11 (DF) disk, the PLATTERS question replaces the UNIT question. You would respond to this question by typing the number of RS11 disks (platters) connected to the RF11 controller.

e. Notice that DSKINT identifies that the disk is a RSTS/E formatted disk and proceeds to list a few of its characteristics. This gives you an opportunity to decide whether it is the disk that you want to DSKINT. This label data provides enough information to make that decision.

f. Type more than six characters and DSKINT reprompts the DISK question. Type six or less and your response is accepted.

g. Type one to six alphanumeric characters which become the pack identification label for the SYSGEN disk. RSTS/E uses this label as a system-wide logical name for the disk and internally as the password of system account [0,1].

h. Specify the pack cluster size for the system disk. Refer to Appendix B for a list of disk device cluster sizes. The pack cluster size must be at least the device cluster size and no greater than 16. In general, large pack cluster sizes permit faster access to data stored on the disk at the expense of wasted disk space. Small pack cluster sizes permit more efficient allocation of disk storage space at the expense of frequent access to retrieval information (pointers to file data) stored in user file directories. You can improve the access speed on a disk with a small pack cluster size by grouping individual files and user file directories (UFDs) at a size greater than the pack cluster size. DIGITAL recommends the minimum pack cluster size for almost all installations.

i. Have DSKINT place the Storage Allocation Table SATT.SYS file near the center of the disk since it will be accessed frequently. This procedure makes possible the reduction of average seek time for the disk heads. However, you may not want the file near the center of the disk if you only use information located in the first half of the disk or if you need to create large contiguous files.

j. Type an MFD password greater than six characters and DSKINT rejects it.

k. Type one to six alphanumeric characters which become the password for the Master File Directory (MFD) account [1,1]. The MFD password should be kept secret, because irresponsible access to any privileged account can destroy system security. To further prevent a security break, choose an MFD name that cannot be easily guessed.

l. Specify the cluster size for the MFD. With the restriction that the MFD cluster size cannot be less than the pack cluster size, the MFD cluster size can be 1, 2, 4, 8, or 16. Note that the system manager can create approximately (108 * MFD cluster size) accounts. Digital recommends that the cluster size be 16.

m. Respond by typing Y to have DSKINT extend to the maximum size the directories for account [0,1], [1,1], and [1,2] when these files are created. The directories are then created at the 7 block maximum which may, since the directory is made contiguous, decrease directory search times.

n. Type SYS to initialize a system disk. For a system disk, DSKINT automatically creates the library account [1,2] and prints the next two questions.

o. Type one to six alphanumeric characters which become the password for account [1,2]. Keep this password secret and create a name that is not easily guessed. If you have two systems, do not use the same password for both.

p. Specify 16 as the cluster size for account [1,2]. The cluster size for the system library must be at least 4. You may need to specify a larger cluster size if you plan to save many of your installation's library files in account [1,2]. DIGITAL recommends that the library cluster size be 16.

q. Press LINE FEED to have DSKINT place the library account [1,2] near the center of the disk. This location diminishes the average seek time for the disk heads. You can, however, specify a location in blocks if another location is more advantageous. That is, if you only use the first half of the disk or need to create large contiguous files, you may not want to locate the library account near the disk's center.

r. Accept the YES default to retain in the disk directories the date on which files were last modified not the date on which files on the disk were last accessed.

s. Press LINE FEED to cause new files on a disk to be placed at the end of the directory for the account in which they were created. DIGITAL recommends this response which allows the frequently used system programs (for example LOGIN and LOGOUT) to be located at the beginning of the directory where they can be quickly accessed.

t. Press LINE FEED to have the new bad block file created using information from the existing RSTS/E bad block file, if one exists. DIGITAL recommends this response.

u. Type Y to allow DSKINT to write hardware timing and sense data on the disk.

v. Request that DSKINT perform 8 pattern checks for bad blocks. DIGITAL recommends this number. The time that you spend running these pattern checks may protect you from encountering bad blocks during an important run, a condition that may be avoided if you perform all 8 pattern checks.

w. Type Y to proceed, since you made no errors during the DSKINT dialogue sequence. After you press RETURN, DSKINT begins the format pass, then notifies you when it starts and ends.

x. Notice that DSKINT begins pattern checking with pattern 8 and ends with pattern 1. If DSKINT prints a block and cluster number during pattern checking, it adds the cluster number to the bad block file (BADB.SYS). In this example, DSKINT adds cluster numbers 40630 and 40526 to BADB.SYS. Errors that DSKINT marks as RECOVERABLE, such as those in patterns 8, 6, 2, are not added to the bad block file.

y. Notice that DSKINT returns you to the OPTION prompt.

3.3.4 Initializing a Nonsystem Disk

The DSKINT option initializes, formats, and does pattern checking on nonsystem disks that will be used on the RSTS/E system. System disk initialization is described in Section 3.2.3. The example that follows applies only to nonsystem disks.

The following example initializes an RK06 cartridge as a private disk:

```
Option: DSKINT

DD-MM-YY? 14-MAY-79
12:01 AM?

Disk? DM1:

This disk pack appears to be a RSTS/E formatted
disk with the following characteristics:

Pack ID :                PATCHA
Pack cluster size :      2
Pack is currently :      Private.

Pack ID? SAMPLE
Pack cluster size? 4
SATT.SYS base?
MFD password? SYSMFD
MFD cluster size? 16
Pre-extend directories <no>? Y
PUB, PRI, or SYS? PRI
Library password? SYSLIB
Library UFD cluster size? 16
Date last modified <yes>?
New files first <no>?
Use previous bad block info <yes>?
Format <no>? Y
Patterns? 8
Proceed (Y or N)? Y

Disk pack serial # 75465

   Cyl    Trk    Sec    Block   Cluster
   260      1     11    17193     4298
   332      1     11    21945     5486

Starting format pass
End format pass

 Pattern # 8

DM1 Error     RKCS1  RKWC   RKDA   RKCS2  RKDS   RKER   RKDCYL
              100222 171502 000413 000201 100301 000200 000404
              100222 177502 000413 000201 100301 000200 000404
 Block Cluster
 17193    4298
              100222 177502 000413 000201 100301 000200 000514
              100222 177502 000413 000201 100301 000200 000514
 21945    5486
```

```
Pattern # 7

DM1 Error     RKCS1  RKWC   RKDA   RKCS2  RKDS   RKER   RKDCYL
              100222 171502 000413 000201 100301 000200 000404
              100222 177502 000413 000201 100301 000200 000404
 Block Cluster
 17193     4298

              100222 177502 000413 000201 100301 000200 000514
              100222 177502 000413 000201 100301 000200 000514
 21945     5486

Pattern # 6

DM1 Error     RKCS1  RKWC   RKDA   RKCS2  RKDS   RKER   RKDCYL
              100222 171502 000413 000201 100301 000200 000404
              100222 177502 000413 000201 100301 000200 000404
 Block Cluster
 17193     4298
              100222 177502 000413 000201 100301 000200 000514
              100222 177502 000413 000201 100301 000200 000514
 21945     5486

Pattern # 5

DM1 Error     RKCS1  RKWC   RKDA   RKCS2  RKDS   RKER   RKDCYL
              100222 171502 000413 000201 100301 000200 000404
              100222 177502 000413 000201 100301 000200 000404
 Block Cluster
 17193     4298
              100222 177502 000413 000201 100301 000200 000514
              100222 177502 000413 000201 100301 000200 000514
 21945     5486

Pattern # 4

DM1 Error     RKCS1  RKWC   RKDA   RKCS2  RKDS   RKER   RKDCYL
              100222 171502 000413 000201 100301 000200 000404
              100222 177502 000413 000201 100301 000200 000404
 Block Cluster
 17193     4298
              100222 177502 000413 000201 100301 000200 000514
              100222 177502 000413 000201 100301 000200 000514
 21945     5486

Pattern # 3

DM1 Error     RKCS1  RKWC   RKDA   RKCS2  RKDS   RKER   RKDCYL
              100222 171502 000413 000201 100301 000200 000404
              100222 177502 000413 000201 100301 000200 000404
 Block Cluster
 17193     4298
              100222 177502 000413 000201 100301 000200 000514
              100222 177502 000413 000201 100301 000200 000514
 21945     5486

Pattern # 2

DM1 Error     RKCS1  RKWC   RKDA   RKCS2  RKDS   RKER   RKDCYL
              100222 171502 000413 000201 100301 000200 000404
              100222 177502 000413 000201 100301 000200 000404
 Block Cluster
 17193     4298
              100222 177502 000413 000201 100301 000200 000514
              100222 177502 000413 000201 100301 000200 000514
 21945     5486
```

```
Pattern # 1

DM1 Error     RKCS1   RKWC    RKDA    RKCS2   RKDS    RKER    RKDCYL
              100222  171502  000413  000201  100301  000200  000404
              100222  177502  000413  000201  100301  000200  000404
 Block Cluster
 17193    4298
              100222  177502  000413  000201  100301  000200  000514
              100222  177502  000413  000201  100301  000200  000514
 21945    5486

Option:
```

In the example, the pattern checks discovered bad blocks. Since bad blocks were found, DSKINT prints a summary of the block number, cluster, and hardware information (for use by DIGITAL field service personnel).

3.3.5 Initializing a Non-File Structured Disk

It is not necessary to use DSKINT on non-file structured disks that you will use for swapping. However, you can use the DSKINT option to perform pattern checking on these disks. Such disks do not require the RSTS/E file structure that DSKINT creates. The file structure is useless and is overwritten during time sharing operations.

During an initial hardware installation or when a hardware malfunction is suspected, DSKINT can supplement the tests performed by standard diagnostic methods. DSKINT does not duplicate all the tests performed by diagnostic programs. DSKINT, therefore, should be used only to complement the standard hardware maintenance procedures.

The example that follows shows the use of DSKINT to run pattern checks on an RS04 fixed head disk.

```
Option: DSKINT

14-MAY-79
08:17 AM?

Disk? DS
Unit? 0
Pack ID? SWAP
Pack cluster size? 1
SATT.SYS base?
MFD password? SWPMFD
MFD cluster size? 1
Pre-extend directories <no>? Y
PUB, PRI, or SYS? PUB
Create library account? N
Date last modified <yes>?
New files first <no>?
Use previous bad block info <yes>? N
Patterns? 8
Proceed (Y or N)? Y

Pattern # 8
Pattern # 7
Pattern # 6
Pattern # 5
Pattern # 4
```

```
Pattern # 3
Pattern # 2

DSO Error    RSCS1  RSWC   RSBA   RSDA   RSCS2  RSDS   RSER
             144250 172066 056154 001463 040700 010600 000000
Recoverable

Pattern # 1

Option:
```

If DSKINT discovers bad blocks on a fixed head disk, you should not use the disk non-file structured for swapping. Call DIGITAL field service to locate the hardware problem. You can avoid the bad blocks by using the disk for file-structured swapping space. Refer to Section 3.8.1.1 for a discussion of swapping files.

3.3.6 DSKINT Dialogue Error Messages

Table 3–3 summarizes the error messages that can appear during the DSKINT option dialogue.

Table 3–3: DSKINT Dialogue Error Messages

Message and Meaning
BLOCK NUMBER TOO BIG The block number you typed is greater than or equal to the maximum logical block number for the disk.
DRIVE NOT READY The initialization cannot proceed because the disk to be initialized is not on-line and ready. You can ready the drive and press LINE FEED to proceed or you can type CTRL/C to abort the initialization.
DSKINT NOT LEGAL ON SYSTEM DISK You specified the disk from which the initialization code was bootstrapped. You cannot initialize this disk now because the initialization code would be destroyed.
ILLEGAL DISK NAME The string you typed is not the name of a valid RSTS/E disk device.
ILLEGAL NUMBER, TRY AGAIN The number you typed is not a valid octal number between 1 and 177777.
SORRY, BUT THAT DISK DOESN'T EXIST The string you typed is a valid RSTS/E disk name, but that disk controller or the unit number does not exist on this sytem.

The preceding table describes only some of the errors that can occur during the DSKINT option dialogue. For information on the error messages that can appear during the initialization process, refer to Appendix A.

3.4 Copying System Files to Disk

During tailoring of the SYSGEN system, the COPY option copies system files from account [0,1] on the distribution medium to the SYSGEN disk. During tailoring of the Target system, COPY transfers system files from account [0,1] on the SYSGEN output tape to the Target disk. The list that follows describes the system files that COPY transfers from the distribution medium:

1. The INIT.SYS file contains the system initialization code.
2. SYSGEN.SIL (for the SYSGEN system) or the first file in [0,1] with the extension .SIL (for the Target system), which is the RSTS/E Monitor Save Image Library.
3. RT11.RTS (for the SYSGEN system) or the first file in [0,1] with the extension .RTS (for the Target system), which is the run-time system.
4. ERR.ERR (for the SYSGEN system) or the first file in [0,1] with the extension .ERR (for the Target system), which is the RSTS/E error message text.
5. All files in [0,1] with the extension .SAV, which are stand-alone programs that can be loaded by the LOAD option. DIGITAL does not supply any stand-alone programs.

The COPY option automatically copies the files from the device that was last bootstrapped. If you are tailoring a SYSGEN system, the option copies the files from the distribution disk or magnetic tape. If you are tailoring a Target system, the option copies the files from the system tape or disk written by the batch stream.

As it attempts to transfer each file, COPY scans the output disk for a file with the same name. If it finds one, COPY issues the following prompt, substituting the filename and extension for filnam.ext.

```
FILE filnam.ext EXISTS:
```

Press RETURN for the following additional information:

```
The file named above already exists on the output disk.
Type 'D' to delete it and create a new file of the same name.
Type 'S' to skip this input file and continue.
Type CTRL/C to abort the COPY operation:
```

After each filename scan, COPY creates the file on the output disk and copies the contents of the input file to it. However, COPY neither creates nor copies the file if it finds the file on the output disk and you specify 'S'. The COPY option does not generate an error message if one or more of the input files is missing.

After COPY has transferred all the files, it scans the output disk to verify that account [0,1] contains a minimal set of system files (INIT.SYS, a .SIL file, a .RTS file, and a .ERR file). If one or more of the files is missing, COPY prints an error message and returns to the OPTION: prompt. If all the files are present, it bootstraps the output disk and returns to the OPTION: prompt.

Therefore, the initialization code is running with a different system device after the COPY option terminates successfully.

The following is an example of the COPY option:

```
Option: COPY

20-MAY-79?
08:27 AM?

To which disk? DB
Unit? 0

Enabling only console, disks, and tapes.

RSTS V7.0 (DB0)

Option:
```

In the example, you press LINE FEED to accept the date and time printed. The DB response to the TO WHICH DISK question and the 0 response to the UNITS question specify the device to which COPY transfers the system files. The COPY option copies the files, then bootstraps the output disk. After COPY bootstraps the DB disk, the initialization code prints the system identification message (indicating the booted device) and the Option: prompt.

NOTE

To copy to the output disk all files that have .SIL, .RTS, and .ERR extensions, you can use the /A switch in response to the TO WHICH DISK query. For example:

```
TO WHICH DISK?DB/A
```

Table 3–4 summarizes the error messages that can appear during the COPY option dialogue.

Table 3–4: COPY Option Dialogue Error Messages

Message and Meaning
CANNOT COPY TO THE SYSTEM DISK You specified the current system disk, which is invalid as an output disk for the COPY option.
ILLEGAL DISK NAME You typed an invalid disk name or specified a unit number for a DF disk.
INVALID UNIT NUMBER The disk unit number you specified does not exist on this system.
INVALID RESPONSE Your response to the FILE FILNAM.EXT EXISTS: prompt was not D, S, or CTRL/C.
SORRY, BUT THAT DISK DOESN'T EXIST The disk type you specified does not exist on this system.

For information on errors that occur during the copying operation, refer to Appendix A.

3.5 Correcting the System Code

The PATCH option provides a method for altering RSTS/E system code. Use PATCH to correct errors that are found in the system code and to add optional program code. DIGITAL publishes mandatory corrections and optional additions to code in the *RSTS/E Release Notes* if the changes are concurrent with the release of the distribution kits. Between releases, patches are published in the monthly *RSTS/E Software Dispatch* publication. The following procedures describe the PATCH option in detail. In general, however, published patches include the necessary instructions.

You can patch any file in account [0,1]. This account includes the initialization code (INIT.SYS) and any .SIL or .RTS file. Patching makes permanent changes to the code on disk and has no effect on the code currently in memory. Therefore, after patching the initialization code, you must bootstrap the system disk to load the corrected initialization code into memory.

Patches take many different forms. Some are in-place patches to one or more words in one or more modules. Others require patch space in the affected areas. The RSTS/E Monitor, initialization code, and run-time systems always include patch space. You can patch the overlay code by using free space in overlay segments or monitor patch space. Sometimes, patches affect fixed addresses and are straightforward; usually, however, the exact octal address of a patch varies from system to system according to the system configuration. Published patches describe in detail the procedures required to make the alterations correctly.

When you generate a new RSTS/E system, refer to the *RSTS/E Release Notes* and the *RSTS/E Software Dispatch* for patches and patching information. Unless instructed otherwise by the *RSTS/E Release Notes*, you should install all required patches immediately after the SIL is placed on the SYSGEN or Target system disk. This procedure is necessary because patches may affect the initialization code, which builds required file structures, creates system files, and sets up tables used during time sharing.

3.5.1 Using the PATCH OPTION

Use the PATCH option to perform patching operations. To invoke PATCH, type PATCH or PA. PATCH replies by asking for the name of the file to patch, a MODULE NAME (if the file is a SIL and has more than one module), a BASE ADDRESS, and an OFFSET ADDRESS.

In response to the FILE TO PATCH question, type the name and extension of the file that requires patching, or press LINE FEED to patch the installed monitor SIL. Since the initialization code cannot always distinguish a SIL from other files, the published patch may append /N to the name of any file that is not a SIL.

The module name designates the SIL module to be patched. You can obtain a list of SIL modules by pressing RETURN in response to the MODULE NAME question. The base address defines the actual locations to be patched. For instance, if you are patching the PRINT USING section of BASIC–PLUS, you would enter the symbol PU as the base address. The offset address is the first location to be patched relative to the specified base. For instance, a PRINT USING patch may begin at an offset of 100 octal bytes from the beginning of PRINT USING.

Responses to the BASE ADDRESS and OFFSET ADDRESS questions can be numbers or expressions. Valid octal numbers are 0 to 177777, and leading zeroes are optional. Valid decimal numbers are 0. to 65535., and are distinguished from octal numbers by the presence of a trailing decimal point. When patching a SIL, you can substitute a global symbol name for an octal number. The symbol table for the module being patched is part of the SIL file. It contains that module's global symbol names and their values. A global symbol name must be one to six alphanumeric characters and must be defined in the symbol table for the current module. To refer to a global symbol in another module of the current SIL, type the symbol name followed by a commercial at sign @ and the name of the module in which the symbol is defined. For example, LOGIN@BASIC and DISK@ERR refer to the symbols LOGIN and DISK in the modules BASIC and ERR, respectively. An expression consists of one or more numbers or global symbols, separated by arithmetic operators (+,–,*, and /). Parentheses can be used to group portions of an expression.

After you specify the base and offset addresses, PATCH opens the specified locations, prints the old contents, and accepts input. If the old contents do not match what is shown under 'Old' in the published patch, then you have made an error or the published patch is incorrect. Remove any changes you have already made and try again. Table 3–5 summarizes the possible input.

Table 3–5: Possible Input to the PATCH option

Input	Meaning
Number, symbol, or expression	Enter the number, symbol, or expression as the new contents of the current location.
LF	Advance to the next location without altering the contents of the current location.
^(circumflex)	Return to the previous location without altering the contents of the current location.
CTRL/Z	Return to the previous question.
CTRL/C	Finish all patching and return to the OPTION: prompt.

PATCH makes each specified change immediately after you press RETURN. Therefore, if you make an error, you must patch the location again to correct your mistake. To check that an entire patch is correct, type CTRL/Z to return to the OFFSET ADDRESS question. Type the same offset, then press LINE FEED to examine all the patched locations.

If the old contents listed for any location do not match the 'New' column in the published patch, restore all locations to their original contents and install the patch again. If you have followed the published procedures correctly and the old contents do not match the published patch, consult your software support representative.

If you patch the initialization code, you must reboot the system. Rebooting loads the changed version of the initialiation code into memory. To perform the bootstrap procedure, follow the instructions in the published patch and use the BOOT option, which is described in Section 3.12.

The examples in the following sections illustrate the use of PATCH.

3.5.2 Patching the Monitor – Example

The following example shows the procedure for patching the installed monitor SIL. The patch in this example is a sample only, NOT a real patch.

```
a    Option: PATCH
b    File to patch? (LF)
c    Module name? OVR
d    Base address? DLNOST
e    Offset address? 300
      Base    Offset  Old      New?
f    032000  000300  006200   ? 4737
g    032000  000302  032711   ? PATCH+10
h    032000  000304  040000   ? ^C
i    Option: PATCH
     File to patch? (LF)
     Module name? RSTS
     Base address? PATCH
     Offset address? 10
      Base    Offset  Old      New?
     023136  000010  000000   ? 6200
     023136  000012  000000   ? 32711
     023136  000014  000000   ? 40000
     023136  000016  000000   ? 207
     023136  000020  000000   ? ^C

     Option:
```

Follow this explanation keyed to the letters that are located in the previous example:

a. Specify the PATCH option, then terminate your response by pressing RETURN.

b. Press LINE FEED to patch the installed monitor SIL.

c. Respond to the MODULE NAME question with OVR.

d. Enter the global symbol DLNOST in response to the BASE ADDRESS question.

e. Specify 300 which represents the number of octal bytes offset from the base name DLNOST.

f. Enter the new value.

g. Type the new value which shows the use of additions.

h. Type CTRL/Z, echoed as ^C, to exit from the PATCH option.

i. Notice the second use of the PATCH option continues the installation of this patch.

3.5.3 Patching the Initialization Code – Example

The following example shows the procedure for patching the initialization code. The patch in the example is a sample only, NOT a real patch.

```
a    OPTION: PATCH
b    File to patch? INIT.SYS
c    Base address? DEFPAT
d    Offset address? 0
      Base    Offset  Old      New?
     117002  000000  016700   ? 4737
     117002  000002  177672   ? 104260
     117002  000004  042705   ? ^Z
e    Offset address? ^Z
     Base address? 104260
     Offset address? 0
      Base    Offset  Old      New?
     104260  000000  000000   ? 22127
     104260  000002  000000   ? 40
     104260  000004  000000   ? 17375
     104260  000006  000000   ? 105711
     104260  000010  000000   ? 261
     104260  000012  000000   ? 207
     104260  000014  000000   ? ^Z
f    Offset address? 0
      Base    Offset  Old      New?
     104260  000000  022127   ? (LF)
     104260  000002  000040   ? (LF)
g    104260  000004  017375   ? (LF)
     104260  000006  105711   ? (LF)
     104260  000010  000261   ? (LF)
h    104260  000012  000207   ? ^C

     Option:
```

The letters that prefix the explanation that follows are keyed to identifying letters located within the previous PATCH example. Follow the lettered steps through this sequence of steps:

a. Specify the PATCH option, then terminate your response by pressing RETURN.

b. Type the name of the file to patch which is in this case INIT.SYS, the system initialization code.

c. Enter the base address of DEFPAT.

d. Indicate an offset address of zero by typing 0.

e. Note the use of CTRL/Z to return to the previous question.

f. Enter the patch values and CTRL/Z to the OFFSET ADDRESS question.

g. Press LINE FEED, after entering the patch, to examine successive locations to ensure that the patch was properly installed.

h. Type CTRL/C to terminate the patching operation and return to the OPTION: prompt.

3.5.4 PATCH Option Error Messages

Table 3-6 summarizes the error messages that can occur during the PATCH option dialogue.

Table 3-6: PATCH Option Dialogue Error Messages

Message and Meaning
ADDRESS ABOVE MODULE BOUNDS The address you specified exceeds the upper bound of the module.
ADDRESS BELOW MODULE BOUNDS The address you specified is below the lower bound of the module.
BLOCK OFFSET BEYOND EOF The block offset address you typed is greater than or equal to the number of blocks in the file.
FILE NOT FOUND The initialization code did not find the file you specified in account [0,1] on the system disk.
ILLEGAL FILE NAME The filename you typed is in an incorrect format. The name must not be more than six characters long; the extension must not be more that three characters long. The filename must be alphanumeric and can not contain embedded spaces. Typing LINE FEED in response is illegal if no monitor SIL is installed.
INVALID MODULE NAME The module name you typed is in an incorrect format. The name must be one to six alphanumeric characters.
INVALID CHARACTER The expression line contains an illegal character.
INVALID EXPRESSION The expression contains an illegal symbol name or an invalid operator. Symbol names must be one to six alphanumeric characters. Valid operators are +, -, *, and /.
INVALID SIL FORMAT The file you specified does not contain a valid SIL directory. If the file is not a SIL, append the /N switch to the filename.
MODULE NOT FOUND IN SIL The module you specified is not in the SIL. Press RETURN in response to the MODULE NAME question for a directory of SIL modules.
SYMBOL NOT FOUND IN STB A symbol you typed is not in the symbol table for the module.

3.6 Specifying the Hardware Configuration

With the HARDWR option, you can perform the functions summarized in Table 3–7. The option operates whether or not you have installed a monitor SIL because the settings it affects are written on the system disk, not in the monitor SIL. Thus, when you add or remove system devices you must use the HARDWR option again. If you only change monitors, you need not use the option. This procedure differs from that of the DEFAULT and SET options which are described in this chapter.

If you have not yet used the HARDWR option or have not used the INSTALL option to install a monitor on the system disk, the complete hardware configuration is not available. That is, the initialization code INIT.SYS has not yet scanned the entire hardware configuration. This prevents INIT.SYS from incorrectly treating devices at non-standard addresses.

You can declare any non-standard device characteristics at this time by using the HARDWR suboptions you need. You can enter and verify changes, then exit from the HARDWR option. HARDWR will bootstrap the system disk; INIT.SYS will then scan the entire hardware configuration, applying the changes you have entered.

The INIT.SYS message:

```
ENABLING ONLY CONSOLE, DISKS, AND TAPES.
```

indicates that the initialization code has completed only a partial scan of your system's configuration. The message occurs, for example, when you bootstrap INIT.SYS from the RSTS/E distribution medium.

If you change no device characteristics, you can force INIT.SYS to scan the entire hardware configuration. To initiate the hardware scan, use the INSTALL option to install a monitor SIL, or use the HARDWR suboptions RESET and EXIT. Either of these options will reboot the system disk, if necessary, and cause INIT.SYS to perform a complete hardware scan.

The HARDWR option includes a set of suboptions, which are summarized in Table 3–7.

The LIST suboption lists the current configuration and all requested changes.

The ENABLE and DISABLE suboptions allow you to enable or disable a device controller, not just a single unit. By disabling the RK611 or RK711 (RM) controller, for example, you disable all RK06 and RK07 disk units. To disable or enable devices on a unit-by-unit basis, see Section 3.10.

The CSR suboption enables you to set non-standard values for a device controller's CSR set. The Control Status Register (CSR) set is the unique set of addresses on the UNIBUS to which a device controller responds. When the initialization code is bootstrapped, it ascertains the number of each type of controller on the system by applying standard rules for finding CSR sets.

DIGITAL Field Service representatives follow these rules when they install systems; thus, you probably will not need to use the CSR suboption. Refer to Appendix C for a brief discussion of the hardware checks performed by the initialization code.

Table 3-7: HARDWR Suboptions

Suboption	Function
LIST	Lists the system hardware configuration.
DISABLE	Disables a device controller.
ENABLE	Enables a device controller.
CSR	Declares a non-standard controller address.
VECTOR	Declares a non-standard vector assignment.
RESET	Sets all vectors and addresses to the standard and enables all devices.
DM	Declares DM11-BB and DH11 associations.
TU58	Associates a TU58 with a controller.
UNITS	Associates a disk type with a controller.
HERTZ	Specifies AC line frequency of system.
SWITCH	Specifies CPU Switch Register characteristics.

With the VECTOR suboption, you can specify a non-standard vector for any device controller. A controller vector assignment directs the processor to the proper routines when that controller requests an interrupt. When you bootstrap the system, the initialization code ascertains each device controller's vector assignment by forcing each device to interrupt. If a device does not respond, the initialization code prints a message at the console terminal and disables that device. If more than one device has the same vector assignment, the initialization code prints a message and disables all except the first one it finds. Because the initialization code can find the vector address of most functioning hardware, even if the vector is non-standard, the VECTOR suboption should not normally be used except for non-DIGITAL hardware and for card readers with non-standard vectors.

The RESET suboption returns all CSR settings and vector assignments to the standard addresses, enables all devices, and associates each DM11-BB unit with the DH11 multiplexer that has the same unit number. If you have no HARDWR changes, you can use RESET. This will cause INIT.SYS to reboot the system device and execute a full configuration scan.

The DM suboption allows you to specify the DM11-BB modem control multiplexer that is associated with each DH11 terminal multiplexer. In a similar manner, the TU58 suboption allows you to specify the TU58 cassette tape drive that is associated with each DL11 terminal interface.

The HERTZ suboption allows you to specify the AC line frequency of your system, and the SWITCH suboption allows you to specify the characteristics of your system's CPU Switch Register.

To use the HARDWR option, type HARDWR or HA. In response, the option requests a suboption name. Type the name of a suboption from Table 3–7. You need to type only the first two characters. HARDWR then performs the dialogue (if any) for the suboption you selected. If you indicate any changes to the controller characteristics, HARDWR does not affect them immediately. Instead, it applies them after you exit from the HARDWR option, when it bootstraps the system disk. Thus, you can verify the accuracy of the changes before the HARDWR option applies them. If you have made any errors, you can correct them before HARDWR applies them.

After you have made and verified the changes you need, type EXIT or press LINE FEED in response to the HARDWR SUBOPTION question. HARDWR effects the changes, bootstraps the system disk, and prints one of the following messages:

Message and Meaning

```
OPTION:
```

You have made no HARDWR changes; also, the initialization code has previously completed a scan of the system's hardware configuration.

```
nn CHANGES PENDING
REBOOTING...
```

You have made nn changes which will be implemented by the initialization code when it bootstraps the system disk. A complete hardware scan is done as the system reboots.

```
ENABLING ALL DEVICES.
nn CHANGES PENDING
REBOOTING
```

The initialization code has previously completed only a partial scan of the system's hardware configuration. You have made nn changes (or have used the RESET suboption). The changes are now applied by the initialization code, and a complete hardware scan is done as the system reboots.

To exit from the HARDWR option without applying any changes, type CTRL/C. The CTRL/C response returns you to the OPTION: prompt.

Questions in the DISABLE, ENABLE, CSR, and VECTOR suboptions request the name of a controller. To get a list of valid controller names, type a

question mark (?) in response to the question. The suboption responds with the following list:

```
Name   Max no   Description

 TT         1    Console terminal
 RF         1    RF11 fixed head disk
 RS         1    RS03/RS04 fixed head disk
 RK         1    RK05/RK05F disk
 RL         1    RL01/RL02 disk
 RM         1    RK06/RK07 disk
 RP         1    RP02/RP03 disk
 RR         1    RM02/RM03 disk
 RB         1    RP04/RP05/RP06 disk
 TM         1    TU10/TE10/TS03 magtape
 TU         1    TU16/TE16/TU45/TU77 magtape
 TS         8    TS04 magtape
 TC         1    TC11 DECtape
 PR         1    Paper tape reader
 PP         1    Paper tape punch
 LP         8    Line printer
 RX         4    RX11 floppy disk
 CR         1    CR11/CM11 card reader
 CD         1    CD11 card reader
 KL        16    KL11/DL11A/DL11B single line interface
 DL        31    DL11C/DL11D single line interface
 DE        31    DL11E single line interface
 DP        31    DP11 synchronous line interface
 DC        32    DC11 single line modem interface
 KG         8    KG11 CRC arithmetic unit
 DM        16    DM11-BB modem control for DH11
 DJ        16    DJ11 16 line multiplexer
 DH        16    DH11 16 line multiplexer
 DU        16    DU11 single line synchronous interface
 D1        16    DUP11 single line synchronous interface
 XM        16    DMC11 interprocessor link
 XK        16    KMC11 microprocessor
 DZ         8    DZ11 8 line multiplexer
```

The first column contains the controller names. The second column, Max no., is the maximum number of each type of controller that can be used by RSTS/E. The final column describes the controller.

Your reply to a request for a controller should be a 2-character controller name followed by the number of the controller you plan to change. Controllers are numbered from 0 to the maximum possible number of controllers minus 1. You can omit a controller number of 0 if only one such controller is possible. For example, RK and RK0 are equivalent responses because a PDP-11 can have only one RK05 controller. On the other hand, LP and LP0 are not equivalent. LP0 designates line printer controller number 0; LP is invalid because more than one line printer controller can be on the system.

To exit from a suboption without specifying a controller name, type CTRL/Z in response to the question.

Controller characteristics set by the HARDWR option remain with the disk device rather than with the RSTS/E Monitor. Therefore, when you install a different monitor on the same system disk, you need not reset the device controller characteristics. If you create and subsequently bootstrap a new

system disk, however, the initialization code sets all controller characteristics to the standard values and then performs only a partial configuration scan. Thus, if it is necessary, you will need to use the HARDWR option to set non-standard characteristics.

3.6.1 Listing the Hardware Configuration

The LIST suboption prints the current hardware configuration table, including all changes that HARDWR will apply when you exit from the option. The following is a sample listing:

```
HARDWR suboption? LI

1 change pending.

Name   Address Vector  Comments
TT:    177560  060
RS:    172040  204     Units: 0(RS04)
RK:    177400  220     RK05F units: none
RB:    176700  254     Units: 0 (RP04)
TU:    172440  224
TC:    177340  214
LP0:   177514  200
(LP0:  System          Disabled)
DL0:   175610  310
DL1:   175620  320
DL2:   175630  330
DL3:   175640  340
KG0                    Disabled
DM0:   170500  474
DH0:  *160100 *500
DH1:  *160120 *510
DU0:   160060  400

KW11L  177546  100
KW11P  172540  104
SR     177570
DR     177570

Hertz = 60.

Other: FPU, SL

Hardwr suboption?
```

The top line lists the number of changes that HARDWR will implement when you exit from the option. If no changes are pending, the LIST suboption omits this line.

Next, LIST prints the hardware Configuration Table. It contains one line for each device controller that exists on the system. The table also contains an additional line, printed in parentheses, for each controller that has changes pending. This line appears whether or not the controller has a listing line. Thus, if you declare a non-standard characteristic for a controller that does not yet exist on the system, HARDWR prints a parenthetical change line noting the change. In addition, the table contains a line for controllers that are currently either disabled or nonexistent.

Each line is divided into four columns. The first column contains the name and number of the device controller. The second includes the address of the controller's CSR set and the third contains the controller's vector address. Note that, if the device has two vectors, HARDWR prints the lower address; an asterisk (*) precedes a CSR or vector address that is non-standard.

In a parenthetical change line, the Address column contains either a non-standard address or the notation SYSTEM. This notation means that the initialization code will find the CSR set according to the standard fixed and floating address rules when it bootstraps the system disk. (See Appendix C for a discussion of fixed and floating address rules.) The third column in a change line is blank or contains a non-standard vector address that you specified.

The fourth column, for any line, supplies information about the controller. Table 3–8 summarizes the comments that may be in the listing for each controller.

Following the device table there are several lines of information. The information reported will vary with the system configuration and the changes (if any) you have made to the configuration.

The information reported is:

Mnemonic	Line and Meaning
KW11-L	177546 100 If the system has a KW11-L clock, its address and vector are reported.
KW11-P	172540 104 If the system has a KW11-P clock, its address and vector are reported.
SR	177570 VOLATILE DISABLED If the CPU has a Switch Register, its address is reported. If you have used the SWITCH suboption to specify Switch Register VOLATILE or DISABLED, that choice is reported.
SR	VOLATILE DISABLED The CPU does not have a Switch Register, but you have used SWITCH suboption to ENABLE or DISABLE it.
(SR	DISABLED) ENABLED VOLATILE There is a pending change from SWITCH suboption.
DR	177570 If the CPU has a Display Register, its address is reported.
HERTZ 50 60	The system's AC line frequency is always reported.
(HERTZ = 50) 60	There is a pending change to the system's AC line frequency.
CIS	The CPU has the Commercial Instruction Set option.
FPU	The CPU has the Floating Point Processor option.
FIS	The CPU has the Floating Instruction Set option (PDP11/40 only).
SL	The CPU has a stack limit register.
MED	The CPU has the Maintenance Examine/Deposit instruction.

Mnemonic	Line and Meaning
CACHE	The CPU has main memory cache.
CACHE W/ADDRESS	The CPU retains address information upon a memory fault.
22-BIT ADDRESSING	The CPU supports more than 124KW of memory.
SYSTEM ID = nnnnn	The contents of the CPU identification register are reported, if the register exists.

Table 3-8: Possible Comments in the Configuration Listing

Device	Comment and Meaning
ALL	Disabled Device is (or will be) disabled.
ALL	Not found Device has a non-standard CSR set, but did not respond when you last bootstrapped the system.
RF	n platters n is the number of disk platters present.
RS	BAE=+xxx BAE indicates that the device controller supports 22-bit addressing and has a Bus Address Extension register at the specified offset from its CSR base. units: m...t m through t are unit numbers of drives that exist on the controller (8 are possible). In parentheses after each unit number is the disk type. Following the disk type is IL, if that unit interleaves sectors.
RK	RK05F units: n/m n and m are the even and odd unit numbers of the RK05F drive. RK05F units: none No RK05F units are on the system.
RL	units: m(RL01)... p(RL01) m through p are unit numbers of drives that exist on the controller (4 are possible). In parentheses after each unit number is the disk type.
RM	units: m(RK07)... t(RK07) m through t are unit number of drives that exist on the controller (8 are possible). In parentheses after each unit number is the disk type.
RP	RP03 units: m...t m through t are unit numbers of RP03 disks. (note that 8 units are possible.) Unit numbers of RP02 drives are not listed.
RB,RR	BAE=+xxx BAE indicates that the device controller supports 22-bit addressing and has a Bus Address Extension register at the specified offset from its CSR base. units: m(RM02)... t(RM02) m through t are unit numbers of drives that exist on the controller (8 are possible). In parentheses after each unit number is the disk type. Following the disk type is DP, if that unit is a dual-ported disk.

(continued on next page)

Table 3–8: Possible Comments in the Configuration Listing (Cont.)

Device	Comment and Meaning
TU	BAE=+xxx BAE indicates that the device controller supports 22–bit addressing and has a Bus Address Extension register at the specified offset from its CSR base. units: m(TU16@TM02#X)... t(TU16@TM02#X) m through t are unit numbers of drives that exist on the controller (8 are possible). In parentheses after each unit number are the tape type, formatter type, and the formatter number. The TU16, TE16, TU45, and TU77 represent the valid device types for the TU controller and the TM02 and TM03 are the valid formatter types. The formatter number (#X) can be any number from 0 to 7.
DM	DHn DH11 controller number n is logically associated with this DM11–BB unit. No DH11 No DH11 controller is logically associated with this DM11–BB unit.
DE, DL, KL	units: m(TU58)... t(TU58) m through t are unit numbers of DL11 controllers that have TU58 cassette tape drives connected to them.

3.6.2 Disabling a Device Controller

The DISABLE suboption allows you to make a device controller unavailable for time-sharing use. This suboption has two possible uses: (1) to disable a controller that needs repairs, and (2) to disable an erroneously detected controller. In certain circumstances, the initialization code interprets a non-standard device as a normal PDP–11 device, and therefore enables the standard PDP–11 device. With the DISABLE suboption, you can disable the non-existent PDP–11 device.

The following is an example of the DISABLE suboption:

```
HARDWR suboption? DIS

  Controller to disable? DM0

HARDWR suboption? LIST

2 changes pending.

Name  Address Vector  Comments
TT:    177560   060
RF:    177460   204   2 platters
RK:    177400   220   RK05F units: none
RP:    176700   254   RP03 units: 0 1
TM:    172520   224
TC:    177340   214
PR0:   177550   070
PP0:   177554   074
LP0:   177514   200
```

```
 DPO:                        Disabled
(DPO:    System)
 DMO:    170500    300
(DMO:    System              Disabled)
 DHO:    160020    310

 KW11L   177546    100
 KW11P   172540    104
 SR      177570
 DR      177570

 Hertz = 60.

 Other: FPU, SL

 HARDWR suboption?
```

In the example, you specify DM0 as the device controller to disable. The initialization code executes the DISABLE suboption and returns to the HARDWR SUBOPTION question. You then specify the LIST suboption to verify that DM0 will be disabled when you exit from the HARDWR option.

3.6.3 Enabling a Device Controller

Use the ENABLE suboption to enable a disabled device controller. The following example illustrates the use of the ENABLE suboption:

```
 HARDWR suboption? ENABLE

   Controller to enable? DPO

 HARDWR suboption? LIST

 1 change pending.

 Name   Address Vector  Comments
 TT:     177560   060
 RF:     177460   204   2 platters
 RK:     177400   220   RK05F units: none
 RP:     176700   254   RP03 units: 0 1
 TM:     172520   224
 TC:     177340   214
 PRO:    177550   070
 PPO:    177554   074
 LPO:    177514   200
 DPO:                   Disabled
(DPO:    System)
 DMO:    170500   300
 DHO:    160020   310

 KW11L   177546   100
 KW11P   172540   104
 SR      177570
 DR      177570

 Hertz = 60.

 Other: FPU, SL

 HARDWR suboption?
```

In the example, you enable the DP0 controller. When the initialization code returns to the HARDWR SUBOPTION question, you initiate a list of the hardware configuration to verify the change.

3.6.4 Declaring a Non-Standard Controller Address

The CSR suboption allows you to specify a non-standard address for a device controller's CSR set. Use the CSR suboption when a controller is installed at the wrong place or when you need to rearrange device controller assignments.

To invoke the CSR suboption, type CSR. The suboption responds by requesting a controller name and address. In response, type the controller name as described in Section 3.6. When the CSR suboption prints the question, type the address of the lowest register in the controller's CSR set. The address must be an even 6-digit octal number greater than 160000. To remove a non-standard address and revert to the standard setting, type RE or REMOVE instead of a response.

To return to the HARDWR SUBOPTION question without specifying a new address, type CTRL/Z.

The following example shows the use of the CSR suboption:

```
HARDWR suboption? CSR

  Controller with non-standard address: DH0
  New controller address? 160100

HARDWR suboption? LI

1 change pending.

Name  Address Vector  Comments
TT:     177560   060
RS:     172040   204   Units: 0(RS04)
RK:     177400   220   RK05F units: none
RB:     176700   254   Units: 0(RP04)
TU:     172440   224
TC:     177340   214
LP0:    177514   200
DL0:    175610   310
DL1:    175620   320
DL2:    175630   330
DL3:    175640   340
KG0:    170700
DM0:    170500   474
(DH0:  *160100)
DU0:    160060   400

KW11L   177546   100
KW11P   172540   104
SR      177570
DR      177570

Hertz = 60.

Other: FPU, SL

HARDWR suboption?
```

In this example, you request the CSR suboption, type DH0 as the controller, and specify a new address of 160100. To verify the address change you then request the LIST option.

3.6.5 Declaring a Non-Standard Vector Address

The VECTOR suboption permits you to specify a non-standard vector address for a device controller. Use VECTOR if the initialization code incorrectly determines a controller's vector address or if the hardware configuration includes more than one card reader or paper tape reader.

If you have a non-standard device controller, DIGITAL strongly recommends that you use *only* the CSR suboption. This tells INIT.SYS to find the device at its non-standard UNIBUS address, but still lets INIT.SYS determine the device's vector. If the device is functioning properly, INIT.SYS will find the device's non-standard vector. INIT.SYS can determine the vector locations for all devices except card readers and high-speed paper tape readers. If one of these devices has a non-standard vector, you must use the VECTOR suboption to specify its vector location.

You must be careful when assigning non-standard vectors to devices. INIT.SYS checks all device vectors assigned through the VECTOR suboption or determined automatically, against a table of reserved locations. INIT also determines if a vector location is used by more than one device. It if finds any conflict, INIT.SYS prints the message:

```
Vector for Device XXn: (vvv) already in use - device disabled.
```

where *vvv* is the octal address of the erring vector.

The RSTS/E reserved locations, which may not be used as device vectors, are:

Address	RSTS/E Usage
0–2	Detection of jumps to 0 and traps to 0.
4–36	System trap vectors.
40–56	Reload start addresses, failure HALT.
100–102	KW11-L line frequency clock vector.
104–106	KW11-P programmable crystal clock vector.
110–112	Jump to 0 handling.
114–116	Memory parity trap vector.
144–146	Crash dump handling.
234–236	Statistics handling.
240–242	PIRQ trap vector.
244–246	FPP or FIS exception trap vector.
250–252	Memory Management Unit trap vector.

VECTOR requests the device controller's name and its new vector address. Type the name as described in Section 3.6. The vector address is the 3-digit octal address of the lowest vector for the device controller. The address must be even. To remove a non-standard vector address and return to the standard, type RE or REMOVE. Type CTRL/Z to return to the HARDWR SUBOPTION question without specifying a new vector address.

The following is an example for the VECTOR suboption:

```
HARDWR suboption? VEC

  Controller with non-standard vector? DH0
  New vector address? 500

HARDWR suboption? LI

1 change pending.

Name   Address  Vector   Comments
TT:     177560    060
RS:     172040    204    Units: 0 (RS04)
RK:     177400    220    RK05F units: none
RB:     176700    254    Units: 0 (RP04)
TU:     172440    224
TC:     177340    214
LP0:    177514    200
DL0:    175610    310
DL1:    175620    320
DL2:    175630    330
DL3:    175640    340
KG0:    170700
DM0:    170500    474
(DH0:  *160100   *500)
DU0:    160060    400

HARDWR suboption?
```

In this example, you have already set a non-standard controller address for DH0. The next task is to set a non-standard vector address for DH0. In response to the NEW VECTOR ADDRESS: question, you type 500, then list the configuration to verify the vector address.

3.6.6 Resetting the Configuration

The RESET suboption sets all device characteristics to the standards. It removes all non-standard CSR sets and vector addresses and enables all devices. The following example shows the effects of the RESET suboption.

```
HARDWR suboption? LIST

3 changes pending.

Name   Address  Vector   Comments
TT:     177560    060
RF:     177460    204    2 platters
RK:     177400    220    RK05F units: none
RP:     176700    254    RP03 units: 0 1
TM:     172520    224
(TM:    System   *226)
TC:     177340    214
PR0:    177550    070
(PR0:  *160002)
PP0:    177554    074
LP0:    177514    200
DP0:                     Disabled
(DP0:   System)
DM0:    170500    300
DH0:    160020    310
```

```
HARDWR suboption: RESET

HARDWR suboption? LIST

1 change pending.

Name   Address  Vector   Comments
TT:     177560    060
RF:     177460    204    2 platters
RK:     177400    220    RK05F units: none
RP:     176700    254    RP03 units: 0 1
TM:     172520    224
TC:     177340    214
PR0:    177550    070
PP0:    177554    074
LP0:    177514    200
DP0:                     Disabled
(DP0:   System)
DM0:    170500    300
DH0:    160020    310

HARDWR suboption?
```

For the purposes of this example, the LIST suboption is used before and after the RESET suboption to show the effects of resetting the configuration. The first listing shows that two devices (TM: and PR0:) would have non-standard addresses and vectors set if you were to exit from the HARDWR option. A third device, DP0:, is disabled and would be enabled with a standard address and vector. After the use of the RESET suboption, the listing shows that TM: and PR0: have returned to standard characteristics. Note that the listing for DP0: did not change because DP0: was already designated to be enabled with standard characteristics.

3.6.7 Declaring DM11-BB and DH11 Associations

The DM suboption allows you to specify the DM11-BB modem control multiplexer that is associated with each DH11 terminal interface multiplexer. The DH11 terminal interface multiplexer has 16 lines (which are numbered from 0 to 15), any number of which can be modem lines. A PDP-11 can have up to 16 DH11s. The DM11-BB modem control multiplexer also has 16 lines. Each line can answer one modem line on a DH11. A PDP-11 can have only as many DM11-BBs as DH11s.

DM11-BB modem control lines and DH11 modem lines must meet the following conditions under RSTS/E:

1. A DM11-BB can answer modem lines on only one DH11.
2. A DH11 can be associated with only one DM11-BB.
3. The line numbers of the DH11 modem line and its associated DM11-BB line must be the same. For example, a DM11-BB line number 4 can control only a DH11 modem line number 4.

The RSTS/E software cannot ascertain which DM11-BB unit is associated with a DH11. Therefore, RSTS/E assumes that DM11-BB unit number 0 controls modem lines on a DH11 unit number 0, and so forth. On most systems, the unit numbers are equal. RSTS/E does not, however, require that

DH11 and DM11-BB unit numbers be equal. Thus, DM11-BB unit number 2 can control modem lines on DH11 unit number 4, as long as the preceding rules are followed.

If you want a different association, the DM suboption allows you to specify the DM11-BB unit that is associated with each DH11 on the system. The suboption requests the DM11-BB unit number in the following prompt:

```
DH FOR DMn (xxx)?
```

In response, type the number of the DH11 unit with which DM11-BB unit number n is associated or press LINE FEED to accept the current setting, which appears in parentheses. If no DH11 is currently associated with the DM11-BB, a question mark (?) appears in parentheses. If DM11-BB unit n is not on the system the notation NX (for nonexistent) appears in parentheses. HARDWR requests DH11 unit numbers for all 16 possible DM11-BB units whether or not the system includes 16 units. Therefore, you can logically associate a DH11 unit with a DM11-BB that is not yet on the system, but is expected in the future. You need not specify associations for nonexistent DM11-BBs; you can type CTRL/Z at any time to return to the HARDWR SUBOPTION question. Note, however, that CTRL/Z causes the system to make no associations for the remaining DM11-BB units, and cancels the assumption that DHn is associated with DMn.

The following is an example of DM:

```
HARDWR suboption? DM
  DH for DM0 (0) ?LF
  DH for DM1 (1, NX)? ^Z

HARDWR suboption?
```

In the example, you associate DH0 with DM0, and then make no more associations because the system includes only 1 DH11 and 1 DM11-BB.

3.6.8 Declaring DL11 Associations

You use the TU58 suboption to specify the DL11 single line terminal interface controller that is associated with each TU58 cassette tape drive. The initialization code will scan all DL11 interfaces to determine which controllers have TU58's connected to them. Usually this will be sufficient to allow you to use TU58s on your system.

To associate a DL11 controller with a TU58 tape drive, you enter the DL11 controller name and unit number in response to the following prompt:

```
DL for DDn (xxx)?
```

If you want to accept the default setting that appears in parentheses, press LINE FEED. The suboption prints a question mark (?) if there are no DL11s associated with a TU58. HARDWR requests DL11 unit numbers for all 8 possible TU58's whether or not they were found on the system. You can type

CTRL/Z if you do not want to specify associations for nonexistent TU58s. A CTRL/Z response instructs the system to make no associations for the remaining TU58 units.

The following example illustrates the use of the TU58 suboption:

```
HARDWR suboption? TU58
DL for DD0 (DL0)? RET
```

Type the controller and unit number of the DL11 controller to associate with this TU58. Press LINE FEED to use the unit number indicated. Type CTRL/Z if there are no more TU58s.

```
DL for DD0 (DL0)? LF
DL for DD2 (?)? LF
DL for DD4 (?)? LF
DL for DD6 (?)? LF

HARDWR suboption?
```

In the example, you press RETURN to learn how the INIT dialogue wants you to respond. After the message prints, you accept the default DL0 setting by pressing LINE FEED. Since no other TU58's exist on your system, you press LINE FEED to the remaining questions. A CTRL/Z to the DL FOR DD2 prompt would have returned you to the HARDWR suboption prompt sooner.

3.6.9 Specifying AC Line Frequency

The HERTZ suboption allows you to specify the correct AC line frequency of your system. Since the AC line frequency is the basis for all system timing, you will need to use the HERTZ suboption if the LIST suboption shows an incorrect line frequency.

To use the HERTZ suboption, type HERTZ in response to the HARDWR SUBOPTION question. The prompt returned is:

```
NEW AC LINE HERTZ?
```

Type 50 if your AC line frequency is 50 Hz (commonly used in the United Kingdom); Type 60 if your AC line frequency is 60 Hz.

3.6.10 Specifying CPU Switch Register Characteristics

The SWITCH suboption allows you to specify the characteristics of your CPU's Switch Register. You define the characteristics of your CPU's Switch Register by typing SWITCH in response to the HARDWR SUBOPTION question, then typing ENABLE, DISABLE, or VOLATILE in response to the following question:

```
SWITCH REGISTER?
```

The SWITCH suboption categories are defined in Table 3–9. The system uses the characteristics you specify to determine procedures for recovery after a

power failure or other types of system crashes. For related information, refer to the *RSTS/E System Manager's Guide.*

Table 3-9: SWITCH Suboption Responses

Response	Meaning
ENABLE	Your CPU Switch Register has 2-position toggle switches and you want to use them to control: a) Automatic Restart after a system crash. b) The optional Monitor Statistics Gathering Package. To enable Automatic Restart all switches must be in the up position. Enable the Monitor Statistics Gathering Package by placing switches 0 and 15 in the up position.
DISABLE	Your CPU has no Switch Register, or you wish to prevent the Switch Register Control of: a) Automatic Restart. b) Statistics. RSTS/E will behave as if all switches are always down.
VOLATILE	Your CPU Switch Register is volatile; that is, it loses its contents upon a power failure. If RSTS/E encounters a power failure, it will ignore the Switch Register and will always reboot and perform an automatic restart. Note that a volatile Switch Register does control restarts after other types of system crashes and does control Monitor Statistics.

3.6.11 Using the UNITS Suboption

You can use the UNITS suboption to instruct the system to consider a disk a valid device even when the disk is disabled. Usually, if a disk malfunctions, you must power the drive down, bring it off-line, and call field service to rectify the problem. If RSTS/E should go down and then come up again during the time the disk is being repaired, the initialization code resets the hardware configuration table to indicate that the device is no longer part of the system configuration. Thus, when the disk becomes operational and you need to reestablish it as part of the system, you must bring RSTS/E down and then up again to allow the initialization code to update its configuration table. This process permits the initialization code to acknowledge the reappearance of the previously disabled device and thereby add the device to its configuration table. To prevent having to reset the table by bringing the system down, use the UNITS suboption to identify the names of those disks which are to remain permanently in the configuration table. The disks that you specify with the UNITS suboption will not be deleted from the table even if the devices become disabled.

To invoke the UNITS suboption, type at least the first two letters of the word UNITS in response to the HARDWR option prompt, then press RETURN. The HARDWR option responds by printing the following question:

```
DISK TO SET UNITS FOR?
```

The question asks you for the two character device mnemonic of the disk you want either to 1) remain permanently in the system configuration table or 2) delete from the permanent configuration table. Press RETURN to receive a list of legal disk device mnemonics if you do not know what they are. The list that the initialization code prints contains these device mnemonics: DS, DK, DL, DM, DP, DR, and DB. When you have decided which disk to use, type its mnemonic and press RETURN. The question the initialization code asks next appears as follows:

```
UNIT?
```

Type the device unit number which is any number in the range from 0 to 7, and terminate your response by pressing RETURN. UNITS next asks you for the disk device type in the following question:

```
TYPE OF THIS UNIT?
```

Since several disk types can be associated with one disk device mnemonic, the UNITS suboption requires that you specify the type of disk. Press RETURN for a list of all valid responses. For example, a legal response for DB disks is RP06. If the unit is currently attached to the system, the easiest answer is LINE FEED which specifies the attached device. In this case, the following questions do not appear. Also, rather than specifying a disk type, you can type the word REMOVE to delete the device reference you specified previously. This is the procedure you must follow to allow INIT to disable a disk that you previously specified UNITS for. After you terminate a disk type with the RETURN key, the UNITS suboption asks the following question if your response to the TYPE OF THIS UNIT question was DR or DB.

```
DUAL-PORTED?
```

If you respond to this question by pressing RETURN, the initialization code prints the explanatory message:

```
Can this drive be accessed by more than one computer?
```

Even though RSTS/E is not able to use the dual-ported feature of these disks, it needs to know whether RM02/RM03 or RP04/RP05/RP06 disks are dual-ported, in order to recognize them when they come on-line.

If the device type response to the TYPE OF THIS UNIT question was RS03 or RS04, then UNITS asks the next question:

```
INTERLEAVED?
```

If the RS03 or RS04 disk that you specified is interleaved, type YES or Y then press RETURN. Otherwise, type NO or N, then press RETURN. This information is used to recognize the disk when it comes on-line.

3.6.12 HARDWR Option Error Messages

Table 3–10 summarizes the error messages that can occur during the dialogue of the HARDWR option.

Table 3–10: HARDWR Option Error Messages

Suboption	Message and Meaning
CSR	ADDRESS MUST BE AN EVEN OCTAL NUMBER GREATER THAN 160000. You specified an invalid address. Type an address that meets the requirements.
DISABLE	CANNOT DISABLE CONSOLE TERMINAL You tried to disable the console terminal.
DISABLE	CONTROLLER ALREADY DISABLED You tried to disable a disabled controller.
ENABLE	CONTROLLER NOT DISABLED You tried to enable an enabled controller.
DISABLE, ENABLE,CSR, VECTOR	CONTROLLER NUMBER MISSING You did not specify a controller number for a device that has multiple controllers.
DISABLE, ENABLE,CSR, VECTOR	CONTROLLER NUMBER MUST BE LESS THAN nn The controller number you typed is larger than the maximum of nn.
DM	DH11 ALREADY ASSIGNED TO A DM11-BB The DH11 unit you specified is already assigned to a DM11-BB.
DISABLE, ENABLE,CSR, VECTOR	INVALID CONTROLLER NAME The first two characters you typed did not name a valid device controller. Type ? to obtain a list of valid controller names and try again.
DISABLE, ENABLE,CSR, VECTOR	INVALID CONTROLLER NUMBER The controller number you typed is not an integer. Type the number in the correct format.
DM	INVALID RESPONSE The unit number you specified is not a decimal number from 0 to 15.
VECTOR	VECTOR MUST BE AN EVEN OCTAL NUMBER LESS THAN 1000. You specified an invalid address. Type an address that meets the requirements.

3.7 Installing a Monitor

Use the INSTALL option to designate the monitor Save Image Library (SIL) that you will use for time sharing. You can use INSTALL to change to a different monitor any time the initialization code is running. Therefore, you can retain more than one monitor on one system disk. After installing a newly generated monitor, you must use the DEFAULT option to set defaults for that monitor. The monitor that you install in this step is the default monitor for all operations until you use the INSTALL option again to install another monitor SIL. When you are generating a SYSGEN system, the name of the monitor you should install is SYSGEN. When you are generating a Target system, the

monitor has the name you specified during the configuration questions. Examples of the use of the INSTALL option follow.

If you are using the INSTALL option for the first time on the current system disk and the initialization code has not yet completely scanned the hardware configuration, the INSTALL option will reboot the system disk and make a complete scan of the hardware configuration. A sample dialogue of this situation is:

```
Option: INSTALL
  SIL? SYSGEN
  REBOOTING...
RSTS V7.0 (DB0)
Option:
```

To obtain a list of all SIL files in account [0,1], press RETURN in response to the SIL question.

If the initialization code has already done a complete scan of the hardware configuration, the INSTALL option does not bootstrap the system disk. A sample dialogue of this situation is:

```
Option: INSTALL
  SIL? RSTS
Option:
```

Thus, the INSTALL option prompts you for the name of the monitor SIL to install, performs consistency checks on the specified SIL, and bootstraps the system disk (when necessary). Execution of the INSTALL option takes 30–40 seconds. Table 3–11 contains the error messages that can appear when you respond to the prompt.

Table 3–11: INSTALL Option Dialogue Error Messages

Message and Meaning
FILE NOT FOUND The installation code did not find the SIL file that you specified on the system disk in account [0,1].
ILLEGAL FILE NAME The file name you typed is not one to six alphanumeric characters.
INVALID SIL FORMAT The file you specified does not have a valid SIL index block.

After you type a valid response, the option ascertains that the SIL you named contains all the necessary modules. If a module is missing or in an incorrect format, the INSTALL option prints an error message and returns to the OPTION: prompt. These error messages are explained in Appendix A.

If a monitor SIL file is already installed, the INSTALL option turns off certain bits (in the [0,1] directory entry for that file) so that you can delete the old monitor file (and its default RTS and ERR files, if any). Next, for both a change of monitor and an entirely new system, the option turns on the proper bits to install the monitor SIL and records its name for use by the initialization code. Finally, the option records any defaults that are already set for the newly installed monitor. The installation is then complete.

3.8 Changing System File Allocation

You can 1) list file status, 2) change system file allocation, 3) create and delete files in account [0,1], and 4) examine and update the bad block file with the REFRESH option. REFRESH operates only on disks that have been initialized with the DSKINT option (see Section 3.3). The REFRESH option also includes a CLEAN facility, which rebuilds a disk's storage allocation table (SATT.SYS) and checks the consistency of directories.

If you are generating the first RSTS/E system on the current system disk, you must use REFRESH to create the required swapping file SWAP.SYS. REFRESH also creates additional swapping files, CRASH.SYS, OVR.SYS, ERR.SYS, and BUFF.SYS (which is required if the system will support DECtape). It allows you to position these files at specific places on a disk. File positioning and creation (except SWAP.SYS) are optional operations that can increase system speed and efficiency.

Once you have generated a system, use the REFRESH option when system files need changes. For example, REFRESH permits you to add bad blocks to the bad block file on any disk. If you discover bad blocks, use REFRESH to allocate them to the bad block file.

REFRESH can also allocate file space on nonsystem disks. For example, you can use REFRESH to allocate swapping space on a nonsystem disk (usually a fixed head disk). The REFRESH option can also allocate OVR.SYS and ERR.SYS files on auxiliary disks.

3.8.1 Planning System Files

Before you use the REFRESH option, you should plan which files to include in the system, how large to make them, and where to place them. REFRESH allows you to create the following files:

- Swapping files - SWAP.SYS, SWAP0.SYS, SWAP1.SYS, SWAP3.SYS (SWAP2.SYS does not exist.)
- OVR.SYS
- ERR.SYS
- BUFF.SYS
- CRASH.SYS

If the SYSGEN and Target systems will be on the same (moving head) disk*, you can allocate all system files that you will need later for the Target system while you are tailoring the SYSGEN system. For example, you can allocate a SWAP.SYS file on the system disk at the size needed for the Target system instead of the minimal size file that the SYSGEN system uses. If you plan to use a fixed head disk for swapping files, the overlay code, and error message file, you can also REFRESH it while you are tailoring the SYSGEN system. If you allocate the files for the Target system when you tailor the SYSGEN system, you need not allocate them again after you install the Target monitor. You should use the REFRESH option after installing the Target monitor to list the directory of the Target disk (Section 3.8.3) and ensure that the files are correctly allocated. Note that you need not allocate the Target system files when you tailor the SYSGEN system; you can allocate them after you install the Target monitor if you prefer.

If the SYSGEN and Target systems will be on different disks (or if the Target system will overwrite the SYSGEN system on a fixed head disk), you should not allocate Target system files while tailoring the SYSGEN system. When you use REFRESH in tailoring the SYSGEN system, create only the minimal file necessary for system generation - SWAP.SYS (at least 224 blocks). You can allocate Target system files later when you tailor the Target system (described in Chapter 5).

3.8.1.1 Planning the Swapping Files—The most important and time-consuming of the planning processes concerns the swapping files. You must answer the following three questions to properly plan the swapping files:

1. How many swapping files does this sytem need?
2. Where should the swapping files be placed?
3. How large should each swapping file be?

The cardinal rule for planning swapping files is to anticipate future growth. If you suspect that the system will someday require a larger swap maximum or job maximum than it currently requires, you should allocate enough swapping space to serve your future needs. You should try to reserve this space now because swapping files require contiguous space on a disk. Although you can create contiguous swapping files during time sharing (with the contiguous mode switch in an OPEN statement), DIGITAL does not recommend this procedure. Once many files have been allocated on a disk, space on that disk becomes fragmented. This fragmentation may cause difficulty in allocating contiguous swapping files of sufficient length. Furthermore, if you allocate extra contiguous swapping space, but expected growth does not occur, you can simply release the space for other use.

---

*DIGITAL recommends this method only for large, moving head disks of the DM, DP, DR, or DB type.

RSTS/E can use swapping space in one to four swapping files, numbered from 0 to 3. Swap file 2 is permanently assigned to the file SWAP.SYS on the system disk. The other swapping files (0, 1, and 3) can be associated with swapping files or non-file structured disks. You can specify these associations on-line by using the UTILTY program or the INIT.BAC system program. When you associate swapping files with swapping slots, DIGITAL recommends that you use the name SWAP0.SYS for swap file 0, SWAP1.SYS for swap file 1, and SWAP3.SYS for swap file 3. This manual follows that naming convention.

In allocating swapping space, you should consider the way in which the system is used and the number of event-driven jobs on the system. (Event-driven jobs are not run unless a particular event occurs. Events that cause these jobs to be run are the end of a SLEEP or hibernation state, and the reception of a message.)

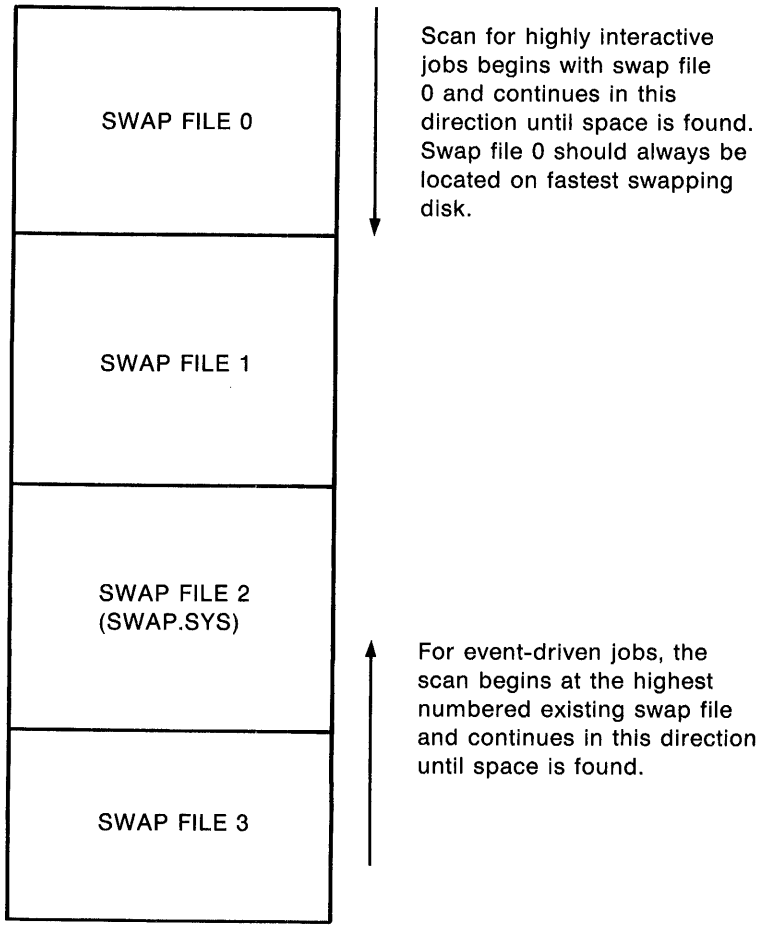
The system scans the swap files whenever it needs to swap a job out of memory. The system places event-driven jobs in the first swap file with available space that it finds during a "bottom up" scan (from swap file 3 to swap file 0). Since these jobs do not require frequent swapping, they can be swapped onto a slow or heavily used disk without noticeably degrading performance. The system performs a "top down" scan (swap file 0 to swap file 3) when it swaps out a highly interactive job (one requiring frequent processor intervention). Whenever possible, highly interactive jobs should be swapped to the fastest area available. Figure 3–1 illustrates the swap file scanning procedures.

You should also consider the system's disk configuration. If the system has only one disk, you need only create the one required swapping file, SWAP.SYS, on that disk. The file should be at least large enough to hold a number of jobs equal to the default job maximum.

For a system with more than one disk, planning swapping files is more complicated. You need to choose the disk or disks on which to place the swapping files and calculate the size of each file.

First, consider a system with both moving head and fixed head disks. Assume that the system disk is a moving head device. Unless you need the speed of access on a fixed head disk for other files (such as a frequently accessed database index), you should place all swapping files (except SWAP.SYS, which must be on the system disk) on a fixed head disk. If you can spare an entire fixed head disk, you can use it non-file structured as a single swapping unit. To do so, you should first use the DSKINT option to check the disk for bad blocks. If the disk contains no bad blocks, you need not use REFRESH on it; you can simply use INIT.BAC at start-up time to install it as a swapping unit. (Refer to the *RSTS/E System Manager's Guide* for a discussion of INIT.BAC.) Once you install it, RSTS/E can use the disk only as a swapping unit. Remember that a swapping file can extend across platter boundaries on a DF disk, but cannot extend across disk unit boundaries for other fixed head disks.

Figure 3–1: Swap File Scanning



DIGITAL recommends that, if at all possible, you place the files OVR.SYS and ERR.SYS on an initialized fixed head disk to increase system performance. You can then use the remaining space on the disk for swapping.

If the fixed head disk contains bad blocks, you can use it only as a file-structured unit. Use REFRESH to set up a swapping file on the disk. You can place other files on the disk if enough space remains. Note that the file SWAP.SYS must reside on the system disk and must be large enough for at least two jobs at size SWAP MAX. (The system requires this file as a place to swap a job when time sharing begins but before the other swapping files are installed.) Therefore, for a system that will swap all jobs onto a single fixed head disk, you must create two swapping areas: SWAP.SYS (which can be of minimal size) on the system disk, and SWAP0.SYS (which should be large enough to hold the default maximum number of jobs at size SWAP MAX) on the auxiliary fixed head disk. Also, it is advantageous to make SWAP.SYS large enough to swap all jobs so the JOB MAX does not have to be reduced if a swapping device goes down.

If you cannot place all swapping files on a fixed head disk, you should consider the average number of jobs that will run on the system. If the system usually runs near the default job maximum, you should allocate as large a swapping space as possible on a fixed head disk. Name this file SWAP0.SYS if the fixed head disk is a nonsystem disk or SWAP.SYS if the fixed head disk is the

system disk. The system will swap highly interactive jobs into this file. You should also allocate a swapping file on a moving head disk. This file should have a high number (SWAP3.SYS if on a nonsystem moving-head disk or SWAP.SYS if on a moving head system disk) so that the system will swap event-driven jobs into it.

Some systems usually run below the default job maximum with approximately the number of jobs that fit into a swapping file on a fixed head disk. For such a system, you should first estimate the number of jobs that are inactive at any one time. Inactive jobs usually include ERRCPY, QUEMAN, OPSER, spoolers, and similar programs. Then, estimate the amount of swapping space necessary to accommodate any jobs over those that will fit on the fixed head disk up to the default job maximum. For example, if approximately 18 jobs usually run on the system (and will fit on the fixed head disk), but the default job maximum is 25, calculate the amount of space necessary to accommodate the extra 7 jobs. (The 7 jobs require 7 times the SWAP MAX multiplied by 4 blocks. Four blocks equal 1024, or 1K words.) For this system, you should allocate 3 swapping files. SWAP0.SYS, on a fixed head disk, should be large enough to hold the highly interactive jobs. SWAP3.SYS, also on a fixed head disk, should be able to hold the event-driven jobs. SWAP.SYS, on the moving head system disk, can accommodate all jobs.

If your system has more than one moving head disk and no fixed head disk space is available for swapping files, you need to consider one more possibility. If you are certain that two disks will always be mounted, you can create one swap file on each of two disks instead of creating one larger file on only one disk. Make the two files equal in size. This arrangement reduces access time for moving head disks because it uses the overlapped seek drivers efficiently. If, however, one of the disk drives becomes unavailable for use during time sharing, the system limits the maximum number of jobs that can log in. RSTS/E logs in only as many jobs as the existing swapping files can accommodate. You can run the system with a reduced job maximum, or you can try to allocate additional swapping space on another disk.

Now, consider the question of size. A swapping file must be (4 times SWAP MAX) blocks long to hold one job of size SWAP MAX. Thus, the total swapping space required on a system is (JOB MAX multiplied by 4 times SWAP MAX). Each swapping file holds an integral number of jobs, N, where

$$N = \frac{\text{Size of swapping file in blocks}}{\text{SWAP MAX} * 4} \text{ (truncated)}$$

Once you have decided how many jobs a particular swapping file needs to accommodate (N), simply calculate (N multiplied by SWAP MAX times 4) to determine the necessary size for each swapping file you plan to allocate. You can type the expression directly to REFRESH if you wish. For example, 10*28K, 10*28*4, and 1120 all indicate enough space for 10 jobs if the SWAPMAX is 28K. Appendix B contains a table of disk device sizes, which you may find useful in determining swapping file sizes.

3.8.1.2 Planning Optional System Files — To set up your system for optimal performance, you need to consider creation and placement of the additional contiguous system files BUFF.SYS, OVR.SYS, and ERR.SYS. If your system is configured for DECtape, you must create the file BUFF.SYS, which contains the DECtape buffers. This file must reside on the system disk and must contain at least three blocks for each DECtape unit on the system. If your system disk is a moving head device, you can group BUFF.SYS with other system files near the center of the occupied space on the disk for optimal performance. If your system disk is a fixed head disk, there is no need to specially place BUFF.SYS.

OVR.SYS contains a copy of the monitor code (from the monitor SIL) which is not permanently resident. ERR.SYS contains a copy of the system error message file. Placing these two files on a disk with faster access time than that of your system disk will reduce the time to load these files when necessary.

The files OVR.SYS and ERR.SYS perform no useful purpose on a fixed head system disk. Since the error messages and overlay code already reside on the fixed head system disk, placing them in separate files on the same fixed head disk does not improve performance and wastes disk space.

If your system disk is a moving head disk and the system hardware configuration includes a fixed head disk, you can improve system performance by creating separate files to hold the overlay code and error messages during time sharing. REFRESH allows you to create and position the files OVR.SYS and ERR.SYS for this code. You gain optimal system performance by placing these two files on a fixed head disk. Placing OVR.SYS and ERR.SYS on a fixed head disk should take precedence over allocating one extra swapping space in a swapping file. You can enable the use of these files by using the UTILTY program or the INIT.BAC system program (see the *RSTS/E System Manager's Guide* for a description of these programs).

If space is not available on an auxiliary fixed head disk, group the files with other system files near the center of the occupied space on the system disk. This grouping can increase system performance by reducing average seek time for the disk heads.

3.8.1.3 Planning for the Crash Dump File — The final system file you need to plan is CRASH.SYS. First, decide whether to create it; second, determine its optimal size.

CRASH.SYS is optional, but, if included, must reside on the system disk. If you plan to enable the crash dump facility, you must create CRASH.SYS.

To ensure that you do not lose error information if the system crashes, DIGITAL recommends that you create CRASH.SYS and enable crash dumps. The following are the steps RSTS/E takes when a crash occurs.

1. The RSTS/E error handling code discovers an error from which it cannot recover.

2. RSTS/E dumps the contents of the read/write area of monitor memory into CRASH.SYS (if the file exists and the crash dump facility is enabled). Since the dump preserves the state of the system at the time of the crash, it contains essential diagnostic information.

3. RSTS/E then reboots the system disk and performs an auto-restart.

For example, assume that monitor error logging routines log a parity error within monitor memory. The system crashes because the monitor may be corrupt. Since the ERRCPY program cannot run to log the error, the error data (and probably the cause of the crash) are lost unless a crash dump is performed. Creating CRASH.SYS and enabling the crash dump facility prevent this loss of error data.

Allocate enough space to CRASH.SYS so that it can hold the read/write area of the RSTS/E Monitor. The read/write area of the monitor contains tables and data areas that change during time sharing. The size of the monitor read/write area depends on the system's hardware and software configuration, so it varies from system to system. It is usually 8K to 16K words (32 to 64 blocks).

To determine the size necessary for CRASH.SYS, examine the file status table printed by the LIST suboption. (See Section 3.8.3.) If your system disk is large, you can create CRASH.SYS at the maximum possible size (80 blocks). Allocating an 80 block CRASH.SYS file allows for future expansion and reserves additional contiguous disk space. Contiguous space may not be available after the disk has been heavily used. If your system disk is too small to allow you to allocate an 80 block CRASH.SYS file, try to allocate a file approximately eight to twelve blocks larger than the minimum required size. An extra eight to twelve blocks provides space for 2K to 3K monitor expansion. Of course, if you are certain that your system disk will not be used for an expanded monitor, you need not configure any extra space at all.

3.8.2 Using the REFRESH Option

To invoke REFRESH, type REFRESH or RE in response to the OPTION: prompt. The option responds by requesting date and time. After you specify the date and time, REFRESH asks you for the disk type and unit on which to allocate the files. Type a disk name or press LINE FEED to specify the system disk. If you do not press LINE FEED, the REFRESH option requests the unit number of the disk. After you specify the disk to use, REFRESH may ask whether to clean the disk. Table 3–12 summarizes these questions and the possible responses.

The cleaning operation, which repairs a corrupt file structure, performs the following steps:

1. It builds a new storage allocation table (SATT.SYS) that reflects all the files on the disk.

2. It scans all directories and deletes all files that have the extension .TMP or are marked for deletion.
3. It finds any doubly-allocated blocks and allows you to specify their correct allocation.
4. It finds and deletes all invalid directories.
5. It marks the disk as having a clean file structure.
6. It allows you to delete files that contain bad blocks.
7. It writes zeroes over any disk blocks that were allocated before cleaning began but are no longer allocated.

Table 3-12: REFRESH Questions and Responses

Question	Response
DD-MMM-YY?	Type the date in alphabetic or numeric format, or press LINE FEED to accept the date printed.
HH:MM?	Type the time in 24-hour or AM/PM format, as in 15:12 or 3:12 PM. Press LINE FEED to accept the time printed.
DISK?	Type the name of the disk on which to allocate files. Valid disk names are DF, DS, DK, DL, DM, DP, DR, and DB. Press LINE FEED to use the system disk.
UNIT?	Type the physical unit number of the disk. This question is not asked if the response to the previous question was DF, or LINE FEED.
CLEAN?	Type YES to clean the disk. Type NO or press LINE FEED if you are certain that the directory structure of the disk is not corrupt. This question is asked only if the disk was logically dismounted after its last use. If the disk was not logically dismounted, the REFRESH option automatically cleans the disk.

REFRESH automatically cleans a disk that was improperly removed from the system or, in other words, was not logically dismounted. If your disk was properly dismounted, REFRESH asks the CLEAN question. Specify a cleaning operation if you suspect that the disk has a corrupt file structure. Any ?BAD DIRECTORY FOR DEVICE errors occurring on a particular disk may indicate a corrupt file structure on that disk. You should also specify a cleaning operation if a file containing a bad block was deleted during time sharing. The cleaning operation frees the portion of the file that did not contain any bad blocks. The amount of time required for the clean operation depends on the type of disk and the number of files it contains.

After all preliminary questions have been asked and answered, you can begin to use the REFRESH suboptions to allocate files. Table 3-13 lists the suboptions.

Table 3-13: REFRESH Suboptions

Suboption	Function
LIST	Lists the file status table.
CHANGE	Changes the system file allocation.
FILE	Changes the characteristics of a file in [0,1].
BADS	Examines or adds to the bad block file.

To use a suboption, type the first two or more characters of its name in response to the REFRESH SUBOPTION question. REFRESH executes the suboption dialogue, makes any requested changes, and returns to the REFRESH SUBOPTION question. You can then specify another suboption or type CTRL/Z to return to the DISK question. When you are finished with the REFRESH option, type EXIT or press LINE FEED to return to the OPTION: question.

3.8.3 Listing the File Status Table

The LIST suboption lists the file status table. This table includes all the files that may be in account [0,1] on the system disk. The files are divided into two categories: (1) the system files (under the heading System Files:) that you can manipulate with the REFRESH option and (2) other files (under the heading Others:). If you need a listing of only the files in the Others: category, type CTRL/O during the printing of the system files. The output automatically resumes printing at the Others: header. The following is a sample file status table:

```
REFRESH suboption? LIST

File                      File              Current  Minimum    Start
Name        Required?     Flags   Status    Size     Size       LBN

System files:

 SWAP   .SYS    YES     NOD CTG     OK      224        68       2132
 SWAP0  .SYS    NO                  OK
 SWAP1  .SYS    NO                  OK
 SWAP3  .SYS    NO                  OK
 OVR    .SYS    NO                  OK                 43
 ERR    .SYS    NO                  OK                 16
 BUFF   .SYS    YES                 CRE                 6
 CRASH  .SYS    NO      NOD CTG     OK       35        35       2356

Others:

 BADB   .SYS                NOD               0
 SATT   .SYS            NOD CTG               2                    9
 INIT   .SYS                NOD              19
 RSTS   .SIL            NOD CTG             214
 RT11   .RTS                CTG              20                  452
 BASIC  .RTS            NOD CTG              68                  472
 ERR    .ERR            NOD CTG              16                  218

REFRESH suboption?
```

NOTE

The file status table lists only files in account [0,1]. Remember that the availability of space on the disk depends not only on the sizes of the files in account [0,1], but also in other accounts on the disk.

The file status table is divided into seven columns, which are labelled File Name, Required?, File Flags, Status, Current Size, Minimum Size, and Start LBN. Table 3–14 summarizes the file status table entries.

The File Name column lists all the files in account [0,1] by name.

The entry in the Required? column indicates whether the file is required for operation of the currently installed RSTS/E Monitor. This column is blank for nonsystem files in [0,1] (i.e., files listed under the Others: heading). The file SWAP.SYS is always required on the system disk. The file BUFF.SYS is required on the system disk if the installed monitor supports DECtape. All other system files are optional on the system disk. All files are optional on a nonsystem disk.

Table 3–14: File Status Table Entries

Entry Heading	Possible Entries and Meaning
File Name	All files in account [0,1] Files are divided into two categories under the headings System Files: and Others:.
Required	YES The file is required for operation of the current monitor.
	NO The file is not needed to operate the system.
	(blank) The file is not a system file.
File Flags	NOD The file cannot be deleted.
	CTG The file is contiguous on the disk.
Status	OK No REFRESH action is required.
	CRE You must create the file.
	D/C You must delete and re-create the file.
Current Size	n The value n is the decimal number of 256-word blocks the file occupies on the disk.
	(blank) The file does not exist.

(continued on next page)

Table 3-14: File Status Table Entries (Cont.)

Entry Heading	Possible Entries and Meaning
Minimum Size	n The value n is the decimal number of 256-word blocks the file minimally requires.
Start LBN	n The value n is the logical block number (in decimal) at which each contiguous file starts. Disk logical blocks are numbered from 0 to (disk size - 1). (blank) If the CTG flag is not present, the file is not contiguous. If the CTG flag is present, the file is currently contiguous but might be eligible to be extended, becoming noncontiguous.

The File Flags column can contain the entries NOD and CTG. The entry NOD for a file means that even privileged users cannot delete that file during time sharing; the file can be deleted only during the use of the REFRESH option. The entry CTG means that the file is contiguous.

The Status column (which is always blank for files in the Others: category) contains the entry OK, CRE, or D/C. The entry OK means that you need not use REFRESH on the file. The entry CRE means that you must use REFRESH to create the file. The entry D/C means that you must delete the file and re-create it.

The Current Size column lists the current size of each existing file. If the file does not exist on the disk that is being REFRESHed, this column remains blank.

The Minimum Size column (which is blank for all files in the Others: category) lists the minimum size (in blocks) for each file if RSTS/E is to use that file. The minimum size for SWAP.SYS is four times the current value of SWAP MAX multiplied by two (to hold two jobs). If you have not yet set defaults for the installed monitor, the minimum size is 64 blocks - 2 jobs at 8K words each. ERR.SYS must always be sixteen blocks long. The minimum sizes of OVR.SYS and CRASH.SYS depend on the installed RSTS/E Monitor. BUFF.SYS must contain at least three blocks for each DECtape unit that the installed monitor supports. The Minimum Size column is blank for OVR.SYS, CRASH.SYS, and BUFF.SYS if no monitor is currently installed. The column is blank for SWAP.SYS, CRASH.SYS, and BUFF.SYS if you are not REFRESHing the system disk because RSTS/E can use these files only on the system disk.

The column labelled Start LBN lists the logical block number (in decimal) at which each of the contiguous files starts. If a file does not exist or is not marked as contiguous, its entry in the Start LBN column is blank.

3.8.4 Changing System File Allocation

The CHANGE suboption allows you to create, delete, and relocate contiguous files on disk. Since CHANGE creates and relocates files by simply manipulating the directory structure, you should not use it on files that contain data (such as ERR.ERR). CHANGE does not copy files; it merely allocates them in directories.

CHANGE begins by asking questions about each of the files it can manipulate. When the dialogue is complete, CHANGE performs the specified file operations and returns to the REFRESH SUBOPTION question. To exit from the suboption before answering all questions, type CTRL/C. This causes all changes to be aborted. Table 3–15 summarizes the CHANGE questions and possible responses.

Table 3–15: CHANGE Suboption Questions and Responses

Question	Possible Responses and Meaning
filnam.ext CHANGES?	NO, OLD, LINE FEED key If the file exists, accept its current size and location and skip the remaining questions for this file. YES If the file exists, skip to the DELETE question. If the file does not exist, skip to the SIZE question. CTRL/Z Return to the REFRESH SUBOPTION question.
OTHER FILES?	NO, N, LINE FEED key, CTRL/Z Last question in the CHANGE suboption. Returns to the REFRESH SUBOPTION question. filnam.ext Allows you to create or delete other [0,1] files. This capability is intended primarily for DIGITAL software support personnel. Certain system files in [0,1] (such as INIT.SYS) must never be modified. If the named file exists, skip to the DELETE question. If the file does not exist, skip to the SIZE question.
DELETE?	NO, OLD, LINE FEED key Asked only if the file exists. Skip to the SIZE question. YES Delete the file and skip the remaining questions for this file. CTRL/Z Return to the first question for this file.
SIZE?	OLD, LINE FEED key If the file exists, retain the current size. If REFRESH is creating the file, create it at the minimum size. n The value n, a positive nonzero integer, is the decimal number of blocks allocated to the file.

(continued on next page)

Table 3–15: CHANGE Suboption Questions and Responses (Cont.)

Question	Possible Responses and Meaning
SIZE? (cont.)	p * qK If the JOB MAX is p and the SWAP MAX is q, then the number of blocks allocated to the file is p * qK. When you type the letter K, the initialization code is in affect multiplying the p * q product by 4 blocks, or 1K words. This procedure converts the file size from K words to blocks. Therefore, type the number of jobs p, the asterisk which indicates multiplication, the SWAP MAX q, the letter K, then press RETURN to instruct the initialization code to calculate the file size in blocks. CTRL/Z Return to the filnam.ext CHANGES question for this file (or to the OTHER FILES question if the current file is not a system file).
BASE?	OLD, LINE FEED key For an existing file, type OLD or press LINE FEED to retain the file at its current starting location, or the next available space if unable to place it at its current location. When creating a new file, type OLD or press LINE FEED to place the file at the first available space on the disk (same as typing 0). n The value n is a decimal number that specifies the starting logical block number for the file. Type 0 to place the file at the first available space on the disk. CTRL/Z Return to the first question for this file.

CHANGE can alter characteristics of the files SWAP.SYS, SWAP0.SYS, SWAP1.SYS, SWAP3.SYS, OVR.SYS, ERR.SYS, BUFF.SYS, and CRASH.SYS. It also allows you to create or delete other files (with the OTHER FILES question) in account [0,1]. The suboption asks all of the questions in Table 3–15 for each file in the above list, substituting the name of the file for filnam.ext in the question. The following is an example of CHANGE:

```
a  REFRESH suboption? CH

b  SWAP.SYS changes? Y

c     Size? 2*28K

d     Base? (LF)

e  SWAP0.SYS changes? (LF)

f  SWAP1.SYS changes? (LF)

g  SWAP3.SYS changes? (LF)

h  OVR.SYS changes? (LF)

i  ERR.SYS changes? (LF)
```

```
j  BUFF.SYS changes? Y

k     Size? 12

l     Base? LF

m  CRASH.SYS changes? Y

n     Size? 80

o     Base? LF

p  Other files? LF

q  REFRESH suboption?
```

The letters that prefix the explanations that follow are keyed to identifying letters located within the previous DSKINT example. Follow the lettered steps through this sequence of steps:

a. Specify the CHANGE option, then terminate your response by pressing RETURN.

b. Indicate that you want to change the size of SWAP.SYS by typing Y.

c. Let the initialization code calculate the 224 block size by entering the formula, 2 * 28K. The K is interpreted to equal 4 blocks. SWAP.SYS can hold 2 jobs at a maximum size of 28K words.

d. Press LINE FEED to place SWAP.SYS at the first available space on the disk.

e. Press LINE FEED to make no changes to the files SWAP0.SYS, SWAP1.SYS, SWAP3.SYS, OVR.SYS, and ERR.SYS.

f. Indicate that you want to make a change to the space allocated for BUFF.SYS by typing Y.

g. Give BUFF.SYS 12 blocks for 3 DECtape drives.

h. Create CRASH.SYS at a maximum size of 80 blocks (1 * 20K).

i. Press LINE FEED to omit changes to any other files.

j. Note that you return to the REFRESH suboption prompt.

3.8.5 Changing [0,1] File Characteristics

The FILE suboption allows you to create, delete, or mark as deletable or not deletable files in account [0,1]. It is intended mainly for two uses: 1) deleting obsolete run-time system files, and 2) marking other files as deletable or not deletable.

When you invoke the FILE suboption, REFRESH responds by asking you for the name of the file to modify. Reply with a filename and extension. If the file exists in account [0,1], REFRESH asks whether you want to delete it. Type

YES or NO in response. If your response is NO, REFRESH retains the file. It then asks SIZE and BASE questions as in the CHANGE suboption. Refer to Table 3–15 for a summary of responses to these questions.

NOTE

> INIT.SYS, the default error message file (e.g., ERR.ERR), the installed monitor SIL, and the default run-time system file can never be modified on the booted disk.

REFRESH allows you to change the status of the "do not delete" bit in the directory entry for the named file. When this bit is on, users cannot delete or rename the file under RSTS/E time sharing. The bit is automatically turned on when you set defaults (for the default error message and run-time system files), when you install the monitor SIL, and when you create other system files. When the bit is off, any privileged user can delete the file. To turn off the bit, type YES in response to the DELETABLE question. To turn on the bit, type NO. To retain the current status of the bit, type OLD or press LINE FEED.

The capability to set and reset this bit can be useful in many circumstances. For example, if your system has important accounting files that you want to protect from deletion, you can simply use the PIP program during time sharing to transfer the files to account [0,1], bring the system down, and use the REFRESH option to set the "do not delete" bit as in the example below. This bit protects the files so that they cannot be deleted during time sharing. Files for which the "do not delete" bit is set can, however, be extended. Only another use of the REFRESH option can delete them. The following example shows the use of the FILE suboption to set the "do not delete" bit for the file MASTER.DAT.

```
REFRESH suboption? FILE

  File name? MASTER.DAT

  File exists, Delete it? N

  Size? LF

  Base? LF

  Deletable? N

  File name? LF

REFRESH suboption?
```

Be careful to specify OLD or LINE FEED in response to the SIZE and BASE questions if you wish to retain the data in the files. The REFRESH option manipulates directory information only; it does not transfer actual file data. Therefore, if you do not reply to these questions with OLD or LINE FEED, REFRESH may reallocate the file and the data may be lost.

3.8.6 Expanding the Bad Block File

The BADS suboption enables you to list the bad blocks currently in the bad block file for the disk currently being REFRESHed and to add bad blocks to the file.

To use BADS, type BADS, BAD, or BA. REFRESH responds with BADS?. Type LIST for a listing of the current contents of the file BADB.SYS. The list is in the following format:

```
  Bads? LIST

  Pack cluster size = 1

  Bad clusters begin at logical block numbers:

3237     4177

  Bads?
```

If the file contains no bad blocks, REFRESH responds as follows:

```
  Bads? LIST

  There are no bad blocks.

  Bads?
```

After the listing or message is complete, REFRESH returns to the BADS question. Type ADD to add bad blocks to the file. REFRESH responds with BLOCK NUMBER?. Reply with the logical block number (in decimal) of the bad block. This number can be from 1 to the disk size minus 1. You can obtain the logical block number of a bad block from the ERRDIS printout of the disk error. REFRESH questions you to ensure that you have typed the correct number. Reply with YES or NO. If your response is YES, REFRESH allocates the pack cluster in which the block resides to BADB.SYS. If you reply NO, REFRESH repeats the BLOCK NUMBER prompt. Be careful to specify the correct block number. The allocation of a cluster to BADB.SYS is irrevocable.

After you have added all bad blocks to the file, type EXIT or press LINE FEED to return to the REFRESH SUBOPTION question. If you added any bad blocks to the bad block file, REFRESH now cleans the disk. The cleaning operation allows you to delete all files that contain bad blocks.

The following example illustrates the use of BADS:

```
REFRESH suboption? BADS

  Bads? ADD

  Block number? 2102

  Really add logical block 2102 to BADB.SYS? Y

  Block number? LF
```

```
  Bads? LIST

  Pack cluster size = 1

  Bad clusters begin at logical block numbers:

3237     4177     2102

  Bads? (LF)

Disk is being cleaned - wait ...

REFRESH suboption?
```

3.8.7 REFRESH Option Examples

Two examples of the use of the REFRESH option follow. In the first example, the system files are structured to allow future expansion. The second example is a small system where disk space is of primary importance. On this system, a reasonable structure of system files is created but no provision is made for future expansion.

3.8.7.1 RP04 System Disk with RS04 Disk — The first example shows a system file allocation typical for a large system disk. The hardware configuration includes an RP04 system disk and an auxiliary RS04 fixed head disk. Four DECtapes are also included in the system. The system is configured for a maximum of 40 jobs at a maximum size of 28K words each. The listing of this example follows.

```
   Option:  REFRESH

   10-MAY-79? (LF)
   04:50? (LF)

a  Disk? DS

   Unit? 0

b  Clean? Y

   Disk is being cleaned - wait ...

c     REFRESH suboption? LIST

      File                    File          Current   Minimum     Start
      Name       Required?    Flags Status    Size      Size       LBN

   System files:

      SWAP   .SYS     NO                OK
      SWAP0  .SYS     NO                OK
      SWAP1  .SYS     NO                OK
      SWAP3  .SYS     NO                OK
      OVR    .SYS     NO                OK                  43
      ERR    .SYS     NO                OK                  16
      BUFF   .SYS     NO                OK
      CRASH  .SYS     NO                OK

   Others:

      BADB   .SYS                NOD               0
      SATT   .SYS            NOD CTG               1                  2
```

```
d  REFRESH suboption? BADS

     Bads? LIST

     There are no bad blocks.

     Bads? EXIT

e  REFRESH suboption? CHANGE

   SWAP.SYS changes? (LF)

f  SWAP0.SYS changes? Y

g    Size? 17*28K

     Base? (LF)

   SWAP1.SYS changes? (LF)

   SWAP3.SYS changes? (LF)

h  OVR.SYS changes? Y

     Size? 64

     Base? (LF)

i  ERR.SYS changes? Y

     Size? 16

     Base? (LF)

   BUFF.SYS changes? (LF)

   CRASH.SYS changes? (LF)

   Other files? (LF)

j  REFRESH suboption? ^Z

k  Disk? (LF)

l  Clean? N

m  REFRESH suboption? LIST

     File                        File             Current   Minimum    Start
     Name         Required?      Flags  Status     Size      Size       LBN


   System files:

     SWAP   .SYS    YES                  CRE       1904       724       1000
     SWAP0  .SYS     NO                   OK
     SWAP1  .SYS     NO                   OK
     SWAP3  .SYS     NO                   OK
     OVR    .SYS     NO                   OK                   64
     ERR    .SYS     NO                   OK                   16
     BUFF   .SYS    YES                  CRE                   12
     CRASH  .SYS     NO                   OK                   34
```

```
Others:

  BADB   .SYS                NOD             0
  SATT   .SYS            NOD CTG            11          12
  INIT   .SYS            NOD CTG           419          28
  SYSGEN      .SIL                   CTG               185        240
  RT11   .RTS                CTG            20         428
  ERR    .ERR            NOD CTG            16         448
  RSTS   .SIL                NOD           205
  BASIC  .RTS            NOD CTG            72        4520
```

```
n  REFRESH suboption? CHANGE

o  SWAP.SYS changes? Y

     Size? 23*28K

     Base? 80000

   SWAP0.SYS changes? (LF)

   SWAP1.SYS changes? (LF)

   SWAP3.SYS changes? (LF)

   OVR.SYS changes? (LF)

   ERR.SYS changes? (LF)

p  BUFF.SYS changes? Y

     Size? 12

     Base? 80000

q  CRASH.SYS changes? Y

     Size? 80

     Base? (LF)

   Other files? (LF)

r  REFRESH suboption? LIST
```

```
     File                  File           Current  Minimum     Start
     Name       Required?  Flags  Status   Size     Size        LBN


   System files:

     SWAP   .SYS   YES    NOD CTG    OK      2576       224     80000
     SWAP0  .SYS   NO                OK
     SWAP1  .SYS   NO                OK
     SWAP3  .SYS   NO                OK
     OVR    .SYS   NO                OK                  64
     ERR    .SYS   NO                OK                  16
     BUFF   .SYS   YES    NOD CTG    OK        12        12     82576
     CRASH  .SYS   NO     NOD CTG    OK        80        34       692
```

```
Others:

  BADB  .SYS            NOD              0
  SATT  .SYS        NOD CTG             11              12
  INIT  .SYS        NOD CTG            209              28
  SYSGEN.SIL            CTG            185             240
  RT11  .RTS            CTG             20             428
  ERR   .ERR        NOD CTG              8             448
  RSTS  .SIL            NOD            205
  BASIC .RTS        NOD CTG             72            4520

s   REFRESH suboption? EXIT

Option:
```

The letters that prefix the explanations that follow are keyed to identifying letters located within the previous DSKINT example. Follow the lettered steps through this sequence of steps:

a. Answer the date and time question. The REFRESH option then requests the name of the disk on which it should manipulate files. Allocate files on the auxiliary fixed head disk. You already used the DSKINT option to perform pattern checking and to write a minimal RSTS/E file structure on this disk. Your response to the DISK question is DS, which is the device mnemonic of the RS04 disk. It is mounted on unit 0.

b. Request the cleaning operation to ensure that the file structure on the disk is not corrupt.

c. Use the LIST suboption to obtain a listing of the current File Status Table for the disk.

d. Use the BADS suboption to list the bad block file. The message indicates that there are no bad blocks in the bad block file. Since there are no bad blocks, you type EXIT to return to the REFRESH SUBOPTION prompt.

e. Request the CHANGE suboption which can create, delete, and position system files. You decide not to make any changes to SWAP.SYS. Pressing LINE FEED bypasses this question.

f. Request a change to SWAP0.SYS by typing Y and pressing RETURN.

g. Create the file SWAP0.SYS at a size of 1904 blocks which is 17 jobs multiplied by a swap maximum of 28K words. The letter K represents 4 blocks per 1K word. No changes are made to SWAP1.SYS and SWAP3.SYS.

h. Create the file, OVR.SYS, to hold the overlay code. The size of OVR.SYS is 64 blocks which is the minimum size listed in the File Status Table.

i. Create ERR.SYS at a size of 16 blocks, then press LINE FEED in response to the remaining questions. The REFRESH option automatically returns to the REFRESH SUBOPTION question.

j. Type CTRL/Z to return to the DISK question to prepare for the allocation of files on the system disk.

k. Press LINE FEED in response to the DISK question to specify the system disk.

l. Omit the cleaning operation because the disk was recently initialized.

m. Specify the LIST suboption and begin to list the File Status Table for the system disk.

n. Select the CHANGE suboption and begin to allocate system files on the system disk.

o. Request changes to SWAP.SYS. Since the fixed head disk cannot accommodate all the required swapping space, allocate additional space on the system disk. Create SWAP.SYS at 2576 blocks, which is large enough for 23 jobs (40 minus the 17 covered by SWAP0.SYS) at 28K words each. This file provides the remaining swapping space that the system requires, so you need not create other swapping files. Note that you specify a preferred starting location of 80000 to place SWAP.SYS near the center of the 167200 block disk. Grouping the frequently accessed system files near the center of the disk reduces average seek time for the disk heads. The effect of this grouping becomes more pronounced as your files and directories fill the disk. You do not create on the system disk the other swapping files of the overlay and error message files.

p. Create the file BUFF.SYS that this system requires for its four DECtape drives. RSTS/E requires that BUFF.SYS contain at least three blocks for each DECtape unit.

q. Allocate for the crash dump file, CRASH.SYS, a maximum of 80 blocks rather than the minimum of 34 blocks. The larger CRASH.SYS file permits further expansion and reserves extra contiguous space that may be needed later. You do not position CRASH.SYS file since it is not frequently used.

r. Specify the LIST suboption to obtain a final listing of the File Status Table. REFRESH placed all files as requested.

s. Exit from the REFRESH option and the initialization code returns to the OPTION: prompt.

3.8.7.2 RL01 System Disk — The second example shows the use of the REFRESH option on a smaller system which includes two RL01 disks (one the system disk) and no fixed head disks. The hardware configuration also includes two DECtape units. The maximum number of jobs on this system is 20, and their maximum size is 28K words. The example and its explanation follows.

```
a  Option: REFRESH

b  03-Apr-79? LF
   07:21 PM? LF

c  Disk? LF

   Clean? LF
```

```
d    REFRESH suboption? LIST

     File                      File               Current   Minimum    Start
     Name        Required?     Flags   Status      Size       Size      LBN

   System files:

     SWAP   .SYS    YES      NOD CTG     OK        1024        64       1641
     SWAP0  .SYS    NO                   OK
     SWAP1  .SYS    NO                   OK
     SWAP3  .SYS    NO                   OK
     OVR    .SYS    NO                   OK
     ERR    .SYS    NO                   OK                    16
     BUFF   .SYS    NO       NOD CTG     OK          16                  877
     CRASH  .SYS    NO       NOD CTG     OK          64                  813

   Others:

     BADB   .SYS                 NOD                  0
     SATT   .SYS             NOD CTG                  1                 5105
     ERR    .ERR                 CTG                 16                  225
     RSTS   .SIL                 CTG                424
     BASIC  .RTS                 CTG                 72                  665
     RT11   .RTS                 CTG                 20                  737
     RSX    .RTS                 CTG                 15                  757
     TECO   .RTS                 CTG                 39                  773
     INIT   .SYS             NOD CTG                418

e    REFRESH suboption? BADS

       Bads? LIST

       There are no bad blocks.

f      Bads? EXIT

g    REFRESH suboption? CHANGE

h    SWAP.SYS changes? Y

       Delete? N

i      Size? 6*28K

j      Base? 5110

     SWAP0.SYS changes? (LF)

     SWAP1.SYS changes? (LF)

     SWAP3.SYS changes? (LF)

     OVR.SYS changes? (LF)

     ERR.SYS changes? (LF)

     BUFF.SYS changes? (LF)

     CRASH.SYS changes? (LF)

     Other files? (LF)
```

```
k    REFRESH suboption? LIST

     File                   File            Current   Minimum     Start
     Name       Required?   Flags  Status    Size      Size       LBN

   System files:

     SWAP   .SYS    YES    NOD CTG     OK       672        64      5233
     SWAP0  .SYS    NO                 OK
     SWAP1  .SYS    NO                 OK
     SWAP3  .SYS    NO                 OK
     OVR    .SYS    NO                 OK
     ERR    .SYS    NO                 OK                  16
     BUFF   .SYS    NO     NOD CTG     OK        16                 877
     CRASH  .SYS    NO     NOD CTG     OK        64                 813

   Others:

     BADB   .SYS               NOD                0                5105
     SATT   .SYS           NOD CTG                1
     ERR    .ERR               CTG               16                 225
     RSTS   .SIL               CTG              424
     BASIC  .RTS               CTG               72                 665
     RT11   .RTS               CTG               20                 737
     RSX    .RTS               CTG               15                 757
     TECO   .RTS               CTG               39                 773
     INIT   .SYS           NOD CTG              418

l    REFRESH suboption? ^Z

m  Disk? DL
   Unit? 1

n  Clean? Y

   Disk is being cleaned - wait ...

o    REFRESH suboption? CHANGE

     SWAP.SYS changes?

p    SWAP0.SYS changes? Y

q      Size? 14*28K

       Base? 5110

r      SWAP1.SYS changes? <LF>

       SWAP3.SYS changes? <LF>

       OVR.SYS changes? <LF>

       ERR.SYS changes? <LF>

       BUFF.SYS changes? <LF>

       CRASH.SYS changes? <LF>

       Other files? <LF>
```

```
s    REFRESH suboption? LIST

     File                      File             Current   Minimum    Start
     Name       Required?      Flags  Status    Size      Size       LBN

   System files:

     SWAP  .SYS    NO                   OK
     SWAP0 .SYS    NO      NOD CTG      OK        1568                 5110
     SWAP1 .SYS    NO                   OK
     SWAP3 .SYS    NO                   OK
     OVR   .SYS    NO                   OK
     ERR   .SYS    NO                   OK                  16
     BUFF  .SYS    NO                   OK
     CRASH .SYS    NO                   OK

   Others:

     BADB  .SYS                NOD                    0
     SATT  .SYS            NOD CTG                    3                    9
     INIT  .SYS                CTG                  418                   49

t    REFRESH suboption? EXIT

   Option:
```

The letters that prefix the explanations that follow are keyed to identifying letters located within the previous REFRESH example. Follow the lettered steps through this sequence of steps:

a. Select the REFRESH option to list the system file status, change the system file allocations, and examine the bad block file.

b. Respond to the date and time questions by pressing LINE FEED since both are correct.

c. Press LINE FEED to indicate that the disk you want to specify is the system disk.

d. Specify the LIST suboption to obtain a listing of the File Status Table.

e. Use the BADS suboption to list the bad block file. The THERE ARE NO BAD BLOCKS message indicates there are no bad blocks in the bad block file (BADB.SYS).

f. Type EXIT to return to the REFRESH SUBOPTION, since you do not have any bad blocks to add to the bad block file.

g. Specify the CHANGE suboption because you need to alter the SWAP.SYS file.

h. Type Y to indicate you want to make changes to the SWAP.SYS file. RSTS/E requires that SWAP.SYS exist on the system disk at a size large enough to hold at least two jobs at the maximum size of 16K words. Allocate all swapping space in SWAP.SYS on the system disk or divide the swapping space between the two RL01 disks. Before you allocate swapping space on the second RL01, you should be reasonably certain that the disk

will always be mounted. It can be either a public or private disk. If the second disk becomes unavailable for use during time sharing, the system runs with a reduced job maximum until the system manager can allocate additional swapping space for that time-sharing session. Since you are reasonably certain that the second RL01 disk will remain mounted, you allocate only a third of the necessary space to SWAP.SYS on the system disk. You will create another swapping file when you use the REFRESH option on the second disk.

i. Specify a size of only 672 blocks (6 jobs at 28K words each) for the SWAP.SYS file on the system disk since it is more advantageous to locate the largest portion of the swapping space on the second RL01 disk. You will allocate more swapping space on the second disk.

j. Place the file near the center of the 10220-block disk at block 5110. Locating frequently used system files near a disk's center decreases the average seek time for the disk heads and improves system performance as file data becomes scattered across the disk. You do not create any other swapping files on the system disk.

k. Use the LIST suboption again to check the file allocation figures. This is a useful step to perform after you have set up all files for the system disk.

l. Type CTRL/Z in response to the REFRESH SUBOPTION prompt to return to the DISK question.

m. Type DL in response to the DISK question and 1 in response to the UNIT question. You have now specified the second RL01 disk.

n. Request that REFRESH clean the disk to ensure that the file structure is not corrupt.

o. Type CHANGE in response to the REFRESH SUBOPTION question so that you can create the additional swapping file.

p. Choose SWAP0.SYS as the additional file because the system swaps highly interactive jobs (which have the fastest access time available) to the first swapping file it finds. Access to the second RL01 may be slightly faster than access to the system disk. The system normally makes fewer accesses to the second RL01 than to the system disk because it starts all searches on user directories on the system disk. Placing the burden of a frequently used swapping file on the second RL01 can help to even the load between the two disks.

q. Create SWAP0.SYS at a size of 1572 blocks (14 jobs at 28K words each), and place the file at the center of the disk.

r. Type LINE FEED to the remaining CHANGE questions.

s. List the File Status Table once more to check the current sizes of your system files.

t. Type EXIT to leave the REFRESH option and return to the OPTION: prompt.

3.8.8 REFRESH Dialogue Error Messages

Table 3-16 summarizes the error messages that can appear during the REFRESH dialogue.

Table 3-16: REFRESH Dialogue Error Messages

Message and Meaning
CANNOT REFRESH THIS DISK Rerun DSKINT, then try again.
ILLEGAL DISK NAME The response you typed is not a valid disk name. Valid disk names are DF, DS, DK, DL, DM, DP, DR, and DB. Press LINE FEED to use the system disk.
ILLEGAL SUBOPTION The response you typed was not a valid suboption name.
SORRY, BUT THAT DISK DOESN'T EXIST The disk device or unit number you specified does not exist on this PDP-11. Use the HARDWR option to list the hardware configuration.
THAT FILE CANNOT BE CHANGED You cannot modify the file.
TOO MANY BAD BLOCKS There cannot be more than 161 clusters in the bad block file.
UNABLE TO CREATE REQUESTED FILE(S) The disk does not contain sufficient contiguous space at the specified bases to create the specified files. Try again, specifying different bases or smaller files.

The preceding table explains only the error messages that can appear during the dialogue portions of REFRESH. For information on processing errors, refer to Appendix A.

3.9 Setting System Defaults

The RSTS/E initialization code includes routines that allow you to establish system default start-up conditions. These defaults include the following:

1. the maximum number of jobs the system allows during time sharing and the maximum storage space a job can occupy in memory and in the swapping files.
2. the run-time system and error message files.
3. the installation's name, which is used in LOGIN's identifying message.
4. the allocation of certain portions of memory.

5. the data caching parameters.
6. the allocation of UNIBUS mapping registers.
7. the state of the crash dump facility.
8. the labelling format for magnetic tapes.
9. the system clock you will use to generate a system time base.
10. the formats for date and time.
11. the power fail delay for your system.

You must set the defaults after you create the system files and before you start time sharing. You can override some of the default conditions (job and swap maxima, all memory allocations, and crash dump) when you start time sharing. Any changes that you make at start-up time are temporary. They apply to the current time-sharing sessions (and any auto-restart after a system crash). After this time-sharing session, the permanent defaults are again in effect.

Note that defaults are set for a particular monitor rather than for a particular system device. Therefore, you must set defaults whenever you install a monitor for the first time.

Use the DEFAULT option and its suboptions to set defaults. To invoke the DEFAULT option, type DEFAULT or DE in response to the OPTION: prompt. If you have not yet installed a SIL, DEFAULT prints the following message and returns to the OPTION: prompt.

```
DEFAULTS CANNOT BE SET UNTIL A SIL IS INSTALLED
```

Use the INSTALL option to install a SIL. Refer to Section 3.7 for a discussion of the INSTALL option.

If you have installed a SIL, but have not yet used the DEFAULT option, DEFAULT disables the responses OLD and LINE FEED to all questions and prints:

```
NO DEFAULTS ARE CURRENTLY SET
```

DEFAULT then prompts you for the information needed to set the defaults described in the following sections.

3.9.1 Setting Job and Swap Maximums

The first defaults that you set are job and swap maxima. The job maximum is the largest number of jobs that can run during RSTS/E time sharing. The default job maximum (set with the DEFAULT option) can be any value from

1 to the configured job maximum which is the limit you set when you answered the configuration questions. The configured job maximum for the SYSGEN system (which DIGITAL sets) is two.

The swap maximum is the maximum amount of storage space that the largest allowed job can occupy in a swapping file. Since all jobs must be swappable, the swap maximum is also the largest size in memory to which each job can expand.

The maximum number of jobs and the maximum size to which a job can expand affect the sizes of the swapping files. A swapping file must be at least (SWAP MAX times 4) blocks long to hold one job of size SWAP MAX. Note that SWAP MAX is measured in memory storage units (K, where 1K = 1024 words), whereas file length is measured in disk storage units (blocks, where 1 block = 256 words). Four blocks equal 1K words. Thus, each swap file holds an integral number of jobs, N. You can compute N by using the following equation and truncating the result to an integral value.

$$N = \frac{\text{Size of swap file in blocks}}{\text{SWAP MAX}*4}$$

The total number of jobs that all swap files can accommodate limits the number of jobs that can log in. The one required swap file, SWAP.SYS, must be large enough to accommodate at least two jobs of size (SWAP MAX times 4) blocks. You can add up to three more swap files by using UTILTY commands in the control file at system start up. When you enable logins after adding a swap file to the system, the maximum number of jobs that can log in increases by the number of jobs the new swap file can accommodate. The maximum number of jobs that can login cannot be greater than the default job maximum. If the value (2 multiplied by SWAP MAX times 4) is greater than the current size of the file SWAP.SYS, DEFAULT prints the following message:

```
Warning - this SWAP MAX requires that SWAP.SYS be at least n
blocks. SWAP.SYS is currently m blocks.
```

In the message, n is the number of blocks required to hold 2 jobs at size SWAP MAX, and m is the current size of the file SWAP.SYS.

For the SYSGEN system, set the job maximum at 2 and the swap maximum at 28K words. For the Target system, you should select values for job and swap maxima that are compatible with your software. For example, although the initialization code allows a value for SWAP MAX between 8K and 31K words, the BASIC-PLUS Run-Time System does not permit any of its jobs to exceed 16K. The RSTS/E COBOL Compiler requires a 28K word swap maximum. FORTRAN IV requires a swap maximum of at least 8K words, but can use up to 28K words.

At start-up time and during the DEFAULT option, the initialization code prints the current values for job and swap maxima. It then requests any changes, as in the example that follows:

```
Option:DEFAULT

No defaults are currently set

You currently have: JOB MAX = 2, SWAP MAX = 16K,

JOB MAX or SWAP MAX changes? YES

  New JOB MAX? LF

  New SWAP MAX? 28

You currently have: JOB MAX = 2, SWAP MAX = 28K,

JOB MAX or SWAP MAX changes?
```

When you first use the DEFAULT option on a monitor SIL, the option prints the configured job maximum and a swap maximum of 16K words. DEFAULT then asks the JOB MAX OR SWAP MAX CHANGES question. Answer by typing NO or pressing LINE FEED to retain the printed values for job and swap maxima and proceed to establish default files. Answer YES to change one or both of the values. If your answer is YES, the DEFAULT option prints the NEW JOB MAX question. Respond with a decimal number between 1 and the configured job maximum, inclusive, to change the value or with NO, OLD, or the LINE FEED key to retain the current value. The next question is NEW SWAP MAX Your answer can be any integer between 8 and 31, or NO, OLD or the LINE FEED key as in the previous question. When you have answered both questions, DEFAULT prints the JOB MAX and SWAP MAX value and once again allows you to change them. Respond as in the first question. When the values are correctly set, DEFAULT proceeds to questions about default files.

3.9.2 Establishing Default Files

After setting up default job and swap maxima, you must designate the default run-time system and error message files for use during time sharing. The default run-time system for most installations is BASIC-PLUS. The default run-time system file must be a contiguous file on the system disk in account [0,1], be a keyboard monitor, and have the extension .RTS. The default error message file also must be in account [0,1]. It must be exactly 16 blocks long, and have the extension .ERR. Both the error message file and the default run-time system file must be contiguous.

DEFAULT prompts you first for the name of the default run-time system file. If you already installed a run-time system as the default, its name appears in the prompt. For the SYSGEN system, you must type RT11. For the Target system, type the name (one to six alphanumeric characters) of the run-time system you desire as the default. The BASIC-PLUS Run-Time System that you can generate with the RSTS/E Monitor has the name BASIC unless you specify a different name during the configuration questions. To retain the currently installed run-time system, press LINE FEED in response to the prompt.

Next, DEFAULT asks you to specify the default error message file. If you have already installed an error message file, the prompt includes its name. Press LINE FEED to retain the current default file or type the name (one to six alphanumeric characters) of the error message file you prefer to install as the default. Press RETURN to either of the questions that follow to get a list of all legal responses. The following is an example of establishing default files for the SYSGEN system.

```
Run Time System? RT11

Error message file? ERR
```

DEFAULT routines ensure that each file you specify is in the correct format. The routines store the name and size of the run-time system file, for use later when memory is allocated, then proceed to set the next default.

3.9.3 Specifying the Installation Name

After you select the default run-time system and error message files, DEFAULT asks you to specify the installation name. This name is printed in the LOGIN identifying message and is the error message associated with error number 0. The name must be a string of 1 to 15 printable characters including spaces. If your console keyboard has lower-case input capability, you can type the installation name in upper and lower case. The following example illustrates the procedure.

```
Installation name? *Time Sharing*
```

3.9.4 Assigning and Allocating Memory

The initialization code allows you to allocate a specific area of memory to the default run-time system, to lock and unlock areas of memory from use, and to allocate a certain portion of memory to the extended buffer pool.

If you have never set memory allocation defaults for this SIL, DEFAULT automatically sets the defaults and prints a memory allocation table. If you have previously set defaults for this SIL, DEFAULT checks the defaults against the actual memory configuration of the PDP-11. If the default memory allocation table marks any nonexistent memory as in use, DEFAULT prints a warning message then resets the defaults and prints the memory allocation table. Also, if the default memory allocation table marks any existent memory as nonexistent, DEFAULT prints a warning message, resets the defaults and then prints the memory allocation table.

NOTE

In DEFAULT, if new memory has been added or removed, then INIT automatically resets the Memory Allocation Table and prints a message indicating its action. After INIT resets the table, you may need to respecify any memory allocation changes that you made, such as where XBUF is located.

If you installed a new default run-time system earlier in the DEFAULT procedure, DEFAULT scans the allocation table for a place for it. DEFAULT positions the run-time system if it finds enough contiguous space; it resets the entire allocation table if sufficient contiguous space is not available. It then informs you of its actions.

Next, if you previously set defaults and the allocation table is still valid, DEFAULT prints the question ANY MEMORY ALLOCATION CHANGES. Table 3–17 lists the possible responses.

Table 3–17: Possible Responses to ANY MEMORY ALLOCATION CHANGES Question

Response(s)	Meaning
NO, OLD, O, or LINE FEED key	Causes currently established memory allocation assignments to remain unchanged and the next question, CRASH DUMP?, to be printed.
RETURN key	Causes an explanatory form of the question to be printed, after which you can type your response.
YES	Causes TABLE SUBOPTION? to be printed. See Table 3–18 for a list of table suboptions.
CTRL/C	Causes execution to be aborted and the OPTION: prompt to be printed.

In all cases where DEFAULT sets the allocation table, the first question it prints is TABLE SUBOPTION. Table 3–18 summarizes the memory allocation table suboptions. You can abbreviate the name of any suboption to the first two characters.

Table 3–18: Memory Allocation Table Suboptions

Suboption	Purpose
LIST	Lists the memory allocation table.
PARITY	Lists the parity memory configuration.
RESET	Lets the initialization code reset the memory allocation table.
LOCK	Locks portions of memory.
UNLOCK	Unlocks portions of memory.
RTS	Moves the default run-time system.
XBUF	Allocates memory for the extended buffer pool.
MAP	Specifies the amount of extended buffer space to be mapped with UNIBUS Mapping Registers.

When you have made all memory allocation changes, exit from the table suboptions by typing EXIT, EX, or pressing LINE FEED. The DEFAULT option then advances to the crash dump questions.

Questions in several of the suboptions ask you to specify a memory address or a range of memory addresses. You can specify an address in either of the following two formats:

1. Give the absolute address as a four to eight digit octal address. The octal number must be a multiple of 4000 (8) that is less than or equal to 16774000.
2. Give the K address as a decimal number followed by the letter K. The decimal number must be in the range from 0 to 1919.

Specify a range of addresses by typing either two addresses separated by a hyphen (e.g., 45K–47K) or by typing an address followed by a + and a number that represents the size of the range (for example 45K+3).

3.9.4.1 Listing the Memory Allocation Table — The LIST suboption prints the current allocation table on the console terminal. This table shows how each block of memory is being used. It provides information on the following:

- the sizes of the RSTS/E Monitor and default run-time system.
- the amount of memory available for user jobs.
- which portions of memory are locked.
- which portions of memory are assigned to the extended buffer pool.
- the total amount of memory on the computer.

The following is a listing for a large system:

```
Table suboption? LI

Memory allocation table:

   0K: 00000000 - 00164777 (  29K) : EXEC
  29K: 00164000 - 00263777 (  16K) : RTS (BAS4F)
  45K: 00264000 - 00567777 (  80K) : XBUF
  94K: 00570000 - 02777777 ( 290K) : USER
 384K: 03000000 - End              : NXM


Table suboption?
```

Each row of the memory allocation breakdown includes the following, in order:

1. the start of this range (in K words).
2. the starting and ending octal addresses for this range.
3. the amount of memory this range occupies (in K words).
4. the purpose for which this memory is used.

Table 3–19 explains the symbols in the memory allocation table.

Table 3-19: Memory Allocation Table Symbols

Symbol	Meaning
EXEC	Occupied by RSTS/E Monitor (Executive).
RTS	Occupied by the default run-time system, which is named in parentheses.
USER	Available for user space.
LOCKED	Unavailable for use (locked).
XBUF	Reserved for extended buffer pool.
NXM	Does not exist (nonexistent) on this PDP-11.

You can use the LIST suboption as often as you need during DEFAULT as well as at start-up time. Keep a copy of the final memory allocation breakdown with other system management information for future reference.

3.9.4.2 Listing the Parity Memory Configuration — With the PARITY suboption, you can identify and locate the various types of parity memory on the computer. This suboption is used primarily as a diagnostic tool. DIGITAL field service personnel can use it to verify the memory configuration when they install the PDP-11. The PARITY suboption looks at the hardware parity registers to ascertain the types of memory (parity memory, interleaved parity memory, or nonparity memory) on the computer.

On a PDP-11/70, this suboption produces the following response:

```
Table suboption? PARITY

Parity register usage:

All memory is 11/70 parity memory

Table suboption?
```

A typical printout for a PDP-11 other than an 11/70 might be the following:

```
Table suboption? Parity

Parity register usage:

   0K: 00000000 - 00137777 (  24K) : 00
  24K: 00140000 - 00177777 (   8K) : 06
  32K: 00200000 - 00277777 (  16K) : 10(NA)
  48K: 00300000 - 00377777 (  16K) : 14(NA)
  64K: 00400000 - End              : NXM


Table suboption?
```

Table 3-20 defines the parity type codes. The value nn and mm are the last two octal digits of the address of the parity register that controls that section of memory. Up to 16 parity registers can exist. They are in the address range

772100 to 772136. When the system detects a parity error, the parity register responsible for that section of memory usually contains information on the location of the last error discovered. The code NA indicates that the parity register contains no error address information. All parity core memory returns error address information.

Table 3-20: Parity Type Codes

Symbol	Meaning
NO	Nonparity memory.
NXM	Nonexistent memory.
nn/mm	Interleaved parity memory with address information.
nn	Parity memory with address information.
nn(NA)	Parity memory with no address information.
nn(ECC)	Memory with ECC hardware.
nn(ECC)/mm(ECC)	Interleaved memory with ECC hardware.

In interleaved memory, alternate banks respond to sequential memory addresses. In the following example, parity register 00 responds to the first address (000000), while parity register 02 responds to the next address (000002) and so on.

Address	Parity Register
000000	00
000002	02
000004	00
000006	02
000010	00
000012	02

Core memory is interleaved because core memories are destructive read-out devices. After each read from a core memory, the system must restore the original data. However, once the processor or DMA device receives the data it requested, it can go on to other things (presumably another memory access) during the restore cycle in the memory bank just accessed. The bank remains busy until the restore cycle completes. When memory is interleaved, the probability is low that the same bank of memory will be accessed on the next memory cycle. Hence, interleaving allows some overlap of memory read operations and results in faster program execution.

ECC MOS memory is interleaved because it takes time for the memory controller to determine what error-correction bits to store with the data on a write operation. After the memory has accepted the data and the processor or DMA device is allowed to continue, it remains busy until it has stored the data and new ECC bits. When memory is interleaved, the probability is low that the same bank of memory will be accessed on the next memory cycle. Hence, interleaving allows some overlap of memory write operations and results in faster program execution.

3.9.4.3 Resetting the Memory Allocation — The RESET table suboption instructs the initialization code to set up the memory allocation table according to the following rules:

1. Place the default run-time system in low memory immediately after the monitor.
2. Do not reserve any memory for the extended buffer pool. Release any memory previously allocated to the extended buffer pool.
3. Do not lock any memory. Release to user space any memory that was previously locked.
4. Find any new memory on the system and allocate it to user space.

The following example shows the effects of the RESET suboption:

```
Table suboption? LIST

Memory allocation table:

  0K: 00000000 - 00213777 (   35K) : EXEC
 35K: 00214000 - 00307777 (   15K) : RTS (BASIC)
 50K: 00310000 - 00477777 (   30K) : USER
 80K: 00500000 - 00503777 (    1K) : LOCK
 81K: 00504000 - 00757777 (   43K) : USER
124K: 00760000 - End               : NXM

Table suboption? RESET

Table suboption? LIST

Memory allocation table:

  0K: 00000000 - 00213777 (   35K) : EXEC
 35K: 00214000 - 00307777 (   15K) : RTS (BASIC)
 50K: 00310000 - 00757777 (   74K) : USER
124K: 00760000 - End               : NXM


Table suboption?
```

The first use of the LIST suboption shows memory locked and allocated to the extended buffer pool. After the use of the RESET suboption, the LIST suboption shows that the XBUF and LOCKed areas of memory have been released to user space.

You may use RESET to remove all user set memory allocations, for example locked portions of memory, XBUF, and non-standard placement of the run-time system. Generally, this is its only use.

3.9.4.4 Locking Portions of Memory — The LOCK suboption locks out certain portions of memory to prevent the use of that memory during time sharing. Use LOCK to avoid disruption of system operation when a section of memory is known to be defective. If sufficient undamaged memory remains, you can start the system for normal time sharing.

When you request the LOCK suboption, DEFAULT responds by asking for a LOCK ADDRESS. Your response should be an address or range of addresses to lock. The following example illustrates the procedure:

```
Table suboption? LOCK

  Lock address is? 80K

Table suboption? LIST

Memory allocation table:

  0K: 00000000 - 00213777 (   35K) : EXEC
 35K: 00214000 - 00307777 (   15K) : RTS (BASIC)
 50K: 00310000 - 00477777 (   30K) : USER
 80K: 00500000 - 00503777 (    1K) : LOCK
 81K: 00504000 - 00757777 (   43K) : USER
124K: 00760000 - End                : NXM


Table suboption?
```

Certain restrictions apply to locking out memory. You cannot lock memory in use by the monitor because the monitor cannot be relocated to another section of memory. Similarly, you cannot lock memory currently allocated to the default run-time system or to XBUF until the run-time system or extended buffer space is relocated to a usable area of memory. If you try to lock out a portion of memory already in use by the monitor, default run-time system, or as extended buffer space, LOCK prints the message PART OF THAT AREA IS ALREADY IN USE. Finally, to remove a full bank of memory from use, locate all of the 4, 8, 16, 32, 64, or 128 contiguous 1K sections that make up the hardware bank. If the bad memory bank is interleaved, you must lock an amount of memory equal to twice its length.

Certain types of memory failures affect only one word. Other types affect larger sections or even the full hardware bank. Carefully analyze any memory failure to determine the 1K section of memory to lock. After locking memory, study the resultant memory configuration to ensure that sufficient contiguous user memory is available to run your installation's programs.

RSTS/E can continue running with certain types of memory failures. On systems with parity memory, the error handling routines in the monitor log parity errors. The recovery procedures depend on the use of the offending section of memory at the time of the error. Consider the following four cases of memory failure and recovery procedures.

In the first case, a parity error occurs when the monitor is running. Since continued system operation would be risky, the monitor logs the error, takes a crash dump (if the crash dump facililty is enabled), and reloads the system. When the system restarts, use the ANALYS program to extract the error log information from the CRASH.SYS file. An ERRDIS report, automatically appended to the ANALYS report, provides sufficient information to identify the section that should be locked out. If the error occurred in the default run-time system or extended buffer memory, you can relocate these items and lock

the section. If the error was in monitor memory, the hardware must be repaired or reconfigured. In either case, a hard failure may prevent the system from running at all and, hence, you can run neither ANALYS nor ERRDIS. The only recourse in such cases is to run memory diagnostics to locate the problem. If the failure was transient, you can shut down the system to lock out memory or you can continue time sharing. At some point, memory diagnostics should be run to reproduce the failure, if possible.

In the second case, a parity error occurs when a user job is running. The parity error handling routines determine whether a single user is affected (i.e., resides in the malfunctioning section) or more than one user is affected. If more than one user is affected, the system is reloaded as described previously. If a single user is affected, the system aborts that user with the error message ?MEMORY PARITY FAILURE. The monitor logs the error, automatically locks out the section from future use (for the duration of the time-sharing session), and the system continues running. You should lock out the bad section of memory (until repaired) using the LOCK suboption the next time you start the system.

In the third case, multiple parity errors occur in rapid succession. RSTS/E halts at location 54 (56 is displayed) if a second parity error occurs while the system is processing the first parity error. Use memory diagnostics to locate the failing memory.

The fourth case concerns a memory cache parity error. If the hardware memory cache malfunctions and causes a parity error, the hardware again retrieves the needed word from main memory and causes a warning parity trap to occur. RSTS/E logs this type of error. If the error occurs twice within one minute, RSTS/E disables the part of the cache causing the malfunction. RSTS/E continues running but with degraded performance. The system does not print a message, but two successive errors within the same minute in the ERRDIS print-out should alert you.

On systems without parity or ECC memory, the software cannot detect or locate a memory failure. Programs may get incorrect results, memory management errors may occur, or any number of random problems may happen. At worst, the system may crash with misleading clues as to the cause.

3.9.4.5 Unlocking Portions of Memory — The UNLOCK suboption frees a previously locked portion of memory for use by user jobs, the default run-time system, or the extended buffer pool. The following is an example of this suboption.

```
Table suboption? LIST

Memory allocation table:

  0K: 00000000 - 00213777 (   35K) : EXEC
 35K: 00214000 - 00307777 (   15K) : RTS (BASIC)
 50K: 00310000 - 00477777 (   30K) : USER
 80K: 00500000 - 00503777 (    1K) : LOCK
 81K: 00504000 - 00757777 (   43K) : USER
124K: 00760000 - End                : NXM
```

```
Table suboption? UNLOCK

  Unlock address is? 80K

Table suboption? LIST

Memory allocation table:

  0K: 00000000 - 00213777 (   35K) : EXEC
 35K: 00214000 - 00307777 (   15K) : RTS (BASIC)
 50K: 00310000 - 00757777 (   74K) : USER
124K: 00760000 - End               : NXM


Table suboption?
```

3.9.4.6 Positioning the Default Run-Time System — The RTS suboption places the default run-time system (usually BASIC-PLUS, BASIC-PLUS-2, or RSX) anywhere in the first 124K of memory. It is generally advantageous to place the default run-time system (or extended buffer space) in solid-state memory, when it is available. If your system has a mixture of fast and slow core memory, you may gain a small advantage by locating the default run-time system in fast core. Generally, the only reason to position BASIC-PLUS or BASIC-PLUS-2 on systems without solid-state memory is to avoid defective memory. If you do not position the run-time system, DEFAULT places it immediately after the RSTS/E Monitor in the lowest physical memory addresses.

When you specify the RTS suboption, DEFAULT responds with NEW RUN TIME SYSTEM ADDRESS IS?. Reply with the address (in the format described in Section 3.9.4) at which you choose to start the run-time system. There must be sufficient free contiguous space for the default run-time system between the starting address you specify and 124K. The following example illustrates the use of RTS.

```
Memory allocation table:

  0K: 00000000 - 00137777 (   24K) : EXEC
 24K: 00140000 - 00237777 (   16K) : RTS (BASIC)
 40K: 00240000 - 00377777 (   24K) : USER
 64K: 00400000 - End               : NXM


Table suboption? PARITY

Parity register usage:

  0K: 00000000 - 00137777 (   24K) : 00
 24K: 00140000 - 00177777 (    8K) : 06
 32K: 00200000 - 00277777 (   16K) : 10(NA)
 48K: 00300000 - 00377777 (   16K) : 14(NA)
 64K: 00400000 - End               : NXM


Table suboption? RTS

  New Run Time System address is? 48K
```

```
Table suboption? LIST

Memory allocation table:

   0K: 00000000 - 00137777 (  24K) : EXEC
  24K: 00140000 - 00277777 (  24K) : USER
  48K: 00300000 - 00377777 (  16K) : RTS (BASIC)
  64K: 00400000 - End              : NXM


Table suboption?
```

Under certain conditions, you should not place the default run-time system in solid-state memory. Consider the following configuration where the memory allocated to the monitor is shown but, for the purpose of this illustration, the location of the default run-time system is not shown.

Locations 0000000 through 0117777 (20K) are RSTS Executive
Locations 0120000 through 0177777 (12K) are available core
Locations 0200000 through 0277777 (16K) are available solid-state memory
Locations 0300000 through 0377777 (16K) are available core
Locations 0400000 upwards are nonexistent.

Assume that the size of BASIC-PLUS is 14K words. If BASIC-PLUS is located at address 0200000, the remaining user memory is divided into one 12K section below and one 10K section above. Because the system loads user job images into contiguous physical memory, no program larger than 12K can run with this memory configuration. In this system, BASIC-PLUS should be placed at the high end of available memory starting address 250000, leaving 22K words of contiguous memory for user jobs between the monitor and BASIC-PLUS. This configuration allows 16K programs to be run at the expense of not using the high speed solid-state memory to full advantage. Only 8K words of memory are used for BASIC-PLUS while the other 8K words are part of the 22K words of user memory. Ensure that the location of BASIC-PLUS on your system leaves sufficient memory for user jobs.

3.9.4.7 Reserving Memory as Extended Buffer Space — You can reserve memory as extended buffer space with the XBUF suboption. Message send/receive, the DECnet/E package, the RSTS/2780 package, the KMC support package, the data caching module, the FIP buffering module, and optionally, the line printer driver use this reserved memory.

DIGITAL recommends that you allocate extended buffer space on all systems with sufficient memory. The amount of extended buffer space you should allocate depends on the type of processing done on the system. The FIP buffering module uses extended buffer space in 512-byte (256-word) sections, and can use at most 175K words of extended buffer space. If you allocate more than 8K words of extended buffer space, the FIP buffering module will not try to use small buffers for disk directory storage at all. Data caching can use all the XBUF that can be allocated on a system (about 450K words).

The message send/receive code uses extended buffer space to store messages. The amount of space it uses depends on the length and number of outstanding

messages on the system. Each message requires a number of bytes equal to the length of the message plus 8 bytes, rounded up to the next multiple of 64 bytes. A message always consumes at least 64 bytes of extended buffer space; it can consume at most 576 bytes.

DECnet/E package uses extended buffer space to hold inter-job messages. DECnet/E requires at least 4K words of extended buffer space for optimal performance. For the RSTS/2780 package, you should allocate an additional 1K words of XBUF space.

The DECnet/E package and message send/receive code use buffer space in large, contiguous sections. If you are unable to allocate sufficient extended space for these facilities, you may need to configure more small buffers (Section 4.2.11.3).

When the extended buffering line printer driver is configured, each line printer on the system will use up to approximately 2.5K words of XBUF.

When you request the XBUF suboption, DEFAULT responds by asking for the extended buffer address range. You can reply with an address or a range of addresses identifying the memory to reserve. (Refer to Section 3.9.4 for a description of the format for your response.) XBUF memory must be in the range 00100000 (16K) to 03777700 (511K). The allocation table must currently designate the memory you plan to reserve for extended buffer space as either USER or XBUF memory. If high-speed solid-state memory is available, you may place the XBUF space in it to further enhance system performance.

When you allocate memory to extended buffer space, DEFAULT releases any memory previously allocated for that purpose. You can reserve only one region of memory as extended buffer space. To release previously allocated XBUF memory to USER space, type RE (or REMOVE).

The following example illustrates the use of the XBUF suboption.

```
Table suboption? XBUF

  Extended buffer address range is? 115K-127K

Table suboption? LI

Memory allocation table:

   0K: 00000000 - 00147777 (  26K) : EXEC
  26K: 00150000 - 00247777 (  16K) : RTS (BASIC)
  42K: 00250000 - 00713777 (  73K) : USER
 115K: 00714000 - 00777777 (  13K) : XBUF
 128K: 01000000 - End              : NXM


Table suboption?
```

The SIZE OF MAPPED XBUF question allows you to specify the amount of extended buffer space to be mapped with UNIBUS Mapping Registers. Certain device controllers transfer information directly to memory. On the PDP-11/70, these device controllers require special registers, called UNIBUS

Mapping Registers, in order to perform direct device to memory transfers. You can use this question to specify the portion of memory to which these transfers are sent. As a result, the controller will only be able to transfer the data to the mapped area of memory.

The KMC11 and DMC11 controllers, and the XBUF line printer driver require that you map a portion of XBUF for their use. The portion of XBUF to be mapped defaults to the size of XBUF or 32K, whichever is smaller. You invoke the SIZE OF MAPPED XBUF question by typing MAP in response to the following question:

```
Table Suboption: MAP
```

After you press RETURN, DEFAULT prints,

```
Size of mapped XBUF <N> K?
```

Press LINE FEED to accept the default printed in angle brackets or enter a number in K words from zero to the size of XBUF. After you terminate your response, you return to the TABLE SUBOPTION prompt.

3.9.5 Setting the Cache Cluster Size

DEFAULT prints the CACHE CLUSTER SIZE prompt if you answered YES to the EXTENDED DATA BUFFERING question asked during the configuration dialogue. As a result of this response, you will have the disk data caching feature installed in your monitor. Before you can use data caching, however, the monitor requires that you specify the cluster size of the cache. Since data caching allows the monitor to store certain user requested data in a portion of memory, called a cache, the monitor must know how many blocks of disk data are to be read into the cache each time a disk data request is made. When you respond to the CACHE CLUSTER SIZE question, you tell the monitor how many blocks of data (as a cluster) you want read into the cache area of memory as a result of a disk read. That is, the size of the cache cluster (1, 2, 4, or 8 blocks) determines the amount of data that is considered as a unit in a disk read request.

The prompt appears in the DEFAULT dialogue as follows:

```
Cache cluster size <4>? RET

Choose the number of 512 byte blocks to be treated as a unit for
the purposes of disk data caching. Legal values are 1, 2, 4, 8.

Cache cluster size <4>? 8
```

If you press RETURN, DEFAULT prints an explanatory message. Rather than press LINE FEED to accept the default value of 4, you type the number 8. Eight blocks of data will be read into the cache after each disk read request.

The cache cluster size you choose will affect your system's throughput. Therefore, keep the following guidelines in mind when making your choice. The data in the cache is organized in clusters of 1, 2, 4, and 8 blocks. If the cache cluster size is greater than the file cluster size of a noncontinguous file or a directory that is being cached, some of the blocks installed in the cluster will probably contain unrelated data. On the other hand, if the cache cluster size is too small, not all the benefits of caching will be available. A read of a file cluster larger than the cache cluster size may need to be split into two separate reads in order to install the data in the two different cache clusters. RSTS/E will not split a read if doing so would cause more than two physical block read operations. Furthermore, if a file is being read sequentially, one block at a time, then each time a cluster is installed, all other blocks in that cluster can be read without another disk access.

One way to resolve these conflicts is to consider the number of cache clusters that will fit in XBUF. If XBUF is, for example, 20K words long, and the cache cluster size is 2 blocks, almost 40 clusters will fit. This is probably reasonable for a system that typically runs 20 jobs. If the cache cluster size were increased to 8 blocks, fewer than 10 cache clusters would fit in cache, and performance might suffer. Refer to the *RSTS/E System Manager's Guide* for a description of data caching.

3.9.6 Enabling and Disabling the Crash Dump Facility

After you have set the memory allocation, DEFAULT prints the current status of the crash dump facility. The message is one of the following:

```
You currently have crash dump enabled.

You currently have crash dump disabled.
```

DEFAULT then checks that the file CRASH.SYS 1) is present in account [0,1] on the system disk, 2) is large enough for the monitor and 3) is contiguous. If the file does not meet all three of these conditons, DEFAULT prints an appropriate warning text. If CRASH.SYS does not meet the required conditions, and you want to enable crash dump, use REFRESH to correct CRASH.SYS before starting the system.

After checking the file and printing a message (if necessary), DEFAULT prints the CRASH DUMP question. Reply YES to enable crash dump, or NO to disable crash dump. If the CRASH.SYS file is invalid, but you enable crash dump anyway, DEFAULT prints no further warning.

3.9.7 Specifying the Labelling Defaults for Magnetic Tape

After completing the crash dump section, DEFAULT asks the user to set the default for magnetic tape labelling. Individual jobs can reset and restore the tape labelling default during time sharing. A job sets its default with the ASSIGN command, described in the *RSTS/E System User's Guide*. An individual program sets its default with the MODE option of the OPEN statement when it opens a file on the tape. (The *RSTS/E Programming Manual*

describes the MODE option with magnetic tape.) You can set and reset the system default only by using the DEFAULT option. Note that the default labelling format for the SYSGEN system must be DOS.

DEFAULT prints the following query, with NONE, DOS, or ANSI in parentheses to indicate the current setting.

```
Magtape labelling default <none>?
```

Table 3–21 lists the valid responses to the question.

Table 3–21: Valid Responses to MAGTAPE LABELLING DEFAULT Question

Response(s)	Meaning
LINE FEED key or OLD	Retain the current default. Pressing LINE FEED or typing OLD will not be accepted if the current default is NONE.
DOS	Set the default format to DOS/BATCH–11 labelling. The default for the SYSGEN monitor and for building of the system library (if the distribution medium is magnetic tape) must be DOS.
ANSI	Set the default format to ANSI standard labelling.

After you specify the magnetic tape labelling default, DEFAULT issues the PREFERRED CLOCK prompt.

3.9.8 Specifying the Preferred System Clock

Your hardware configuration can include one, or both, of the following system clocks. You must specify which clock will be used to provide system timing.

KW11-L Line Time Clock - The KW11–L divides system time into intervals based on the AC line frequency of the power source used to run your computer system. AC line frequency can be either 50 Hz (the standard in many countries) or 60 Hz (the standard in the United States).

KW11-P Programmable Real-Time Clock - The KW11–P can use the AC line frequency of the power source to provide a system time base, or it can be set to provide a crystal-controlled time base independent of the power source. Using the KW11–P crystal-controlled time base is beneficial in areas where the possible fluctuations in AC line frequency would adversely affect system timing. The interrupt time base for a KW11–P can be set from 50 to 1000 interrupts/second (in multiples of 50). DIGITAL recommends that you set the interrupt rate to 100 interrupts/second.

DEFAULT lets you control which clock will be used to provide a system time base, and, if you specify a KW11–P clock, the time base to be used for the system.

DEFAULT prints the following question (the current default condition appears in parentheses):

```
PREFERRED CLOCK <current default>?
```

To accept the current default, press LINE FEED.

If you have only a KW11-L clock, or you have both clocks but prefer to use the KW11-L, respond by typing L. The system will then use the KW11-L as the AC line frequency for a time base.

If you have only a KW11-P clock, or you have both clocks but prefer to use the KW11-P, respond by typing P. The DEFAULT routines then print the query:

```
INTERRUPT FREQUENCY?
```

Respond by typing LINE to have the KW11-P use the AC line frequency for a time base.

Respond with a number from 50 to 1000 to have the system use the KW11-P's crystal oscillator (at that interrupt rate) for the time base. Your response must be a multiple of 50.

3.9.9 Specifying Date and Time Formats

DEFAULT then prints the following question (the current default condition in parentheses):

```
DATE FORMAT <current default>?
```

To accept the current default, press LINE FEED.

Respond with A (for ALPHABETIC) to change the date format to dd-mmm-yy format. (For example, 10-JUN-79.)

Respond with N (for NUMERIC) to change the date format to yy.mm.dd format. (For example, 79.06.10.)

Next, DEFAULT prints the following question (the current default condition in parentheses):

```
TIME FORMAT <current default>?
```

To accept the current default, press LINE FEED.

Respond with AM/PM to change the time format to nn:nn AM/PM format. (For example, 05:13 PM.)

Respond with 24-HOUR to change the time format to nn:nn format. (For example, 17:13.)

The result of the dialogue is that you have maintained or altered the current defaults for reporting date and time to users of your system.

3.9.10 Specifying the Power Fail Recovery Delay

RSTS/E systems attempt to recover from a momentary power failure by performing an automatic restart procedure. A momentary power failure occurs whenever the AC power drops below 95 volts for 110 volt power (or 190 volts for 220 volt power) or outside a limit of 47 to 63 Hz (AC power). RSTS/E

allows you to specify the delay factor (in seconds) before the system attempts to restart after a momentary power failure. The delay can be from 1 to 300 seconds (5 minutes). Specifying a relatively long delay factor ensures that all disk devices are ready before the system attempts to auto-restart. (For information on the recovery times required by various RSTS/E devices, consult the appropriate hardware publications.) Refer to the *RSTS/E System Manager's Guide* for further information on the RSTS/E auto-restart procedures.

3.9.11 DEFAULT Option Dialogue Error Messages

Table 3–22 explains the error messages that can occur during the DEFAULT option dialogue.

Table 3–22: DEFAULT Dialogue Error Messages

Message and Meaning
EXTENDED BUFFER SPACE NOT IN RANGE 00100000 (16K) TO 03777700(511K) The extended buffer space must fit entirely within the specified range.
FILE NOT CONTIGUOUS The file you specified is not contiguous on disk. The default run-time system file and error message file must be contiguous.
FILE NOT FOUND The initialization code did not find the file you specified on disk.
ILLEGAL FILE NAME The filename you specified is not one to six alphanumeric characters.
ILLEGAL 1K SECTION ADDRESS SPECIFIED The address you specified is not a multiple of 4000(8) or is greater than 1919K (16774000(8)). If you specified a range of addresses, the second of the two addresses must be greater than the first.
ILLEGAL SUBOPTION GIVEN Your response to the TABLE SUBOPTION prompt is not a valid suboption name.
INVALID FILE FORMAT The error message file you specified is not exactly sixteen blocks long.
INVALID MODULE FORMAT The run-time system SIL module is too long, too short, or has a high limit other than 177776(8).
INVALID SIL FORMAT The run-time system file does not contain a valid SIL index.
MUST FIT ENTIRELY BELOW 124K The region you specified for the run-time system extends beyond the system's upper limit of 124K.
NAME MUST BE 1 TO 15 PRINTABLE CHARACTERS The installation name you typed is more than 15 characters long or contains unprintable characters. You cannot respond by pressing LINE FEED if no previously typed name is available.

(continued on next page)

Table 3–22: DEFAULT Dialogue Error Messages (Cont.)

Message and Meaning
PART OF THAT AREA IS ALREADY IN USE The region you specified is unavailable for use. The region must currently be allocated to USER space or to the purpose for which you wish to allocate it. (You can allocate space marked for RTS to the run-time system.)
PART OF THAT AREA IS NOT LOCKED Part of the region you specified is not now locked and, therefore, you cannot unlock it.
RTS IS NOT A KEYBOARD MONITOR The run-time system you specified is not a keyboard monitor. RSTS/E requires the default run-time system be a keyboard monitor (for example, BASIC–PLUS).
TOO MANY MODULES The run-time system SIL contains more than one module.

Table 3–22 describes only the dialogue error messages. For information on other error messages that appear when you use the DEFAULT option, refer to Appendix A.

3.10 Specifying Characteristics for Device Units

You can specify the characteristics of device units in the installed SIL by using the SET option. SET contains a group of suboptions (summarized in Table 3–23). These suboptions allow you to enable and disable device units, set or remove modem control on keyboards, change line printer characteristics, and set or remove restrictions on the use of devices. The ability to enable and disable device units is particularly useful. If, for instance, one of two DECtape drives is not working properly, you can simply shut down the system, disable the malfunctioning unit, and restart time sharing. Repairs can be made while the system is in use.

Table 3–23: SET Suboptions

Suboption	Function
LIST	Lists the status of a device.
MODEM	Enables modem control for keyboards.
LOCAL	Disables modem control for keyboards.
LP	Sets line printer characteristics.
DISABLE	Disables a device unit.
ENABLE	Enables a device unit.
PRIV	Sets restrictions on device use.
UNPRIV	Removes restrictions on device use.

To use the SET option, type SET or SE in response to the OPTION: prompt. In response, SET requests a suboption name. Type a suboption name from Table 3–23. (You need to type only the first 2 characters.) SET executes the suboptions's dialogue, makes the requested changes in the installed SIL, and returns to the SET SUBOPTION question. When you have made all the necessary settings, type EXIT or press LINE FEED to return to the OPTION: prompt.

3.10.1 Listing Device Status

The LIST suboption lists the status of one or more devices in the installed monitor SIL. You can use LIST to verify changes made with other SET suboptions.

To invoke LIST, type LIST, LIS, or LI in response to the SET SUBOPTION question. LIST responds by asking for the device to list. To list characteristics of only one unit, type the device name and unit number (for example, DL2). To list all units of a particular device, type the device name (for example, DL). To list a group of device units, type the device name and two unit numbers separated by a hyphen (as in DL1–3). Type ALL or press LINE FEED to list all devices supported by the installed SIL.

The following is a sample listing using this suboption.

```
SET suboption? LIST
Device? ALL

Name  Control Comments

DF0   RF:
DS0   RS:
DS1   RS:
DK0   RK:
DL1   RL:
DL2   RL:
DL3   RL:
DM0   RM:
DM1   RM:
DP0   RP:
DP1   RP:
DR0   RR:
DR1   RR:
DB0   RB:
DB1   RB:
KB0   TT:
KB1   PK0:
NL0
PK0
LP0   LP0: NOOMITCR,CR,NOEOT,FILL,NOCONTROL,NOVTAB,BSEMULATE, width 80
MT0   TM:
MT1   TM:
MM0   TU:
MM1   TU:
DT0   TC:
DT1   TC:
```

In the listing, the first column contains the device name and unit number. The second column denotes the hardware controller associated with the device. For example, DM1 is associated with RM:, the RK06/RK07 disk controller. For terminal multiplexers and RX11 diskettes, the second column also tells you the line number on the controller associated with each unit. For instance, KB32 may be attached to line 4 on the second DH11 unit; thus the listing for KB32 would include the notation DH1:4. For pseudo keyboard units, this column includes the number of the pseudo keyboard associated with the keyboard unit. For example, if KB1 is associated with a pseudo keyboard number 0, the listing for KB1 includes the notation PK0.

The final column contains comments about the unit. The comment DISABLED means that the unit is not available for use during time sharing. For keyboards, the comment MODEM means that modem control is enabled for that unit. For line printers, the third column includes the printer type (LP, LV, LS, or LA180) and width. If the line printer is lower case, this column also includes the comment LOWER CASE. The comment PRIVILEGED appears for device units that are accessible only to privileged jobs or programs.

3.10.2 Enabling and Disabling Modem Control

The MODEM suboption allows you to enable and the LOCAL suboption allows you to disable modem control on keyboards controlled by a DH11 or DZ11 multiplexer.

To enable modem control, use the MODEM suboption. In response to MODEM's KB question, type the keyboard number or range of keyboard numbers for which modem control should be enabled. To exit from the suboption, press LINE FEED or type CTRL/Z. The following example illustrates the use of the MODEM suboption.

```
SET suboption? MODEM
KB? 27-30
KB? LF

SET suboption?
```

To disable modem control, use the LOCAL suboption. The format and exit procedures for LOCAL are the same as those for MODEM.

3.10.3 Changing Line Printer Unit Characteristics

Use the LP suboption to change the printer type, width, and case associated with any line printer unit on the system. The suboption requests the unit number (if the system includes more than one line printer) for which changes will be made, then prompts you for printer type, width, and case for that unit. Each prompt includes in parentheses the current setting for that unit.

The line printer type can be LP, LV, LS, or LA180. If the line printer is not a standard DIGITAL line printer, you can set individual characteristics for it as described in Table 3–24.

Table 3-24: Line Printer Characteristics

Name	Function
OMITCR	Omits sending <CR> if next character is <LF>.
NOOMITCR	Always sends <CR> to the printer.
CR	Inserts <CR> before <LF>, <VT>, and <FF>.
NOCR	Instructs printer to perform implied <CR> before <LF>, <VT>, <FF>.
FILL	Inserts fill after form feeds.
NOFILL	Fill is not required after form feeds.
CONTROL	Sends non-printing characters to the printer.
NOCONTROL	Discards non-printing characters or uses uparrow mode.
EOT	Sends EOT (^D) to the printer.
NOEOT	Treats EOT like other non-printing characters.
VTAB	Sends vertical tabs to the printer.
NOVTAB	Treats vertical tabs like other non-printing characters.
BSEMULATE	Emulates the action of 'backspace' on the printer.
BSREAL	Indicates the printer has real backspace (carriage moves left).
BSCONTROL	Treats backspace like other non-printing characters.

Unspecified characteristics take the following defaults:

NOOMITCR, CR, NOEOT, FILL, NOCONTROL, NOVTAB, BSEMULATE

The defined printer types are:

LP = OMITCR,NOCR, NOEOT, FILL, NOCONTROL, NOVTAB, BSEMULATE
LV = NOOMITCR, NOCR, EOT, NOFILL, NOCONTROL, NOVTAB, BSEMULATE
LS = NOOMITCR, CR, NOEOT, NOFILL, CONTROL, VTAB, BSEMULATE
LA180 = OMITCR, NOCR, NOEOT, FILL, NOCONTROL, NOVTAB, BSREAL

The width setting for the line printer is a decimal number between 1 and 254, inclusive. The default width is 80 columns, if none is specified with the LP suboption. Listings produced during the SYSGEN process are intended to be printed on 132 column printers. The case setting is upper or lower case. The default setting is upper case only. After you set all characteristics for a printer unit, the suboption returns to the LP question. (If only one printer is on the system, the suboption does not return to LP? but exits to the SET SUBOPTION question.) Type a unit number to set characteristics for another unit; press LINE FEED to exit from the suboption. The following is an example of the LP suboption:

```
SET suboption? LP
Type (NOOMITCR,CR,NOEOT,FILL,NOCONTROL,NOVTAB,BSEMULATE)? LP
Width (80)? 132
Lower case (no) ? YES

SET suboption? EXIT
```

3.10.4 Enabling and Disabling Device Units

The ENABLE and DISABLE suboptions allow you to make device units available or unavailable for time-sharing use. A time-sharing user who attempts to access a unit disabled with the DISABLE suboption receives the ?DEVICE NOT AVAILABLE error message.

The DISABLE suboption of SET differs from that of the HARDWR option in that SET allows you to disable a single unit on a controller without affecting any other units of the same type. HARDWR permits disabling of device controllers only.

Use SET's DISABLE suboption when a particular unit has hardware problems. If you disable the troublesome unit, time sharing can take place while the unit is being repaired. When the unit is working properly, reboot the system and enable the unit again.

DISABLE and ENABLE also, in effect, allow you to configure a device unit that is not yet installed in the processor. You can include the unit at configuration time and disable it until it is installed. After its installation, you can enable it for time-sharing use. Disabling nonexistent units with the SET option suppresses the warning messages generated when the start-up code automatically disables them.

To enable or disable a unit, type the appropriate suboption name (ENABLE or DISABLE, respectively). In response, the suboption asks the DEVICE question. You can disable any device unit except the console keyboard (KB0:). To enable or disable only one unit or range of units of a device, type the device name followed by the unit number or numbers, as in KB10 or KB8-12. The suboption makes the specified change and returns to the DEVICE question. To enable or disable several units of a single device, type only the device name in response to the question. The suboption next prompts with UNIT?. Reply with a number or range of numbers for the units to enable or disable. For the ENABLE suboption only, you can type ALL to enable all units of that device. The suboption makes the specified changes and repeats the question. Specify another unit or range of units or press LINE FEED to return to the DEVICE question.

Once you are at the DEVICE question, you can type another device name to enable or disable additional device units, or you can press LINE FEED to return to the SET SUBOPTION question.

The following example demonstrates the DISABLE suboption. The dialogue for the ENABLE suboption is exactly the same.

```
SET suboption? DISABLE
Device? KB
Unit? 8-12
Unit? LF
Device? LF

SET suboption?
```

3.10.5 Restricting the Use of Devices

The PRIV and UNPRIV suboptions allow you to place and remove restrictions on the use of devices and device units on the RSTS/E system. RSTS/E time sharing normally allows any user job to use any device.

By using the PRIV suboption, you can permit only privileged jobs to use specified devices. A permanently privileged user (one whose project number is 1) can use any restricted device and can reassign a restricted device to an unprivileged job. An unprivileged job gains ownership of a restricted device by running a privileged program that assigns the device or by having a privileged job reassign the device to it. The unprivileged job loses ownership of the device when it logs out or issues a DEASSIGN command. An unprivileged job can also gain access to a restricted device by running a privileged program that uses the device. If the program does not assign the device, the job has access to the device only while the privileged program executes. When execution of the program is complete, the device is once again inaccessible to the job.

You can restrict the use of any device except disks and the null device. Restrictions on keyboard access do not prevent jobs from logging in. Any job can log into a restricted keyboard. The restrictions prevent an unprivileged job from opening or assigning a keyboard other than its console keyboard (KB:).

To place or remove restrictions on the use of one or more devices, use the PRIV or UNPRIV suboptions. In response to the SET SUBOPTION question, type the name of the suboption you need to use. The suboption then prints the DEVICE question. Type the name of the device for which you need to set or remove restrictions. (When using the UNPRIV suboption, you can type ALL in response to the DEVICE question to free access to all devices. UNPRIV then returns to the SET SUBOPTION question.) After you specify a device name, the suboption prints the UNIT question. Respond by typing a unit number, range of unit numbers, or ALL. The suboption enacts the requested changes and repeats the UNIT question. Type another unit number or range of unit numbers, or press LINE FEED to return to the DEVICE question. To set or remove restrictions for another device, type the name of the device. Press LINE FEED to return to the SET SUBOPTION question.

The following example shows the use of PRIV to make the use of keyboards a privileged operation.

```
Option: SE

  SET suboption? PRIV
  Device? KB
  Unit? ALL
  Device? (LF)

  SET suboption? (LF)


Option:
```

3.10.6 SET Option Dialogue Error Messages

Table 3–25 summarizes the errors that can occur during the SET option dialogue.

Table 3–25: SET Dialogue Error Messages

Suboption	Message and Meaning
DISABLE	CAN'T DISABLE KB0: You specified KB0:, which cannot be disabled.
MODEM, LOCAL	INVALID KEYBOARD NUMBER The keyboard number you typed is greater than the maximum allowed.
MODEM, LOCAL, LP	INVALID RESPONSE The number you typed is in an incorrect format.
ENABLE, DISABLE, PRIV, UNPRIV	INVALID RESPONSE The device you specified is not configured in the installed monitor SIL. Use the LIST suboption to obtain a list of valid device names.
ENABLE, DISABLE, LP, PRIV, UNPRIV	INVALID UNIT NUMBER The unit number you typed is not a decimal number, or is too large for the installed SIL. If you typed a range of unit numbers, they must be in ascending order.
MODEM	KBnn:CANNOT HAVE MODEM CONTROL KBnn: is not on a DH11 or DZ11 interface. Therefore, it cannot have modem control.
PRIV, UNPRIV	NOT POSSIBLE ON DISK UNIT You cannot use PRIV or UNPRIV on a disk device.

Table 3–25 describes only the errors that can occur during the SET option dialogue. For information on other errors that can occur with the SET option, refer to Appendix A.

3.11 Starting Time Sharing

Use the START option to start the RSTS/E system for normal time sharing. The START option allows you to change job and swap maxima, memory allocation, and crash dumps. However, any changes made with START override the DEFAULT settings for only one time-sharing session. After that time-sharing session, the DEFAULT settings again apply. You can make permanent changes in the defaults only by using the DEFAULT option.

To invoke the START option, type START, ST, or press LINE FEED. START or ST causes the initialization code to print the start-up questions (which allow you to override DEFAULT parameters) and a list of the disabled devices. If you press LINE FEED, the initialization code omits the questions, preventing you from overriding any defaults. When you press LINE FEED to start the system, the initialization code prints a summary of the system defaults, requests the date and time, and then prints the number of disabled

devices. The following sample dialogue shows the normal procedure for starting a RSTS/E SYSGEN system.

```
Option: ST

You currently have: JOB MAX = 2, SWAP MAX = 28K.

JOB MAX or SWAP MAX changes? (LF)

Any memory allocation changes? (LF)

You currently have crash dump enabled.

Crash dump? (LF)

19-JUN-79? (LF)
18:45? (LF)
DF0: disabled - no RF: controller
DM0: disabled - no RM: controller
DM1: disabled - no RM: controller
MT0: disabled - no TM: controller
MT1: disabled - no TM: controller

5 devices disabled

?Can't Find file or account
.
```

In the example, the answer to each question is the LINE FEED key. By pressing LINE FEED, you accept the parameters you set with the DEFAULT option. Accepting the defaults is the normal start-up procedure. You can accept the current values for date and time, as well, by pressing LINE FEED.

After the system accepts your responses, a pause of several seconds occurs. During this time, the start-up routines enable all configured terminal interfaces, set up monitor tables, turn on memory management, load the monitor and default run-time system, and start the system clock. Finally, the system attempts to execute the INIT.BAC system program (described in the *RSTS/E System Manager's Guide*). When you bring up a new system for the first time, the INIT.BAC system program is not yet in the system library. As a result, the system generates the ?CAN'T FIND FILE OR ACCOUNT error message. If the default run-time system is BASIC-PLUS, the ?PROGRAM LOST - SORRY message also appears. The printing of a dot (.) for the SYSGEN system or the READY message for the Target system (if its default run-time system is BASIC-PLUS) signals the end of the system initialization code routines.

3.11.1 Hardware Messages at Start-Up

The start-up code checks the system to verify that all configured devices exist and that they respond properly. The code disables any device that it cannot find or that you have disabled with the SET or HARDWR option. START accesses all configured terminal interfaces and disables any that do not respond. It activates the memory management unit to determine the size of available memory (as in DEFAULT), to load the monitor and default run-time system, and to prepare for normal time sharing. START, furthermore, loads the stack limit register, enables parity traps for all parity memory, and activates the system clock to begin time sharing. If the system does not start

as shown in the examples, these components are suspect and should be exercised with the standard diagnostics.

3.11.2 Software Messages at Start-Up

In addition to hardware checks, START verifies that the required system files exist and are of the proper sizes.

If the file SWAP.SYS does not exist, is not contiguous, or is too small to accommodate two jobs of size SWAP MAX, START prints one of the following messages:

```
SWAP.SYS not contiguous or too small

SWAP.SYS not present in [0,1]
```

If you enabled crash dumps (with either the DEFAULT option or the START option), START routines check that the file CRASH.SYS is present in account [0,1] on the system disk, is large enough for the current monitor, and is contiguous on the disk. If the file does not meet all these conditions, START prints one of the following error messages:

```
CRASH.SYS does not exist

CRASH.SYS file of nnn blocks is not available

CRASH.SYS is not contiguous
```

In the second message, nnn indicates the number of blocks necessary for a monitor dump. The error message is followed by the text:

```
Crash dump automatically disabled
```

If the start-up procedures are successful, proceed to Chapter 4 to generate the Target system.

3.12 Bootstrapping Devices

The BOOT option, which simulates the hardware ROM bootstraps, allows you to bootstrap magnetic tape and disk devices. You can use BOOT to load another PDP-11 operating system into memory from disk or tape and to reload an altered copy of the initialization code after you have patched it on disk.

To run BOOT, type BOOT or BO in response to the OPTION: prompt. BOOT responds by asking for the device to bootstrap. In response, type either the device name or press RETURN (for a list of bootable devices). If the device has unit numbers (all devices except DF), you can append the unit number to the device name. (If you do not include the unit number in this response, BOOT requests it later, with the BOOT UNIT: prompt.) Any unit can be bootstrapped.

If you press LINE FEED, the system device is bootstrapped. The BOOT option automatically determines the system device and unit number, so the BOOT UNIT: prompt does not appear. This facility is useful for loading a patched version of the initialization code.

The following example illustrates the use of the option.

```
Option: BOOT
  Boot device: DB
  Boot unit: 0


RSTS/E V7.0 System #144 (DB0)


Option:
```

After determining that the specified device exists, BOOT waits for the terminal to stop printing, then executes a device-dependent routine. It reads the device's bootstrap block into location 0, then transfers control to location 0.

The following table explains the error messages that can appear during the BOOT option dialogue.

Table 3-26: BOOT Dialogue Error Messages

Message and Meaning
NOT A VALID BOOT DEVICE The device you named is not a valid bootable device or you specified a unit number for a DF disk. Press RETURN for a list of devices that can be bootstrapped.
SORRY, BUT THAT DEVICE DOESN'T EXIST The device name you typed is valid, but the device does not exist on this PDP-11.

For information on other error messages that appear during use of the BOOT option, refer to Appendix A.

3.13 Loading Stand-Alone Programs

Use the LOAD option to load and run any stand-alone program from account [0,1] on the system disk. You can use LOAD only if the system device is disk. The program to be loaded must have the extension .SAV and must not require RSTS/E Monitor support. DIGITAL does not supply any stand-alone programs.

To run LOAD, type LOAD or LO in response to the OPTION: prompt. If you press RETURN in answer to the first question, LOAD lists the loadable programs. The following is a sample dialogue:

```
Option: LOAD
Load program: STDALN

STDALN V7

#
```

If the program you specify has an odd transfer address, or if the transfer address is greater than the size of the program, LOAD prints the following message:

```
Odd transfer address?
```

If you press RETURN in response to this question, LOAD prints the longer message:

```
The transfer address of the specified program is odd.
Please enter a new (even) transfer address or type
CONTROL/C to abort the load. New transfer address?
```

The program to be loaded must have an even (word) octal transfer address because the PDP-11 traps to an error vector if you specify an odd (byte) address. Therefore, type an even address at which the system should start the program.

If you enter a legal transfer address, the system loads the designated program into memory and starts execution of it. When execution of the program is complete, you can restore RSTS/E by following the appropriate bootstrap procedures.

Error messages that can appear during the LOAD option dialogue are explained in Table 3–27.

Table 3–27: LOAD Dialogue Error Messages

Message and Meaning
DIRECTORY ERROR - FILE NOT FOUND The directory lookup code in the LOAD option found the file you specified, but the file processor code did not. This error indicates a bug in the initialization code. You should submit an SPR.
ILLEGAL PROGRAM NAME The program name you typed is in an incorrect format. The name must be one to six alphanumeric characters with no embedded spaces.
PROGRAM NOT FOUND The program you specified could not be found. Press RETURN to get a list of programs that can be loaded.

For information on other errors that occur during the use of the LOAD option, refer to Appendix A.

3.14 Enabling only the Console Terminal

The UNISYS option provides a way to start the RSTS/E system for time sharing without enabling any terminal interfaces except the console (KB0:) interface. Use UNISYS as a diagnostic tool in cases where the system will not start. If an otherwise nonworking system does work with UNISYS, the terminal configuration is probably faulty.

The UNISYS option simply sets a flag that is checked at start-up time. When the flag is set, the start-up routines bypass the code that enables terminal interfaces. The only way to clear the flag is to reboot the RSTS/E system disk, thus reloading the initialization code. (See the description of bootstrapping devices in Section 3.12.) Therefore, use UNISYS immediately before starting the system. The following example shows the use of the UNISYS option:

```
Option: UNISYS


Option: START

You currently have: JOB MAX = 24, SWAP MAX = 16K.

JOB MAX or SWAP MAX changes? (LF)

Any memory allocation changes? (LF)

You currently have crash dump enabled.

Crash dump? (LF)

20-MAY-79? (LF)
19:58? (LF)
All except console terminal being disabled.
?Can't find file or account
?Program lost-Sorry

Ready
```

In the example, you specify the UNISYS and START options. The START option asks the usual questions, then prints a message indicating that only the console terminal is enabled.

3.15 Setting Console Terminal Fill Characteristics

The FILL option sets fill characteristics for the console terminal. Fill characters are NULL characters used by each terminal for synchronization delays for outputting certain control characters (for example, form feed). The number of fill characters vary depending upon the terminal used. The characteristics set by FILL are in effect only while the initialization code is running. If the initialization code is running from tape, the settings remain only until you reboot the initialization code. If the initialization code is running from disk, the characteristics remain set when you reboot the initialization code. When you start time sharing, however, the characteristics are no longer in effect.

To invoke the FILL option, type FILL or FI in response to the OPTION: prompt. Valid responses are 0–7 and LA30S. Table 3–27 lists the responses recommended for DIGITAL terminals.

Table 3–28: Recommended Console Terminal Fill Characteristics

Fill Characteristic	Terminal
0	ASR33, KSR33, VT05, LA30, VT50, VT52, LA36, VT100, LA120, LA34, LA38
1	ASR35, KSR35
3	VT05B
LA30S	LA30S

To set fill characteristics for use during time sharing, use the appropriate TTYSET commands in the START.CTL and CRASH.CTL control files. For more information on TTYSET and control files, see the *RSTS/E System Manager's Guide*. Refer to the *RSTS/E System User's Guide* for a discussion of fill characters.

3.16 Invoking SAVE/RESTORE while Running INIT

The SAVE/RESTORE system program is a disk volume backup and copy utility that provides you with four operational functions: SAVE, RESTORE, IMAGE, and IDENTIFY. These four functions are defined as follows:

1. SAVE — Creates a copy of a RSTS/E file-structured disk. The SAVE function backs up an entire disk volume to disk or magnetic tape. The tape(s) or disk(s) created by SAVE operations is (are) called a SAVE Set.
2. RESTORE — Recreates a RSTS/E file-structured disk from a SAVE Set.
3. IMAGE — Copies an entire RSTS/E file-structured disk to a LIKE disk.
4. IDENTIFY — Prints label information and other volume characteristics of a SAVE Set volume or a RSTS/E file-strucutred disk.

You invoke the SAVE/RESTORE program off-line while you are running the system initialization code (INIT.SYS). In response to the INIT OPTION: prompt, type SAVRES on the console terminal. After you press RETURN, SAVE/RESTORE requests the current date and time, then prints its own prompt, SAV/RES FUNCTION:. The example that follows illustrates the proper response to the OPTION: prompt and the appearance of the SAVE/RESTORE program prompt.

```
Option: SAVRES

DD-MMM-YY ? 12-MAY-79
HH:MM ? 12:15

SAV/RES Function:
```

As soon as the SAV/RES FUNCTION: prompt appears you are under the control of SAVE/RESTORE and are ready for volume backup processing. If you want to perform a SAVE, RESTORE, IMAGE, or IDENTIFY operation, type one of these functions in response to the SAV/RES FUNCTION: prompt. The program responds by printing a set of dialogue questions (IDENTIFY asks only one). For a description of the SAVE/RESTORE program refer to the *RSTS/E System Manager's Guide* which includes an explanation of the dialogues of all four operations and any error messages that might occur during SAVE/RESTORE operations. Also provided in that documentation is a description of how to boot from a SAVE Set (and RSTS/E volume) and what SAVE/RESTORE operations you can legally perform once you have booted from that medium. Finally, it is strongly recommended that you use the SAVE/RESTORE program to make a copy of the disk you create as a result of the system generation process (Step 37).

Chapter 4
Generating the Target System

After tailoring the SYSGEN system, your next step in the system generation procedure is generating the Target system. The generation of the Target system involves 1) running the program CREATE.SAV, 2) answering the system configuration questions, 3) running the program SYSBAT.SAV, and 4) shutting down the SYSGEN system.

The program CREATE.SAV includes a batch stream that copies the required files to the SYSGEN disk. These files are used in generating the RSTS/E Monitor and BASIC-PLUS Run-Time System. After copying the files, CREATE.SAV chains to the SYSGEN program, which asks the configuration questions.

Your answers to the configuration questions establish the hardware devices and optional software elements that the Target system will support.

After answering the configuration questions, run the SYSBAT.SAV program. SYSBAT.SAV runs a batch file containing commands that cause the assembling of the monitor, terminal service, device drivers and system tables and the linking of the Target system monitor and BASIC-PLUS Run-Time System. If you requested patching during the SYSGEN dialogue, the batch file also contains commands that initiate the patching procedure. When execution of SYSBAT.SAV is complete, shut down the SYSGEN system and proceed to Chapter 5 to tailor the Target system.

NOTE

All filename extensions in this chapter are .SAV, unless stated otherwise.

4.1 Running the Program CREATE.SAV

The program CREATE.SAV includes a batch stream that enables logins and copies the files needed for Target system generation to the SYSGEN disk. CREATE.SAV then chains to the SYSGEN dialogue program, which asks the configuration questions.

If your distribution medium is disk cartridge, logically mount it before running CREATE.SAV. Ensure that the disk drive is write protected. Use a command of the following form:

```
.MOUNT dev:SYSGNG/RO
```

where dev represents the device name (DK, DL, or DM) and unit number of the disk where the distribution disk cartridge is mounted. The /RO switch mounts the disk for read access only to prevent accidental destruction of data on the disk.

Start the execution of CREATE.SAV by typing the following command:

```
.R dev:CREATE.SAV
```

where dev represents the device name and unit number of the distribution medium. The program first enables logins for the SYSGEN system. Then, it copies the LOGIN.SAV program from the distribution medium to the SYSGEN disk. Finally, it logs in on a pseudo keyboard under account [1,2] and uses PIP to copy the following files to the SYSGEN disk from the distribution medium:

LOGIN
LOGOUT
PIP
UTILTY
MACRO
CREF
LINK
SILUS
HOOK
SYSGEN
SYSBAT
ONLPAT
ERR.STB
PIPSAV.TXT
TECO.RTS
TECO.TEC
MINCOP.BAS

The programs LOGIN, LOGOUT, and UTILTY are special versions of system programs that run under the RT11 Run-Time System and are necessary for system generation. DIGITAL supplies only one version of the PIP program which runs under the RT11 Run-Time System and is also necessary for system generation.

The files MACRO, CREF, LINK, SILUS, HOOK, and ERR.STB are used later in the actual generation of the RSTS/E Monitor and BASIC-PLUS Run-Time System. MACRO assembles TBL, TTDINT, and TTDVR, which are the system table and terminal service modules. All other system modules are assembled by DIGITAL before they are shipped. CREF generates the cross reference table that appears at the end of each assembly listing. LINK links modules of both the RSTS/E Monitor and the BASIC-PLUS Run-Time System. SILUS creates Save Image Library files. HOOK makes the disk or tape that is output from the system generation process capable of being bootstrapped. ERR.STB defines the error symbols for the monitor and run-time system links. ONLPAT allows installation and verification of patches to RSTS/E system code.

SYSGEN asks the configuration questions.

SYSBAT is the program which, later in the generation process, interprets a batch file containing commands that run the preceding programs in order to generate the monitor and/or BASIC-PLUS Run-Time System.

CREATE.SAV generates a log file, named CREATE.LOG, on the system disk under the logged in account (normally [1,2]). In addition, it prints all the pseudo keyboard input and output on the console terminal (KB0:), indented two spaces from the left margin.

After CREATE.SAV copies all the necessary files, it logically dismounts the distribution disk (if the distribution medium is disk) and chains to the SYSGEN dialogue program.

4.2 Answering System Configuration Questions

The SYSGEN dialogue program automatically suggests answers to the configuration questions by printing a response (RES) in one of the three forms shown in Table 4-1.

Table 4-1: Automatic Answer Formats

Answer	Reason
RES	The program has ascertained that RES is the correct response.
#RES#	The program assumes that RES is the correct response.
#??#	The program does not know and cannot guess the correct response.

To accept the automatic answer, press LINE FEED. To override the automatic answer, type a response followed by the RETURN key. To obtain an explanatory form of the question, press only RETURN. If you need to return to an earlier question, press ESC (shown as ALT MODE on some terminals). Table 4-2 summarizes the possible responses to a configuration question.

Table 4-2: Possible Responses to Configuration Questions

Response	Meaning
<string>	<string> is the desired answer.
RET	Print the long, explanatory form of the question.
LF	Accept the automatic answer for the question. Not valid if the automatic answer is #??#.
ESC	Return to the preceding question or to the first question in this sequence.

By using the ESC key, you can return to the previous question or to an earlier question in the current sequence. For example, pressing ESC in response to the RK05'S question returns you to the previous question, RS03/RS04'S. Within a sequence of questions, ESC causes a return to the first question in the sequence. As an example, pressing ESC in response to the DATASET SUPPORT FOR DH11'S question will return you to the DH11'S question. You cannot back up beyond certain configuration questions, which delimit sections of the configuration dialogue. These questions are as follows:

```
KL11, LC11, DL11A, DL11B'S?
RF/RS11's?
TU16/TE16/TE45/TU77'S?
RX01/RX02'S?
LARGE FILES?
RESIDENT SIMPLE SYS CALLS?
FPP?
```

If you press ESC in response to any of the listed questions, the SYSGEN dialogue program reprints the question.

The SYSGEN program uses the responses to the configuration questions to create a batch file, SYSGEN.CTL. If you are generating a monitor, the file CONFIG.MAC is also created. CONFIG.MAC defines assembly parameters for the Target monitor. The SYSBAT program uses the SYSGEN.CTL file to perform the requested generation. The remainder of this section describes the configuration questions in detail.

4.2.1 Preliminary Considerations

The system can print the configuration questions in either a short form or a long form. The short form questions are merely a brief prompt. The long form questions include helpful information. If you specify the short form questions, you can request the long form for any question by pressing RETURN in response to the short form prompt.

You can generate RSTS/E for the computer on which you are working or for another computer. If you specify that you are generating RSTS/E for another computer, the SYSGEN program prints #??# for all hardware automatic answers because it cannot perform hardware checks to ascertain the answers.

You must specify the distribution medium on which you received the RSTS/E kit. The automatic answer to the DISTRIBUTION MEDIUM question is #??# unless you began the dialogue by running CREATE.SAV. Answer by typing the device name of the distribution medium (MM, MS, MT, DK, DL, or DM). Remember that the device names MM, MS, and MT are not equivalent on the SYSGEN system. If the system generation files are on the current disk (e.g., if you are generating RSTS/E on-line), type SY to specify the system disk.

The generated system can be output to the SYSGEN disk, another disk, or magnetic tape. DIGITAL recommends that the SYSGEN disk be the output medium only if that disk is a DM, DP, DR, or DB type disk. If the output medium is a small disk (RK05, RL01, RL02), the generated system should be output to a new disk or tape. The system initialization code, error message file, generated monitor SIL file, generated run-time system file, RT11.RTS, PIP.SAV and ONLPAT.SAV are written on an output disk. An output magnetic tape receives the four system files, all load maps, and the listing files. Other files are written out if you answer YES to the RSX AS DEFAULT RTS question. The automatic answer to the OUTPUT MEDIUM question is SY if the SYSGEN disk is large. Otherwise, the automatic answer is the same as the specified distribution medium.

NOTE

> The SYSGEN system supports four RK05 drives and only two of each other disk type and two of each type tape. If you plan to use a fixed disk unit not supported by SYSGEN for the Target system disk, you must use an intermediate medium (such as magnetic tape) for output of the Target system. You can later (as described in Chapter 5) copy the Target system files to the final disk.

If you specify a disk as the output medium, the SYSGEN program prints the PACK ID question. Type the pack ID you specified when you initialized the output disk.

The system generation process creates files (programs with extensions of .OBJ, .LST, .SAV, and .STB) on the SYSGEN disk. If you need to conserve space on this disk, these files can be deleted after they are used. To delete the system generation files, answer YES to the DELETE FILES question. To retain the files, answer NO. If you type N, you will be able to perform an on-line system generation, using SY: as your distribution medium. Type Y and some of the files needed to perform an on-line system generation will be deleted. You will then not be able to perform an on-line generation unless you again mount the distribution medium. On small disks (e.g., RF11), the system generation process will not finish unless you delete the files.

System generation creates load maps and (during RSTS/E Monitor generation) assembly listing files. These files are unique for each system and contain valuable information for system documentation and maintenance. If a line printer is available during system generation, answer YES to the LP FOR SYSGEN question. The load maps will be printed automatically and you can

request (in response to a later question) the printing of the assembly listings. If you answer NO to this question, none of the load maps or listings can be printed during system generation. If the answer to DELETE FILES is YES, but a line printer is not available, the load maps are not deleted from the SYSGEN disk.

The SYSGEN program allows you to generate an entire RSTS/E system, including monitor and BASIC-PLUS Run-Time System; only a monitor; or only the BASIC-PLUS Run-Time System. In addition, you can name both the RSTS/E Monitor SIL and the BASIC-PLUS Run-Time System with any name you prefer. The name must be one to six alphanumeric characters. The default names for the RSTS/E Monitor SIL and BASIC-PLUS Run-Time System are RSTS and BASIC, respectively. If you generate additional RSTS/E Monitors or BASIC-PLUS Run-Time Systems later, remember to assign different names to the new files.

4.2.2 Patching Monitor and BASIC-PLUS Code

The RSTS/E system contains a program, ONLPAT, which you can use to patch system code, or programs you have created. The functions of ONLPAT are described in the *RSTS/E System Manager's Guide.*

The SYSGEN program allows you to include patching with ONLPAT. There is one set of questions for monitor patching and one set of questions for BASIC-PLUS Run-Time System patching. If you include either, the SYSBAT program will provide messages telling you when to mount the device on which your patch files reside.

4.2.3 RSX or BASIC-PLUS-2 as the System Default Run-Time System

If you plan to install RSX or BASIC-PLUS-2 as your system default run-time system, you must type YES in response to the RSX AS DEFAULT RTS configuration question; otherwise, type NO. The YES response instructs the system to copy to the Target disk the RSX.RTS Run-Time System and the tasks necessary to build the remaining libraries.

If you do not generally use the BASIC-PLUS Run-Time System, it may be more beneficial to install RSX rather than BASIC-PLUS as your system default run-time system. Since the RSX Run-Time System requires only 3K words of memory in contrast to 14K words (minimum) for BASIC-PLUS, you can save at least 11K words of memory by installing the smaller run-time system.

4.2.4 Terminal Devices and Software

A RSTS/E system can handle a maximum of 128 terminals including at least one pseudo keyboard. An installation can have any combination of local and remote line interfaces as long as the total number of terminal lines and pseudo keyboards does not exceed 128.

RSTS/E assigns each terminal a keyboard number ranging from 0 to 127. The system assigns keyboard number 0 to the console terminal and refers to the console terminal by the device designator KB0:. The type of line interface that connects a terminal (other than the console terminal) to the system establishes its keyboard number. The keyboard number associated with each line is important because you must use it as a basis for specifying the terminal speeds allowed on each of the variable speed lines on the system. (See the description of the TTYSET.SPD file in the *RSTS/E System Manager's Guide*.)

RSTS/E assigns keyboard numbers in the following order: the system console terminal; all KL11, LC11, DL11A, and DL11B lines; DC11 (remote dial); DL11C and DL11D lines; DL11E (remote dial); PK (pseudo keyboards); DJ11 lines; and DH11 and DZ11 lines in increasing order of unit number and increasing order of configured lines within each unit.

4.2.4.1 Terminal Interfaces — The answers to the configuration questions concerning the number of each type of terminal interface must accurately reflect the hardware configuration. For example, DL11C and DL11D interfaces are similar in construction and operation to the DL11A and DL11B interfaces. However, the interfaces have different ranges of UNIBUS addresses. Because of this similarity, new installations often have problems with improper configuration of the terminal interfaces. You should rely on the automatic answers to verify the terminal interface configuration.

SYSGEN requests the number of lines to enable for each DJ11, DH11, and DZ11 multiplexer unit on the system. Each DJ11 or DH11 multiplexer unit has 16 lines. Each DZ11 multiplexer unit has 8 lines. You need not enable every line on a DJ11, DH11, or DZ11. Therefore, RSTS/E can be configured for fewer than the maximum number of lines physically present on each multiplexer unit. Enable fewer than the maximum number of lines for a multiplexer unit when you need to conserve memory or when enabling all the lines would exceed the limit of 128 lines. For example, if six DH11 and four DZ11 units are present, you can enable at most 126 of the 128 possible lines (because of the console terminal, which is always on a single-line interface and because at least one pseudo keyboard is always generated). If N lines (where N is less than 16) are enabled on a DH11 or DJ11, the lines numbered N through 15 on the unit are not enabled. Lines not enabled are not available for use and are treated as nonexistent. Thus, if you enable five lines on a DZ11, lines 0 through 4 are operational and lines 5 through 7 on that DZ11 cannot be used unless the system is regenerated.

Generate all multiplexer lines into monitor during system generation so that they can be utilized later without regenerating the system. The configuration questions do not ask you to specify which enabled multiplexer lines are actually to be used or which lines are to have modem control enabled (if modems are configured). The SET initialization options allow you to temporarily enable or disable any keyboard line and to enable or disable modem control.

DH11 and DZ11 multiplexers can support automatic answer data sets. A DM11-BB connects a DH11 to an automatic answer data set. If your system

includes one or more DH11 multiplexers and DM11-BB modem control multiplexers, you can include support for automatic answer data sets on the DH11s. DZ11-A and DZ11-B units include partial modem control, but DZ11-C and DZ11-D units do not. If your system includes DZ11-A or DZ11-B units, you can include support for automatic answer data sets on the DZ11s.

4.2.4.2 Pseudo Keyboards — You can configure as many as 127 pseudo keyboards into the system. At least one pseudo keyboard is generated automatically into all systems. Each copy of the BATCH program requires one pseudo keyboard to run user jobs. If you plan to run several copies of BATCH simultaneously, specify at least one pseudo keyboard for each copy of BATCH. One additional pseudo keyboard is necessary for each application that will use the pseudo keyboard features described in the *RSTS/E Programming Manual.*

NOTE

RSTS/E permits a maximum total of 128 single line interfaces, enabled multiplexer lines, and pseudo keyboards. (The console keyboard is always enabled.) If you configure more than 128 lines and pseudo keyboards, the SYSGEN program prints an error message after the pseudo keyboard question and repeats all the terminal interface questions.

4.2.4.3 2741 Terminals — RSTS/E supports 2741-compatible terminals connected to DL11D, DL11E, and DC11 single line interfaces and to DH11 and DZ11 multiplexers. 2741 terminals normally use the RS232 EIA standard connection; hence, they can be connected locally to the computer through null modems to any of the preceding interfaces. They can also be connected through data sets or acoustic couplers for operation over telephone lines. You can include 2741 support on any combination of single line interfaces (DL11D, DL11E, and DC11) and multiplexers (DH11 and DZ11).

NOTE

To function properly on a RSTS/E system, a 2741-type terminal must have the Transmit Interrupt feature, the Receive Interrupt feature, and the ATTN (or BREAK) key. These features allow the terminal to recognize a reverse break signal from the computer, lock its keyboard, and enter receive mode. Manufacturers of 2741 type terminals usually provide these as standard features but a few offer them as optional at extra cost.

RSTS/E supports four code and keyboard arrangements for 2741 terminals: IBM Correspondence Code (CORR), Extended Binary Coded Decimal (EBCD), Standard Binary Coded Decimal (SBCD), and Call 360 BASIC Code (C360). The code and keyboard arrangements are described in the *RSTS/E System User's Guide.* You must define the code(s) your system should support so that the terminal service module can include them. You can specify any combination of the four supported codes.

If you configure more than one code, the terminal service includes a facility that enables a user at a 2741 terminal to change codes (the procedure for changing codes is described in the *RSTS/E System User's Guide*). The first code you name in response to the 2741 CODE(S) question becomes the system default. For example, if your system will support both Correspondence and EBCD 2741 terminals, but you prefer EBCD as the default, type EBCD, CORR in response to the 2741 CODE(S) question.

4.2.4.4 Multiple Terminal Service — The multiple terminal service option allows one program to interact simultaneously with several terminals on one I/O channel. A program can control several keyboards by establishing a master keyboard on a single channel and by assigning various other keyboards as slave terminals. To perform input or output, the program executes Record I/O statements on that single channel. It uses special software options to ascertain the keyboard being serviced. In addition, the system can automatically stall program execution in the absence of keyboard input. The system can then make the program eligible to run when keyboard input is pending from the master keyboard or from one of its slaves. Thus, a single program can interactively service low volume keyboard input and output associated with several stations. This facility eliminates the need to run separate copies of the same program at each terminal when several terminals must perform a similar function. Multiple terminal service is explained in detail in the *RSTS/E Programming Manual.*

4.2.4.5 Echo Control — The echo control option allows a full duplex terminal to simulate block mode operation. A program can define fixed-length fields for user input and accept input from only one field at a time. Echo control also enables a program to define special characters for character deletion sequences within a field. Echo control is useful for data entry and other applications in which the programmer needs to control the appearance of terminal output. A complete description of the echo control facility is presented in the *RSTS/E Programming Manual.*

4.2.5 Disk Devices

Disks in the RSTS/E system operate in either the public structure or as private disks. The disk that contains the system accounts and executable code of RSTS/E is called the system disk and is the first disk in the public structure. All other disks in the system are referred to collectively as nonsystem disks.

A removable system disk is more practical on a RSTS/E system than a fixed system disk. A removable cartridge or pack can be taken from the computer area when the system is not operating and kept in a safe place to reduce the chances of inadvertent or malicious destruction. To provide the same level of security with a non-removable disk you must copy the contents to a secondary medium each time you shut down the system.

If the system requires a large amount of public storage space, a single, large-capacity disk pack drive is preferable to multiple RK05, RK05F, RL01, RL02 or RK06 DECpack disk drives. Each time a file is created within the public

structure, the system searches the directories of each public disk to ensure that a file of the same name does not already exist. The use of multiple disks in the public structure increases the overhead required for such a search. You can use private disks rather than public disks as a method of reducing overhead on systems with multiple disk drives.

An RK05F moving head fixed disk is basically two RK05's with one set of read heads. It has twice the capacity of a single RK05, and provides increased capability at lower cost than multiple RK05s. Unit designations for each RK05F are an even-odd pair (e.g., 2 and 3, 4 and 5). You must initialize and format each half of the disk separately. An RK05F can be assigned unit designations of 0 and 1 and can be used as the system disk. However, DIGITAL recommends for security purposes that the system disk be a removable cartridge. Therefore, you can most effectively use an RK05F as a nonsystem disk.

You can obtain optimum performance if the system is configured with a removable, moving head disk and a fixed head disk. With such a configuration, the monitor can swap user jobs out of memory onto the faster fixed head disk.* Disk accessing operations on the moving head system device can then be confined to manipulating user files and directories while the faster fixed head device takes on the burden of moving user jobs into and out of memory. In such a case, the fixed head disk need not contain valuable system data. At the start of time-sharing operations, you can install swapping areas on the fixed head disk.

All moving head disk controllers allow several drives to perform seek operations simultaneously. Since the controller is not busy during seek operations, data transfers on one drive can overlap seeks in progress on other drives. If more than one drive is on the same controller, you can configure an overlapped seek driver to accelerate processing for the disks on that controller. The overlapped seek drivers, however, require more memory than the nonoverlapped seek drivers. The overlapped seek drivers provide advantages in throughput that normally outweigh the disadvantages of the additional memory required. Therefore, DIGITAL recommends the overlapped seek drivers for all systems with more than one disk drive on a single controller. The only exception to this recommendation is a system that includes a single RK05F disk and no RK05 disks. Because the RK05F disk has only one set of read heads for the even-odd unit pair, no overlapping can take place. You should configure the nonoverlapped seek driver for that disk device.

4.2.6 Other Peripheral Devices

The use of peripheral devices on the RSTS/E system reduces the burden of storage requirements on the disks and provides convenient media for file archives. You can store infrequently used program and data files on magnetic tape (DECtape or industry standard magnetic tape), paper tape, and diskette. You can access the files readily when necessary. The paper tape reader

*The RM03 disk, though a moving head disk, is by virtue of its higher data transfer rate a good alternative to a fixed head disk for swapping. Because of its storage capacity (67 million bytes), only a small fraction of an RM03 disk pack (at most 4 million bytes) is needed for swapping, and it should be a file structured disk. The rest of the pack can be used for data storage.

and card reader provide convenient methods of input. You can improve the production of hard copy output on the RSTS/E system by using multiple line printers with different characteristics.

If the RSTS/E system has a card reader, configure one of the four following card codes: ANSI standard, DEC029, DEC026, or IBM 1401. Refer to the *RSTS/E Programming Manual* for these card codes. The default card code is ANSI.

4.2.7 DECnet/E Network Support

DECnet/E is the DIGITAL network package for RSTS/E. DECnet/E allows user jobs to communicate with other DECnet systems in the network. The DECnet/E documentation describes in detail the concepts and capabilities of DECnet/E. The *RSTS/E Programming Manual* describes local communications. DECnet/E software is not included in the standard RSTS/E distribution kit but is licensed as a separate product. If your system includes DECnet/E, you must respond Y to the DECNET NETWORK SUPPORT question, then specify the medium on which you received the DECnet/E kit after the DECNET DISTRIBUTION MEDIUM question.

For network operation, the system must include at least one DMC11 interprocessor link. RSTS/E supports up to 16 DMC11s.

Messages printed during SYSBAT processing tell you when to mount the medium containing the DECnet/E software.

4.2.8 The KMC–11 Micro-Processor

The KMC–11 is a micro-processor that can be attached to the UNIBUS of the PDP–11 computer system. The KMC–11 will run asynchronously with the PDP–11 CPU. When the KMC–11 is running, as for example to handle 3271 Protocol Emulation, it will provide Non-Processor Request data transfers and greatly reduce PDP–11 CPU overhead by eliminating almost all Binary Syschronous Communication character interrupts and protocol processing. IBM Protocol Emulator products also use XBUF rather than small buffers.

4.2.9 Extended Buffering for LP

If the EXTENDED BUFFERING FOR LP question is answered YES, the line printer driver will be able to buffer data in XBUF as well as in small buffers. Each line printer driver will use a maximum of 2.5K words of XBUF while it is running. In addition, the driver is approximately 70 words longer.

This option is intended for installations with large systems that want to improve line printer performance and reduce line printer impact on the small buffer pool. It is not recommended for systems with less than 10K words of XBUF. This is important because use of XBUF by the line printer driver will significantly reduce the hit rate for directory caching on small systems.

4.2.10 RSTS/E to IBM Mainframe Communications Support

4.2.10.1 RSTS/E 3271 Protocol Emulator — The RSTS/3271 Protocol Emulator allows user tasks running under RSTS/E to communicate interactively with application programs running on an IBM System/370 or IBM Series/30 System. RSTS/E requires that the IBM programs run under the IMS/VS or CICS/VS DB/DC systems. With the RSTS/E Protocol Emulator package you can have on-line entry, retrieval, update, and file transfer access to IBM files. Note that the RSTS/3271 software is not included in the standard RSTS/E distribution kit but is licensed as a separate product.

The communications discipline used by the RSTS/3271 Protocol Emulator is the 3271 subset of IBM's Binary Synchronous Communications (BSC) protocol using EBCDIC code. This subset of BSC supports operation of full and half-duplex leased lines in either point-to-point or multipoint configurations at transmission speeds up to 9600 bits per second. The emulator does not support switched facilities, contention line control, or transparent BSC capability, but it can share a multidrop line with control units functioning in transparent or non-transparent mode.

By using the KMC11 micro-processor the RSTS/3271 Protocol Emulator can lower significantly the CPU overhead associated with BSC communications. To provide this benefit, the KMC11 handles all modem and line control, BSC protocol, and does ASCII/EBCDIC code conversion in both directions.

In summary, the RSTS/3271 Protocol Emulator can:

1. permit RSTS/E tasks to communicate interactively with IBM tasks,
2. talk to IMS/VS,
3. talk to CICS/VS, and
4. support the IBM 3271 interactive BSC protocol.

For a detailed discussion of the RSTS/E 3271 Protocol Emulator, refer to the *RSTS/3271 Protocol Emulator User's Guide.*

4.2.10.2 RSTS/2780 Emulator Package — The RSTS/2780 Emulator Package allows RSTS/E to emulate the operation of an IBM 2780 Remote Batch Terminal. The operations emulated permit communication between RSTS/E and an IBM system or between two RSTS/E 2780 configurations. Transmission of data can originate from a card reader or disk files. Received data can be directed to a line printer or to disk files. All data is transmitted in EBCDIC or binary code, and communication is supported over synchronous, point-to-point contention mode only, at up to 4800 baud. RSTS/E 2780 also supports a spooling operation which allows RSTS/E users to queue files for transmission.

The *RSTS/2780 User's Guide* describes the features of the 2780 package. The RSTS/2780 software is not included in the standard RSTS/E distribution kit, but is licensed as a separate product. Messages printed during system generation tell you when to mount the tape or disk containing the RSTS/2780 software. The 2780 package requires the KG11A communications arithmetic unit and a DP11, DU11, or DUP11 synchronous line interface unit.

4.2.11 System Capacity and Optional Features

4.2.11.1 Large Files — Your installation may need to create and process files which are larger than 65535 blocks. The Large File feature which you can add to your system during system generation provides this capability. If you have a large file requirement, you must include this feature in your monitor. However, even if you do not intend to create files larger than the 65535 block limit, you can significantly improve your system's throughput by selecting this option.

The version of FIP that supports large files retains directory information in memory in buffer areas called File Control Blocks (FCB) and Window Control Blocks (WCB). These areas retain pointers to directory blocks on disk and to blocks that are being accessed. Since the large file processor keeps more directory information in memory than is possible without using the large file processor, you can reduce the amount of directory I/O required to do window turning by including the large file code in your monitor. In addition, because the FCB and WCB buffers are interconnected, you can reduce the amount of directory I/O necessary to open a file which is already open. When a file is opened and information is requested from disk, the large file processor first checks the buffer areas in memory to see if the buffers contain any block information needed by the recently opened file. Since it is significantly faster to scan these buffers in memory than it is to perform a disk I/O, you decrease directory search time and consequently the load on your disk I/O drivers.

Additional features of this option are:

1. reduces the processing time of interlocked block checking for files opened in update mode,
2. able to extend files opened in update mode (for shared write access) while they remain open, and
3. provides accurate file sizes.

Unless it is more important to minimize the size of permanently resident memory in your monitor than to process disk information more efficiently, you should include the Large File feature on your system.

4.2.11.2 Maximum Number of Jobs — With sufficient hardware, RSTS/E can handle up to 63 simultaneous jobs. You must specify a maximum number of jobs (the configured job maximum) at system generation time because this value determines the size of several monitor tables. You can set a lower maximum (the default job maximum) later when you set the system defaults. You cannot increase the configured job maximum without regenerating the RSTS/E Monitor.

The maximum number of jobs that can be run efficiently depends on the memory space available and the number and types of disks on the system. Memory space requirements are described in Appendix B. To calculate the effect of disk devices, see Section 3.8.1.1, which describes swapping files.

4.2.11.3 Small Buffers — The RSTS/E system handles characters, data transfers, queued interjob messages, and file processing requests by using intermediate memory storage, called small buffers. Small buffers are 16–word storage units in the monitor part of memory. These buffers are a system resource. You must configure a sufficient number of them at system generation time. If you do not configure enough small buffers, jobs can become stalled because too few small buffers are available. Jobs must wait until enough buffers are freed by other jobs currently claiming them.

The number of small buffers needed at any one time depends on the dynamic requirements of the jobs on the system. The automatic answer printed by the configuration question is computed as 9 for each configured job, plus 80. This number is sufficient for most systems. Thus, for a typical 10–job system, you should configure 170 ((9*10)+80) small buffers.

For planning purposes, consider the following guidelines. Each active terminal requires four or five small buffers for normal input and output operations, and several more for echo control operations. Each job requires four small buffers for descriptive information about the job. Therefore, a system running 10 jobs and using 8 terminals needs 72 to 80 small buffers.

Next, consider the types of processing done on a typical system. Each file opened by a job requires one small buffer, plus 1 additional for each channel on which it is open on a system which supports files larger than 65535 blocks. If each of 10 jobs opens 3 disk files, RSTS/E needs 30 to 60 more small buffers. If all jobs open the maximum of 15 files simultaneously, 150 to 300 small buffers are necessary. On a typical system, the 3–file situation is more likely, so 30 more small buffers must be added for a running total of 102 to 110. On a system supporting large files, you need to add 1 more small buffer for each distinct file being open.

RSTS/E also uses small buffers for certain transient operations. The system uses one small buffer for each disk transfer queued by the monitor and one small buffer for each job that is installed as a message receiver. Many system programs, including QUEMAN, QUE, ERRCPY, BATCH, SPOOL, and OPSER, communicate through the send/receive system function calls. These system function calls claim at least one small buffer for each message queued for a receiving job. Normally, these operations use small buffers for short time periods (fractions of a second). A reasonable number of small buffers to allocate for such operations on the 10–job, 8–terminal system is approximately 35 small buffers, bringing the total to 127 to 135.

Unless the send/receive code can use extended buffer space (see Section 3.8.4.7), each pending message occupies small buffer space. The number of messages that the system can hold in the small buffer pool depends on the size of the messages and the speed with which the receiving job processes them. The following equation gives the number of small buffers (N) needed to process a message.

$$N = \frac{\text{length of message in bytes} + 8}{32} + 1$$

By substituting the correct value for the length of a message, performing the calculation, and rounding N up to the next integer, you can compute the number of small buffers needed to process any message. By using the equation, you can determine, for example, that a 512-byte message requires 18 small buffers. The size of the messages and the amount of message processing on the system affect the availability of small buffers. If the system processes many messages, you can improve system performance by allocating space to extended buffers.

Character-oriented output devices use small buffers to hold data awaiting output. These devices (line printer, terminal, and paper tape punch) have buffer quotas. A buffer quota is the number of small buffers a device should obtain for reasonable efficiency. The buffer quotas are 20 for a line printer, 10 for a terminal, and 10 for a paper tape punch. The sample system thus needs an extra 20 small buffers for one line printer. The running total is now 157 to 165 small buffers for an 8-terminal, 10 job system.

RSTS/E also uses small buffers for CCL commands and run-time systems. Each defined CCL command requires one small buffer. Auxiliary run-time systems (not the system default) that you add to the system with the UTILTY program also require one small buffer each. If the sample system has 10 CCL commands and 1 auxiliary run-time system, add another 11 small buffers to make the total 168 to 176.

The total requirement for an 8-terminal, 10-job system is approximately 170 small buffers, allowing for idle terminals and occasional system slowdown. Except for periods of heavy keyboard and message activity, enough free small buffers will be available to maintain good system throughput.

You can monitor system performance by observing the number of free small buffers available, as reported by the SYSTAT program. For good system performance, the monitor does not allow the number of free small buffers to drop below 40.

4.2.11.4 System-Wide Logical Name Assignments — RSTS/E allows you to assign up to 50 logical names on a system-wide basis. Any user can type a system-wide logical name to access the device and account it represents. Each logical name assignment requires five words of monitor table space; therefore, you should not configure more logical assignments than your system will use. Refer to the *RSTS/E Programming Manual* or the *RSTS/E System Manager's Guide* for further information on system-wide logical names.

4.2.11.5 Monitor Statistics Gathering Package — The optional Monitor Statistics Gathering Package includes tables that record job, disk, and directory cache statistics. If you include the package during system generation, the code and buffer space will be added to the monitor SIL.

This code is a fully supported part of the monitor; inclusion of this code does not invalidate support for your RSTS/E system. However, the use of this optional feature is an unsupported activity, unless such support is provided for in a DIGITAL Software Services consulation contract. Note also that this feature may change in future releases with respect to what data is accumulated and how the data is accessed.

4.2.11.6 File Processor Buffering — The optional file processor (FIP) buffering module accelerates file processing on the RSTS/E system. The module reduces the number of accesses to disk by maintaining more than one disk directory block in memory. The FIP buffering process improves the performance of system operations that involve accessing of disk directories because the related data are accessed in memory that is used as a cache. The following are representative operations that involve directory accesses:

- File OPEN and CLOSE operations
- Updating an in-memory window of a file (window-turning);
  Random access to files (such as to an RMS indexed file) uses "window-turning" heavily (unless the file is contiguous); FIP buffering greatly improves such accesses.
- Listing directories
- Wild card file operations

Normally, FIP uses only one permanently allocated one-block buffer to store disk directory information. File processing is often delayed because at any given time the directory block that the file processor needs is not in its buffer.

The FIP buffering code claims free buffers from the normal small buffer pool and stores additional directory blocks in them. Frequently used information is thus kept in memory to avoid accesses to disk. If any of the buffers are required for their standard uses, the FIP buffering module releases them to the system. You need not increase the number of small buffers configured for other system operations when you include the FIP buffering module on the system.

You can enhance FIP buffering on the RSTS/E system by allocating additional memory for use by the FIP buffering module. The XBUF suboption of DEFAULT (Section 3.9.4.7) allows you to reserve a fixed amount of memory as extended buffer space. The FIP buffering module can use this space as a cache for disk directory blocks.

The module uses the available extended buffer space before it claims small buffers and does not use small buffers at all if you allocate more than 8K words of extended buffer space. By placing frequently accessed directory blocks in a special area of memory (the extended buffer pool), the FIP buffering module avoids disk accesses. This process prevents degradation of performance on a heavily loaded system, when fast access to directory blocks is needed and user jobs claim most of the small buffers.

With extended buffer space available, the FIP buffering module may increase the speed of an individual operation up to ten times or not at all (if the operation accesses none of the reserved memory). The module affects the performance of system operations that involve computing. Increased overhead in the monitor causes this degradation, which can be as low as a fraction of 1% or as high as 12%. However, the reduced disk activity generally more than compensates for degradation of compute operations, except in extremely compute-bound systems. Generally, the central processor overhead increases

in direct proportion to the improvement in directory related operations. Since only one job at a time may use FIP, speeding up FIP may speed up the entire RSTS/E system.

RSTS/E allows you to control the FIP buffering facility with the ENABLE CACHE and DISABLE CACHE commands in the UTILTY program. (Refer to the *RSTS/E System Manager's Guide* for further information on the UTILTY program.) Therefore, you can disable the module if system use will be heavily compute-bound. You can later re-enable the module when speed of directory operations is needed. In general, however, the FIP buffering module greatly improves system performance and its use is strongly recommended.

4.2.11.7 Extended Data Buffering — The extended data buffering option accelerates processing of specified files (that is, files to be cached,) on the RSTS/E system. Extended data buffering is located within the monitor and requires at least 2K of extended buffer space. The benefits to be gained from this option are similar to those from FIP buffering, as are also the trade-off considerations. Once this has been generated into the monitor you should refer to the *RSTS/E System Manager's Guide* for further information on data caching.

The extended data buffering feature is not recommended for systems with less than 256K words of memory because such systems usually cannot afford to allocate large enough XBUF to make it effective. Usually systems with 64K to 192K words should use directory caching (FIP buffering) but not data caching.

The best size for XBUF can only be determined by experiment. For directory caching, a good starting point is about 10% of memory; for directory and data caching, about 15% of memory.

4.2.11.8 Disk Driver Phase — The disk driver code, ordinarily resident in permanently mapped memory, can be built into a separate monitor phase. Removing this code can increase the size of your small buffer pool at the cost of a physically larger monitor. The actual number of small buffers that are made available by selecting this option depends on the types of disks and other devices for which support is generated. If you can afford the increase in the size of the monitor and need to provide your system with more small buffers, include this option at system generation time.

About 15% of the time, putting disk drivers in a separate phase will make the monitor 1K words larger, independent of any size increase from added small buffers. There is no difference in performance, however, when the disk drivers are put into a different phase.

4.2.11.9 Resident Libraries — A resident library is a collection of shareable code and/or data which you can access in a task as part of your virtual memory space. This shareable code can reduce access time for programs with overlayed code by making the code memory resident and by having more than one program use the library. This saves disk access time and also diminishes the load on your disk I/O drivers, which frees them for other system tasks. In

addition, if there are several programs that require the same code (for example, RMS–11 code) the programs can share that code saving the amount of memory that is not duplicated.

There are a few factors that you must consider before you decide to include the optional resident library feature in your monitor. If you have at least 124K words of memory and plan to use RMS–11, then you should include this feature during the system generation process, so that you may use the RMS–11K Resident Library. If you intend to use resident libraries that you build yourself, the amount of memory that you need may be less than what is recommended when using the 24K RMS–11K Library. This is true if the size of your memory resident libraries, when added together, is smaller than 24K words. Another factor that you must consider is the increase of approximately 1K words in the size of your monitor. Even though the resident library is not made part of permanently mapped memory, the code that handles resident libraries makes the monitor larger. In addition, each job that accesses a resident library will use an additional 1 to 3 small buffers.

Finally, you must weigh all these factors along with the requirements of your installation to determine how you should make use of resident libraries. To learn how to create your own resident library, refer to the *RSTS/E Task Builder Reference Manual*; refer to the *RSTS/E System Manager's Guide* or the *RSTS/E Programming Manual* for an explanation of the load procedures for a resident library.

4.2.11.10 RSX Directives — In RSTS/E V7.0, you can add to your system a feature which allows the monitor to perform the functions (except the load operation) of the RSX Run-Time System (RTS). When you select the RSX Directives option during system generation, you direct the SYSGEN system to include RSX emulator code in the RSTS/E Monitor. With this feature installed, RSX programs will be controlled by the RSX emulator code in the monitor rather than by the RSX RTS, which is then only used as a keyboard monitor or for loading programs. Once the RSX RTS loads an RSX task into memory, RSX passes program control to the RSX emulator in the RSTS/E Monitor. Since the monitor executes all subsequent RSX directives, the RSX RTS is no longer necessary, and is removed (if not needed) from the user address space. This allows the space to be used for expanding (up to 31K words) the user program or for mapping a resident library. Previously, 28K was the maximum executable task size, and will remain that size if you do not select this option or when a program uses a run-time system other than RSX. The removal of the 3K word run-time system allows a program using the RSX RTS to expand to 31K words, if required.

The RSX emulator code adds 1K words to the size of the permanently mapped portion of your monitor. However, you effect a gain of 2K words of dynamic memory, since the removal of the RSX RTS can free 3K words of memory and the addition of the monitor code brings the net gain to 2K words. This is valid on the assumption that RSX is not your system default run-time system.

Because the RMS–11K Resident Library requires 8K words of user job address space, you must select this option when you plan to use the library. Otherwise, the run-time system, which requires 4K words of user space, and the resident library would take a combined total of 12K words, leaving insufficient room for the programs which use the RMS–11K Resident Library. By selecting this option, you allow those programs to run without the run-time system, giving you 4K words more for your programs.

NOTE

Programs which expect to read data (i.e., from the pseudo-vector region as described in the *RSTS/E System Directives Manual*) from the RSX Run-Time System will fail on systems with the RSX Directives option selected. The message that is printed indicating this failure is MEMORY MANAGEMENT VIOLATION.

4.2.11.11 Resident Code — You can configure certain portions of the overlay code to be resident in memory rather than to be stored on disk during time sharing. System performance improves if frequently used code is made resident. The size of each potentially resident segment of code is listed in Appendix B.

The most important code in terms of system performance is the disk-handling code. This code includes the following: 1) the system routines for disk file creation; 2) OPEN and CLOSE routines; 3) routines for processing the RUN command; 4) general routines for opening other devices, deassigning devices, retrieving error messages, and looking up files by name; and 5) routines needed for logout. Because disk handling code is so frequently used, DIGITAL recommends that you configure it as resident, unless memory space is critical and all other steps to reduce the size of the monitor have been taken.

The send/receive code provides interjob communications for such programs as OPSER, QUEMAN, BATCH, and RJ2780. If your system applications require frequent interjob communication, resident send/receive code improves system performance. When DECnet/E is included, Send/Receive is automatically made resident.

The simple SYS call code is used whenever a program executes a SYS call to the file processor (SYS code 6) or the DATE$ and TIME$ functions in BASIC–PLUS. These SYS calls are often used in DIGITAL-supplied system library programs. If your system has more than 64K words of memory and frequently uses file processor SYS calls, you should make the SYS call dispatch code resident.

The file delete and rename code deletes and renames RSTS/E files. If your system is quite large or your applications require an inordinate number of file delete and rename operations, you may prefer to make the code resident.

The login, attach, and attribute code logs in and attaches jobs and performs file attribute read/write operations. If your system is large (many jobs logging in and attaching during time sharing), you may want to make this code

resident. If your system uses languages such as COBOL, BASIC-PLUS-2, and RPG II or uses the Task Builder as part of program development, attributed files are created and you may again prefer to have this code resident. Your choice is to have all the login, attach, and attribute code resident or not.

The directory listing code gathers information about disk directories, performs wildcard disk file lookups, and manipulates file identification blocks for certain files. This code is used by the CATALOG command in BASIC-PLUS and by PIP.SAV for obtaining directory information. If your system has more than 64K words of memory and you make moderate use of the PIP utility, then it is recommended that you make this code resident.

4.2.12 BASIC-PLUS Run-Time System Considerations

Several optional features are available for the BASIC-PLUS Run-Time System. These features include mathematical functions, the PRINT USING facility, matrix manipulation, and string arithmetic.

4.2.12.1 Floating Point Precision and Scaled Arithmetic — You can select either single-precision (2-word) or double-precision (4-word) floating point format as the type of numeric format to be used on the system. These floating point formats are described in the *BASIC-PLUS Language Manual.*

Your answers to the FPP, FIS, MATH PRECISION, and FUNCTIONS questions establish which mathematical software package the SYSGEN program selects from the fifteen math packages included in the RSTS/E distribution kit. Table 4-3 describes the math packages.

The most critical difference among packages is the implementation of floating point operations. The PDP-11/45 compatible Floating Point Processor (FPP) provides both 2-word and 4-word floating instructions in hardware. The PDP-11/40 compatible Floating Instruction Set (FIS) does not provide 4-word floating point instructions in hardware. Therefore, on PDP-11/40 computers with or without FIS, RSTS/E must use the slower software packages (XL4, XT4 or MA4) to perform 4-word floating point operations.

On PDP-11 computers without FPP hardware, the size of a BASIC-PLUS Run-Time System that includes the 4-word floating point software may exceed the maximum of 16K words. To avoid exceeding the limit, you must omit some optional features when you configure BASIC-PLUS. Choose features from Table B-3 of Appendix B so that the total size of the BASIC-PLUS Run-Time System is at most 16383 words.

The scaled arithmetic feature is available only on systems with 4-word floating point format. Scaled arithmetic is described in the *BASIC-PLUS Language Manual* and the SCALE command is described in the *RSTS/E System User's Guide.* Scaled arithmetic helps users to avoid problems such as loss of precision normally associated with floating point calculations. The feature is useful for calculating sums that cannot be easily expressed as integer quantities, such as dollars and cents amounts.

Table 4-3: Two and Four-Word Math Packages

Math Package	Description
MA2	2-word without FIS or FPP.
MA2I	2-word with FIS.
MA2F	2-word with FPP.
MA4	4-word without FIS or FPP.
MA4F	4-word with FPP.
XL2	2-word log function without FIS or FPP.
XL2I	2-word log function with FIS.
XL2F	2-word log function with FPP.
XL4	4-word log function without FIS or FPP.
XL4F	4-word log function with FPP.
XT2	2-word trig function without FIS or FPP.
XT2I	2-word trig function with FIS.
XT2F	2-word trig function with FPP.
XT4	4-word trig function without FIS or FPP.
XT4F	4-word trig function with FPP.

NOTE

FPP is available for PDP 11/34, 11/45, 11/50, 11/55, and 11/70 processors. It is standard on the 11/60.

FIS is available for with PDP 11/40 and 11/35 processors.

4.2.12.2 Mathematical Functions — You can reduce the size of the BASIC-PLUS language code by omitting the trigonometric functions SIN, COS, TAN, ATN; and the logarithmic functions SQR, EXP, LOG, and LOG10. These functions are described in the *BASIC-PLUS Language Manual*. Some installations may need only one part of the math functions (e.g., the logarithmic functions) and may prefer to delete the other part (i.e., the trigonometric functions) in favor of another option. (The polynomial calculation portion of the math functions is present if either or both of the trigonometric or logarithmic functions are included.) Operations such as X^Y require the log functions if Y is not an integer.

4.2.12.3 PRINT USING Option — The PRINT USING optional feature allows BASIC-PLUS programs to perform special formatting of output as described in the *BASIC-PLUS Language Manual*. You can reduce the size of the BASIC-PLUS by omitting this option.

4.2.12.4 Matrix Manipulation — BASIC-PLUS can operate on an entire matrix using single MAT statements as described in the *BASIC-PLUS Language Manual*. Configure this optional feature if you want to include the matrix manipulation (MAT statement) capability.

4.2.12.5 String Arithmetic — BASIC–PLUS can, at your option, include the special string arithmetic functions SUM$, DIF$, PROD$, QUO$, PLACE$, and COMP%. These functions perform arithmetic operations on strings of numerics, minus signs and decimal points, with an accuracy of up to 56 digits. The string arithmetic functions, although slow to execute, are useful for applications such as monetary conversions, which can involve numbers that require a high degree of precision. Refer to the *BASIC–PLUS Language Manual* for complete information on the string arithmetic functions.

4.3 Running the SYSBAT Program

After you answer the final configuration question, the SYSGEN program completes the building of the configuration file (CONFIG.MAC) and the batch control file (SYSGEN.CTL). The program then prints a message instructing you to edit the files (if desired) and start the batch process. If editing is necessary, use the TECO editor, which is on the distribution tape or disk. Refer to the *PDP–11 TECO User's Guide* for instructions on how to use the TECO editor.

NOTE

Before using the TECO editor, you must add the TECO Run-Time System by performing the following procedures:

1. Type the command, RUN $UTILTY, then press RETURN.
2. Type ADD TECO, then press RETURN in response to the asterisk (*) prompt.
3. Type CTRL/Z or EXIT to terminate the UTILTY program. The TECO Run-Time System is now installed. At this point, you can begin to edit the files.

Normally, logins have been enabled by CREATE.SAV. If CREATE.SAV has not been run since the system was last started, the batch process fails to log in and aborts. You should run the UTILTY program and issue the LOGINS command before restarting the batch process. Type R SYSBAT in response to the dot (.) prompt character to start the batch process. The batch process executes commands in the batch control file to generate the RSTS/E Monitor Save Image Library (SIL) and the BASIC–PLUS Run-Time System.

The batch process performs input and output to a pseudo keyboard, and prints all pseudo keyboard input and output at the console terminal, two spaces indented. As it executes, the batch process may request that you mount the distribution medium, ready a line printer (if you requested assembly listings), and mount the output medium for the Target system. The following is an example of a batch process request.

```
MOUNT AP-2773G-BC ON A MAGTAPE DRIVE

WITH NO "WRITE RING" AND SET TO "ON LINE"

Mount MM:"SYSGNG"-write locked
Unit ? 0
```

In response to the UNIT question, type the unit number on which you have mounted the tape.

The batch stream deletes the assembly listing files and other system generation files from previous system generations, if they exist. For more information on the PIP program refer to the *RSTS/E System User's Guide*. The following appears on the console printout when PIP.SAV is run:

```
.R PIP.SAV
*TBL.OBJ,TTDINT.OBJ,TTDVR.OBJ/DE:NOWARN
*TBL.LST,TTDINT.LST,TTDVR.LST/DE:NOWARN
*RSTS.SAV,TER.SAV,DSK.SAV/DE:NOWARN
*EMT.SAV,FIP.SAV,RSX.SAV,OVR.SAV/DE:NOWARN
*RSTS.MAP,TER.MAP,DSK.MAP/DE:NOWARN
*EMT.MAP,FIP.MAP,RSX.MAP,OVR.MAP/DE:NOWARN
*RSTS.STB,TER.STB,DSK.STB/DE:NOWARN
*EMT.STB,FIP.STB,RSX.STB,OVR.STB/DE:NOWARN
*NSP.SAV,TRN.SAV,XMDVR.SAV,RJ2780.SAV/DE:NOWARN
*NSP.MAP,TRN.MAP,XMDVR.MAP,RJ2780.MAP/DE:NOWARN
*NSP.STB,TRN.STB,XMDVR.STB,RJ2780.STB/DE:NOWARN
*^C
```

If any error messages appear in the batch printout, the system generation process may be in error. Refer to Appendix A for a description of these error messages.

When the execution of the batch stream is complete, SYSBAT prints an informative message and returns to the dot (.) prompt character.

4.4 Shutting Down the SYSGEN System

When the batch process completes execution and returns to the dot (.) prompt character, shut down the SYSGEN system.

To shut down the SYSGEN system, run the UTILTY program and issue the NO LOGINS, REMOVE TECO and SHUTUP commands. (If you mounted any disks that the batch process did not logically dismount, issue the DISMOUNT command before issuing the SHUTUP command. If you used the TECO editor to edit CONFIG.MAC on SYSGEN.CTL, you must REMOVE the TECO Run-Time System before issuing the SHUTUP command.). The following example illustrates the procedure.

```
.R UTILTY
*NO LOGINS
*REMOVE TECO
*SHUTUP
```

The UTILTY program disables logins and shuts down the SYSGEN system. The shutdown procedure automatically loads into memory and bootstraps the RSTS/E system initialization code from the SYSGEN disk. Remove the distribution medium and store it in a safe place. After the system initialization code prints its identifying message and the OPTION: prompt, you can proceed to Chapter 5 to tailor the Target RSTS/E system.

NOTE

After the SYSGEN system has been shut down, you may wish to restart it to correct errors that occur in the SYSBAT batch process. To return to the configuration dialogue follow these steps:

1. Reboot the system.
2. Run the START option again. The system will return the message

   ```
   ?CAN'T FIND FILE OR ACCOUNT
   ```

3. Run the UTILTY program by typing:

   ```
   .R UTILTY
   *LOGINS
   *CTRL/C
   ```

4. The system will return the prompt (.). If you type R SYSGEN in response to the prompt, the system will return to the configuration dialogue.

Chapter 5
Tailoring the Target System

After generating the Target system, use the initialization code to tailor the Target system to your installation. You need to 1) bootstrap the Target disk, 2) install the Target monitor, 3) correct the system code, 4) manipulate the system files, 5) establish default start-up conditions for the Target system, 6) specify device unit characteristics, and 7) start the Target system.

5.1 Bootstrapping the Target Disk

Before you can install the Target monitor, the initialization code must be running and the system device must be the Target disk. If the SYSBAT batch process wrote the Target system on the SYSGEN system disk, the system shut down procedure has already loaded the initialization code from the Target disk. Proceed to Section 5.2 to install the Target monitor.

If the batch stream wrote the Target system on another disk or on tape, bootstrap that disk or tape. Next, if the Target system is to be on a device other than the one SYSGEN wrote its output to, use the COPY option to copy the Target system files to the Target disk. The copying operation automatically bootstraps the Target disk. After the Target disk is bootstrapped, you can set hardware characteristics (if necessary).

5.1.1 Bootstrapping the Disk or Tape

Use the BOOT option (described in Section 3.12) to bootstrap the disk or tape output from the SYSBAT batch process. Type BOOT or BO in response to the OPTION: prompt. When the BOOT DEVICE: prompt appears, type the device name and unit number of the disk or tape to be bootstrapped. The initialization code bootstraps the device and returns to the OPTION: prompt. If the Target system is now on the Target disk, proceed to Section 5.1.3 to set hardware characteristics. If the Target system is to be on a disk different than the one SYSGEN wrote its output to, follow the procedures in Section 5.1.2 to transfer the Target system files to disk.

5.1.2 Copying Files from Tape to Disk

If you have not already initialized the Target disk, use the DSKINT option to do so. Type DSKINT or DS to invoke the DSKINT option, and then use the option to initialize the disk as a system disk. Refer to Section 3.3 for a complete description of the DSKINT option.

After initializing the Target disk, use the COPY option (described in Section 3.4) to copy the system initialization code, the RSTS/E Monitor SIL, all run-time system files, and the default error message file to the Target system disk. You must specify /A after the output disk name, to get all auxiliary run-time systems as well as your default run-time system onto your system disk. The COPY option automatically bootstraps the Target system disk.

You can now set hardware characteristics for the Target system disk.

5.1.3 Specifying Hardware Characteristics

If you have not previously used the Target disk as a system disk (or if the Target disk is a fixed head disk), you may need to set console terminal fill characteristics and correct the hardware configuration.

If your console terminal has a fill characteristic other than 0, use the FILL option (Section 3.15). The FILL option allows you to set fill characteristics for a variety of terminal types.

The DIGITAL field service engineer who installed your system may have informed you of changes that are necessary for your system's hardware configuration. Use the HARDWR option (Section 3.6) to make any necessary changes.

5.2 Installing the Target Monitor

Use the INSTALL option (described in Section 3.7) to install the RSTS/E Target Monitor. To invoke the INSTALL option, type INSTALL or IN in response to the initialization code's OPTION: prompt. When the option prints the SIL question, type the name you specified for the RSTS/E Monitor SIL during the configuration questions. The INSTALL option checks the monitor SIL for format, sets bits in the monitor SIL to install it, then returns to the OPTION: prompt. Execution of the INSTALL option takes about 30 seconds.

5.3 Correcting the System Code

If you used Autopatch to correct the system code, then most of the patches are already in place. Otherwise, use the PATCH option at this point. Note that optional patches may be performed here also. Consult the *RSTS/E Release Notes* and issues of the *RSTS/E Software Dispatch* for patches that your system requires. Follow the instructions in the published patch. If you need more information on the PATCH option, refer to Section 3.5.

5.4 Allocating System Files

The REFRESH option (Section 3.8) creates, deletes, and positions files on any disk. If the Target system is on the SYSGEN disk, you should use REFRESH to ensure that the system file allocation is correct. If the Target system is not on the SYSGEN disk, you probably need to use REFRESH to create all the system files.

5.5 Setting Default Start-Up Conditions

The DEFAULT option (Section 3.9) establishes system defaults for job and swap maxima, the run-time system, the error message file, the installation name, memory allocation, crash dumps, and magnetic tape labelling format. Use the DEFAULT option to set these defaults for the newly generated monitor. You may specify either BASIC-PLUS or RSX as your default run-time system at this point. If you intend to use BASIC-PLUS-2 as your default run-time system, specify RSX now.

5.6 Specifying Characteristics for Units of Devices

The SET option (described in Section 3.10) establishes device characteristics on a unit-by-unit basis. If your system includes one or more line printers, use SET to declare type, width, and case for each unit. You can also enable and disable units of a device, enable and disable modem control for keyboards, and restrict the use of devices by unprivileged jobs.

5.7 Starting the Target System

After you specify characteristics for units of devices, use the START option (Section 3.11) to start the Target system. You can invoke the START option by typing START (or ST) or by pressing LINE FEED. If you type START or ST, the START option prints questions that allow you to change certain default start-up conditions. After you answer the questions, the START option prints a list of all the disabled devices on the system. If you press LINE FEED to start time sharing, the START option prompts you for only the current date and time and prints only a line telling the number of disabled devices on the system. If you omit the questions (i.e., press LINE FEED), you cannot change any of the default start-up conditions for the current time-sharing session.

Chapter 6
Building System Library Files and Optional Software

This chapter explains the procedures you must follow to build the RSTS/E utility program library, add auxiliary run-time systems (RTS), and install optional software. After you have completed these steps, you will have finished the generation of your system and will then be able to perform normal time-sharing tasks.

As a first step toward this end you use the START option as mentioned in Chapter 5 to start the Target system. When you perform this task, the monitor sets up job 1 under the system library account [1,2], then attempts to run a system start-up program. If your system default run-time system is BASIC-PLUS, this program is SY:[1,2]INIT.BAC (INIT.TSK for RSX). Because you have not created the RSTS/E system library and thus have no programs in account [1,2], the run-time system prints the message:

```
?CAN'T FIND FILE OR ACCOUNT
?PROGRAM LOST - SORRY

READY
```

and returns control to keyboard monitor command level. The READY prompt indicates that you are currently running under the BASIC-PLUS Run-Time System. If an angle bracket (>) appears rather than the READY prompt, you are under the control of the RSX Run-Time System. You can now use the console terminal (KB0:) as if you had already logged onto the system. At this point, your Target system is running, which means you must now either transfer files to the Target disk using MINCOP or begin to install the RSTS/E software required by your installation.

6.1 Transfer Files to the Target Disk Using MINCOP

You may have decided earlier in the system generation procedure to place the Target system on an intermediate disk or magnetic tape. This means you generated the Target system on a medium that you planned not to be your final Target system medium. It is advantageous, at times, to generate the Target system onto magnetic tape or a small disk (RK05), then transfer it to your final Target medium, often a larger disk. Follow these procedures only if you created an intermediate Target system (i.e., the Target disk is different than the SYSGEN disk) on disk or magnetic tape. You must now transfer the information to the final Target medium.

1. Mount the intermediate Target medium.

   a. If the Target medium is magnetic tape, mount it and invoke the MINCOP program at Step B.

   b. If the Target medium is disk, physically mount, then logically mount the disk using the following command:

      ```
      MOUNT dev:packid/RO
      ```

      where dev represents the device name and unit number of the intermediate Target disk. Include the pack identification of the disk and specify it read only.

2. Run the MINCOP program.

   Type RUN dev:$MINCOP, then press RETURN, where dev represents the device name and unit number of the intermediate Target disk. MINCOP begins to transfer the files and prints copy messages on the console terminal to indicate the successful completion of each copy procedure.

6.2 Introduction to the BUILD Program

DIGITAL supplies on magnetic tape or disk the RSTS/E libraries that you will install on your system. Included on the magnetic tape or disk distribution media are the RSTS/E utility programs, several control files (Refer to Appendix D), and a special program, BUILD. The control files contain commands that the BUILD program uses to compile the utility programs. After BUILD retrieves the programs from the distribution medium and compiles them, it places them in the system library account [1,2]. The compiled programs in account [1,2] constitute the RSTS/E system library. In addition, to ensure that all RSTS/E software is up-to-date, DIGITAL provides, on an Autopatch distribution medium, patches that you can apply while using the BUILD program. Since BUILD can simultaneously create and patch the system library, your first step before you build them will be to mount the Autopatch medium. When the medium is mounted and ready, you invoke BUILD which then presents you with a sequence of dialogue questions. BUILD creates and patches the system library after you respond to all the questions. Section 6.6 contains a discussion of the BUILD program as it relates to creating the standard system library.

You can also use the BUILD program to construct the utility programs for a system default run-time system if you plan to install RSX or BASIC-PLUS-2 as your default run-time system. Basically, you follow the same procedures that you perform to build the RSTS/E libraries; invoke BUILD, answer the resulting dialogue questions, and BUILD creates and patches the RSX or BASIC-PLUS-2 versions that run under RSX or BASIC-PLUS-2 utility programs. If you decide to use one of these two run-time systems as the system default, you must build them prior to creating the RSTS/E system libraries. To build RSX or BASIC-PLUS-2 as the system default RTS follow the steps described in Section 6.5.

The list that follows summarizes the steps you perform to ensure complete generation of your system:

1. Section 6.3 - Provides standard mount procedures for magnetic tape and disk.
2. Section 6.4 - Mount the Autopatch distribution medium and copy patches (if necessary) to the public disk structure.
3. Section 6.5 - Create and patch the default run-time system and its utility programs if it is not BASIC-PLUS.
4. Section 6.6 - Mount the RSTS/E system library distribution medium. Create and patch the standard system libraries.
5. Section 6.7 - Add auxiliary run-time systems then patch them.
6. Section 6.8 - Build optional software.
7. Section 6.9 - Create system message and start-up control files.
8. Section 6.10 - Create user accounts.
9. Section 6.11 - Shut down the system, specify default run-time system (if required), and create recovery media.
10. Section 6.12 - Start Time Sharing, Verify System Control Files, and Store Distribution and Recovery Media.

The section that follows explains magnetic tape and disk mount procedures.

6.3 Magnetic Tape and Disk Mount Procedures

DIGITAL distributes Autopatch kits, system library kits, and optional software kits on either magnetic tape or disk. In this chapter you will be mounting these various media at different times during the system generation. Rather than duplicate the mount procedures throughout the chapter, they are presented here. Refer to this section when you need to mount either medium.

6.3.1 Mounting Magnetic Tape

To mount the magnetic tape perform these steps:

1. Ensure that there is no write-enable ring on the reel.
2. Mount the reel on a free magnetic tape drive.
3. Position the tape at its load point.
4. Set the ON-LINE/OFF-LINE switch to ON-LINE.

6.3.2 Mounting Disk

To mount a disk, perform the following steps:

1. Mount the disk on a free disk drive.
2. Set the unit's RUN/STOP (for RK06 and RK07) or LOAD/RUN (for RK05) switch to RUN; press the LOAD switch to the in position for RL01's.
3. Set the unit's write-protect switch on.
4. When the unit's READY light comes on, logically mount the disk by typing the following command:

   ```
   MOUNT dev:packid/RO
   ```

   where dev: is the device mnemonic and the unit number of the disk and packid is the identifier listed in Section 1-3.

If you will always have one or more public disks mounted besides the system disk, you may use the MOUNT command now to mount them. This will allow subsequent procedures to use the extra disk space.

6.4 Mounting the Autopatch Distribution Medium and Copying Patches to the Target Disk

The BUILD program allows you to simultaneously create and patch the standard system library. If you have an Autopatch distribution medium for the system library, you must mount it at this time. Since DIGITAL distributes the Autopatch kit on both magnetic tape and disk, you will need to follow the appropriate mount procedures for the type of distribution you have. A description of these procedures appears in Section 6.3.1 for magnetic tape and in Section 6.3.2 for disk. After you have successfully mounted the kit, you may need to transfer the patches to the public disk structure. If you have a magnetic tape distribution kit, you must use the PATCPY program, described in Section 6.4.2, to transfer patches from the kit to the public disk structure. BUILD requires that the patches be on disk. You may also need to transfer patches to disk even if you have a disk Autopatch kit (see Section 6.4.1 2b).

6.4.1 Mounting the Autopatch Distribution Medium

Perform the following steps to mount the Autopatch kit:

1. Magnetic tape distribution medium.

   a. Mount the magnetic tape as described in Section 6.3.1.

   b. Go to Section 6.4.2 because BUILD requires the patches on disk.

2. Disk distribution medium.

   a. Mount the disk as described in Section 6.3.2.

   b. The BUILD program can apply patches to the standard system library programs only if the patches reside on disk. If you do not have enough free disk drives available so that the Target disk, the Autopatch distribution, and the library distribution medium can be mounted at the same time, then you must transfer the patches from the patch kit to the system disk. If you need to move the patches to the system disk, perform the procedures in Section 6.4.2. However, if you have enough free drives, then you may keep the patches on the patch kit and have the BUILD program apply the patches directly from the Autopatch kit. In this case, it is unnecessary for you to transfer the patches to disk, and you do not need to perform the steps in Section 6.4.2. Proceed instead to Section 6.5.

6.4.2 Using PATCPY to Copy Patches from the Autopatch Distribution Medium

Run the PATCPY program if you need to transfer patches from the Autopatch distribution medium. The procedures that follow assume you have mounted the distribution medium as described in Section 6.4.1. Perform these steps:

1. Type RUN dev:$PATCPY if your default run-time system is BASIC-PLUS. Replace dev with the mnemonic name and unit number of the device that the library distribution is mounted on, then press RETURN. However, if your default run-time system is RSX, type RUN SY:$PATCPY. After PATCPY prints its header line, PATCPY presents the following dialogue:

   ```
   ENTER DISTRIBUTION DEVICE/PPN <SY:[1,2]>:
   ```

   Respond with the name and unit number of the device on which the patch kit is mounted. A typical response might be MT0:. It is not necessary to specify an account, since the files are distributed in the default account [1,2]. PATCPY next asks you where you would like it to copy the patches.

   ```
   ENTER OUTPUT DEVICE/PPN <SY:[200,200]>:
   ```

   Reply with an account that you would like to hold the patching files. DIGITAL suggests that you reserve account SY:[200,200] for this purpose; therefore, respond by pressing RETURN. If you specify an account that is

not already created on your system, PATCPY responds with a warning message and another question:

```
%CAN'T FIND FILE OR ACCOUNT
ATTEMPT TO CREATE ACCOUNT SY:[PPN] <NO>?
```

The %CAN'T FIND FILE OR ACCOUNT message indicates the account you specified does not exist on your system. To accomodate, PATCPY asks the ATTEMPT TO CREATE ACCOUNT question to give you the opportunity to have the account created. If the bracketed PPN [PPN] is the account number you want to create, answer the question by typing YES, then press RETURN. This procedure will create the account. If you do not want the account created, press RETURN to accept the <NO> default and return to the ENTER OUTPUT/DEVICE PPN question. After you terminate your response, PATCPY asks, in the following question, the name of the command files you want transferred.

```
PACKAGES TO PATCH?
```

Respond to this question by typing one or more of the package names found in Table D–1. To specify more than one package name at one time, you can string them together by separating them with commas. To ensure that all the package names you might use during the BUILD procedure are transferred, type ALL, then press RETURN. The ALL response instructs PATCPY to transfer the entire patch kit. If you type an unrecognized package name such as HELP, PATCPY lists all the package names it knows. Once you enter any valid response, PATCPY prints the question:

```
OTHER WILD CARD STRINGS?
```

Press LINE FEED. Entering wildcard strings is useful for customer patching kits, but should not be necessary when patching the RSTS/E libraries. After you press LINE FEED, PATCPY copies the files. Note that the PATCPY operation copies several files in addition to those needed by any individual package. The BUILD program uses the required files only, and ignores the others. As PATCPY transfers each file from the Autopatch distribution medium to the account, it prints:

```
COPYING <filespec> TO <filespec>
```

If you do not want this output printed, type CTRL/O to suppress the output.

2. When PATCPY finishes copying files, it prints:

```
nnn FILES COPIED
COPY OPERATION COMPLETE
```

where nnn represents the number of files copied. If your patches were distributed on disk, PATCPY asks the following dismount question:

```
LOGICALLY DISMOUNT <dev>: <YES>?
```

Dismount the disk device represented by <dev> by pressing LINE FEED. Type N if you do not want the device logically dismounted.

You have completed the copy operation and are now prepared to build and patch the system default run-time system if it is to be RSX or BASIC-PLUS-2; continue at Section 6.5. If neither of these are to be your system default run-time system, proceed to Section 6.6 to build the standard system libraries.

6.5 Build and Patch System Default Run-Time System – RSX or BASIC-PLUS-2

BASIC-PLUS, RSX, or BASIC-PLUS-2 can be your default run-time system (RTS). At this point in the system generation process you are running either in BASIC-PLUS or RSX. To determine which run-time system you are running under, check the preceding dialogue sequence for your response to the DEFAULT option RUN-TIME SYSTEM question. Also, the run-time system prompts, READY and angle bracket (>), can determine your current RTS. READY indicates you are running under BASIC-PLUS and the angle bracket character (>) signifies that you are in the control of RSX. If you are in BASIC-PLUS and want it to be your system default run-time system, then go to Section 6.6 to begin the BUILD of the standard system library files. If you want RSX or BASIC-PLUS-2 to be your default run-time system, follow the procedures described in this section. Note that since the BASIC-PLUS-2 RTS requires the RSX version of the system library files, you must build RSX before building BASIC-PLUS-2.

Now that you have decided to select either RSX or BASIC-PLUS-2 as your system default run-time system, you are ready to build the utility programs associated with the RSX Run-Time System. To perform this task you will be using the BUILD program, the same program that creates the standard system library files discussed in Section 6.6. Follow the steps in sequence to install either/both of these run-time systems:

1. Mount the RSX distribution medium containing the RSX utilities.

   a. If the RSX kit is on magnetic tape, follow the mount instructions described in Section 6.3.1. Begin the BUILD at step 2.

   b. If the RSX kit is on disk, follow the mount instructions described in Section 6.3.2. Continue at Step 2.

      You are now ready to begin the BUILD of the default run-time system at Step 2.

2. Begin the BUILD dialogue. After you have successfully mounted the distribution medium, type the following RUN command to invoke the BUILD program and to start the dialogue sequence:

   ```
   RUN SY:$BUILD
   ```

   After you terminate the command by pressing RETURN, BUILD prints its header line as follows:

   ```
   BUILD    V7.0 RSTS V7.0 Time Sharing
   ```

Following the header, BUILD prints the first dialogue question.

```
SYSTEM BUILD <NO>? LF
```

Press LINE FEED or type NO in response to this question. Do not type YES. A YES response is only necessary when you are first building the library under BASIC-PLUS.

```
SOURCE INPUT DEVICE <SY:>? dev:
```

Type the device mnemonic and the unit number of the distribution medium. Terminate your response by pressing RETURN. BUILD now knows the device on which the RSX utility programs reside.

```
LIBRARY OUTPUT DEVICE <SY:>? LF
TARGET SYSTEM DEVICE <SY0:>? LF
LIBRARY ACCOUNT <[1,2]>? LF
```

Press LINE FEED in response to the last three questions. When you accept the defaults, you instruct BUILD to place the RSX utility programs on the public disk structure in account [1,2]. BUILD then asks the question:

```
CONTROL FILE IS? RSX
```

to which you type RSX. As soon as you terminate your response by pressing RETURN, BUILD prints a copy file message to indicate it is transferring the RSX build control file to a temporary file on the system disk.

```
*** COPYING FILE dev:[1,2]RSX.CTL TO BLD1.TMP ***
LOCATE LOGICAL 'LB:' ON <SY:[1,1]>?
```

It is recommended that you specify an account other than [1,1] as the location for the system-wide logical LB:. Various files used by the RSX utility programs are stored on the logical device LB:. Initially, LB: stands for SY:[1,1], but storing these files in [1,1] (the Master File Directory) clutters the MFD and slows access to user accounts and other files. If you do not accept the default, type the disk mnemonic name, unit number, a colon (:), and the account number of the library account.

BUILD asks in the next question if you want to build and patch, patch, or build the RSX programs.

```
FUNCTION (BUILD/PATCH, PATCH, BUILD) <BUILD/PATCH>? LF
```

If you accept the default, you instruct the BUILD program to patch the RSX utility programs (if there are patches to apply) at the same time it performs the build operation. Specify the default option, BUILD/PATCH. The BUILD program processes the RSX utility programs properly even if it finds no RSX patches on the Autopatch kit. If you do respond to the

FUNCTION question with either the BUILD/PATCH or the PATCH option, BUILD asks the following patch related questions:

```
PATCH FILE INPUT LOCATION <SY:[200,200]>?
```

BUILD asks you, in this question, for the location of the Autopatch kit. If your DIGITAL distributed patch kit is physically and logically mounted, type dev:[1,2], since DIGITAL places the patches in that account. If you transferred the patches from the Autopatch distribution medium using PATCPY, then you must type the same device name and account location you specified during the PATCPY operation (Section 6.4.2). If you placed the patches on the public disk (SY:) in account [200,200], accept the default by pressing RETURN.

```
SAVE PATCHED SOURCES <NO>?
```

Due to the manner in which the RSX Run-Time System utility programs are patched, there are no RSX patched sources saved. Press LINE FEED to accept the <NO> default. BUILD asks, in the next question, for the name of any additional control files you want processed.

```
ADDITIONAL CONTROL FILE IS <NONE>? (LF)
```

Since you want to build only the RSX utility programs at this time and you have already informed BUILD of this fact when you typed RSX in response to the CONTROL FILE IS question, press LINE FEED. This response instructs BUILD to begin processing the RSX control file. BUILD notifies you when it finishes this process; it prints the message that follows:

```
*** BUILD COMPLETE ***
```

Since the RSX utility programs are now built, you can now dismount the RSX distribution medium (if disk) by typing:

```
RUN SY:$UTILTY.SAV
```

After you type UTILTY.SAV, UTILTY prints an astrisk (*) prompt. Type DISMOUNT dev: in response to this prompt, where dev is the device mnemonic and unit number of the distribution medium. Terminate your reply by pressing RETURN. When UTILTY completes the dismount operation, it reissues the asterisk prompt. To the second prompt, type CTRL/Z, which takes you out of program mode and places you under the control of your run-time system. The entire UTILTY dismount procedure would appear as follows:

```
RUN SY:$UTILTY.SAV
*DISMOUNT dev: (RET)
*(CTRL/Z)
```

If you want RSX as your default run-time system, you may now proceed to Section 6.6 to begin building the standard system library. If you want BASIC-PLUS-2 to be your default run-time system, continue at Step 3.

3. If you have a BASIC-PLUS-2 V1.6 distribution kit, you can build the BASIC-PLUS-2 Run-Time System, at this point, by following the installation instructions found in the *BASIC-PLUS-2 Installation Guide*. Refer to that document for complete instructions.

NOTE

If for any reason you need to reboot your system after you build BASIC-PLUS-2, you must again add the BASIC-PLUS-2 Run-Time System before proceeding to Section 6.6. This procedure is necessary since the system returns to the original system default run-time system which in this case is RSX. That is, BASIC2 and BP2COM are no longer valid run-time systems. To add BASIC-PLUS-2 follow these steps:

Type RUN $UTILTY; UTILTY issues an asterisk prompt (*) to which you type,

```
*ADD BP2COM RET
```

After you press RETURN, UTILTY prints another prompt. You type ADD BASIC2 in response to the asterisk as follows:

```
*ADD BASIC2
```

After the next asterisk prompt, type CTRL/Z. The entire dialogue appears as follows:

```
RUN $UTILTY
UTILTY V7.0 RSTS V7.0 TIME SHARING
*ADD BP2COM RET
*ADD BASIC2 RET
*CTRL/Z
```

You are now ready to BUILD the system libraries.

6.6 Mount the RSTS/E System Library Distribution Medium and Build the Standard System Library

This section explains the procedures you must follow to create a system utility library from a RSTS/E distribution medium. DIGITAL issues RSTS/E programs and system library control files on its system library distribution medium. DIGITAL also includes on the distribution kit in account [1,2] a special program, BUILD, which you use to create the RSTS/E libraries. After you invoke the BUILD program with a RUN command, BUILD presents you with a sequence of dialogue questions. One of the questions asks for the name of the control file you want BUILD to process. Once you have specified the control file, the BUILD program uses commands found in that control file to

read the programs from the distribution medium, patch them, compile them, and place them in the system library account [1,2]. The compiled programs that BUILD places in account [1,2] constitute the RSTS/E standard system library.

BUILD.CTL, SPLER.CTL, BIGPRG.CTL, BACKUP.CTL, and DEVTST.CTL represent the five control files that DIGITAL supplies with its library distribution medium. Of the five, BUILD.CTL is the only control file that you must process with the BUILD program, since the programs compiled and placed in account [1,2] by this control file are required by all RSTS/E systems. Build the other system library programs only if you plan to include their optional features in your system.

Follow this sequence of steps to mount and then create the standard system libraries:

1. Mount the Standard System Library distribution medium.

   a. If you have a system library magnetic tape distribution kit, follow the tape mounting instructions described in Section 6.3.1. After mounting the magnetic tape, proceed to Step 2.

   b. If you have a disk system library distribution kit, follow the disk mounting instructions described in Section 6.3.2. Proceed to Step 2 as soon as you successfully mount the disk.

2. Run the BUILD program to begin creating the RSTS/E utility libraries. To perform this task while running under the BASIC-PLUS Run-Time System, type the following command:

   ```
   RUN dev:$BUILD
   ```

   The dev represents the device mnemonic and unit number of the drive on which the device is mounted. For example, you might type RUN MT0:$BUILD if the RSTS/E library distribution medium was supplied to you on magnetic tape and you mounted it on the unit 0 drive.

   If you are under the control of the RSX Run-Time System, however, type the following command:

   ```
   RUN SY:$BUILD
   ```

   The BUILD program presents the following sequence of dialogue questions:

   ```
   SYSTEM BUILD <NO>?
   ```

   Since there are five libraries that you can create using the BUILD program, you may need to invoke BUILD several times. The first time you invoke BUILD, you must type YES if you are running under the BASIC-PLUS Run-Time System; type NO thereafter. If you are under

the RSX or BASIC-PLUS-2 Run-Time System, always accept the NO default to this question.

```
SOURCE INPUT DEVICE <SY:>?
```

Type the device name of the disk that contains the RSTS/E libraries and the unit number of the drive (followed by a colon) on which the libraries are mounted. The SOURCE INPUT DEVICE question can take, in addition to the dev: specification, a logfile and various switches. With a logfile specified you can instruct BUILD to create a logfile of the BUILD operation. Write the command in the following format:

```
(logfile=)dev:[/switches]
```

where logfile is the file specification of the file in which to log the BUILD procedure and dev is the source input device. The switches that you can append to the command are:

1. /DEN[SITY]:800 - 800 bpi magnetic tape density.
2. /DEN[SITY]:1600 - 1600 bpi magnetic tape density.
3. /PAR[ITY]:ODD - odd parity for magnetic tape.
4. /PAR[ITY]:EVEN - even parity for magnetic tape.
5. /DOS - DOS magnetic tape labelling.
6. /ANSI - ANSI magnetic tape labelling.
7. /DET[ACH] - causes BUILD to detach from the console terminal (KB:). If you specify a logfile and the /DETACH switch, you can speed up some BUILD/PATCH procedures because this eliminates time spent waiting for the KB: output. If you do not use the /DETACH switch and specify a logfile, then the BUILD operation is logged in the logfile as well as printed on KB:.

NOTE

DIGITAL recommends that the /DETACH switch not be used until after the standard system library (BUILD.CTL) is built.

Whether you specified a logfile and switch or merely a device and unit number, press RETURN to terminate your response. The next question that BUILD asks is:

```
LIBRARY OUTPUT DEVICE <SY:>?
```

If you press LINE FEED to accept the default, you force BUILD to place the library programs on the public disk structure. If you want to place the

libraries on a specific disk, type the device mnemonic and the unit number of the disk on which you want the programs placed. Terminate your response with a colon (:), then press RETURN.

```
TARGET SYSTEM DEVICE <SY0:>?
```

Specify the device name of the disk which will be your system disk and the unit number of the drive on which it is mounted. Type a colon (:), then press RETURN. If your Target disk is to become your system disk, press LINE FEED to accept the SY0: default.

```
LIBRARY ACCOUNT <[1,2]>?
```

BUILD places the library programs in account [1,2] if you press LINE FEED. It is recommended that you accept the default.

There are five library control files that DIGITAL supplies with the RSTS/E system library distribution medium: BUILD.CTL, SPLER.CTL, BIGPRG.CTL, BACKUP.CTL, and DEVTST.CTL. Using the BUILD.CTL control file, BUILD creates the standard system library, which is required by all RSTS/E systems. Note that it is the only control file that must be processed. Therefore, if you typed YES in response to the SYSTEM BUILD question, BUILD assumes that BUILD.CTL is the first control file you will process. As a result, BUILD automatically retrieves BUILD.CTL from the distribution medium after you answer the LIBRARY ACCOUNT question. BUILD notifies you of its action by printing the following copying message:

```
*** COPYING FILE dev:[1,2]BUILD.CTL TO BLD1.TMP ***
```

If you typed NO or pressed LINE FEED to accept the default to SYSTEM BUILD <NO>?, BUILD would have printed, immediately after the LIBRARY ACCOUNT question, the following:

```
CONTROL FILE IS?
```

If you are running under the BASIC-PLUS Run-Time System, BUILD knows that BUILD.CTL is the first control file it must process and, as a result, does not ask you the CONTROL FILE IS question the first time through the dialogue. However, if you are under the control of the RSX Run-Time System, BUILD does ask you for the name of the control file you want to process. Respond by typing BUILD which is the control file you must process first. After you process BUILD.CTL, you may indicate the names of the other control files that you want built.

```
LOCATE LOGICAL 'LB:' ON <SY:[1,1]>?
```

The account you type in response becomes the location for the system-wide logical LB:. It is recommended that you specify an account other than [1,1] as the location for the system-wide logical LB:. Various files

used by the RSX utility programs are stored on the logical device LB:. Initially, LB: stands for SY:[1,1], but storing these files in [1,1] (the Master File Directory) clutters the MFD and slows access to user accounts and other files. If you do not accept the default, type the disk device name, unit number, a colon (:), and the account number of the system library account.

```
FUNCTION (BUILD/PATCH, PATCH, BUILD) <BUILD/PATCH>?
```

You now have the option to BUILD/PATCH, PATCH, or BUILD the standard system library. If you mounted an Autopatch distribution medium as described in Section 6.4, you should accept the default by pressing LINE FEED. This not only instructs the BUILD program to create the library using the BUILD.CTL control file but also instructs BUILD to apply any patches as the library is being built. Since you usually do not know if there are patches for a particular library on the Autopatch medium, specify the BUILD/PATCH option. Even if there are no patches for the programs that comprise the standard system library, BUILD will process the control file properly. Type BUILD if you know that you do not have any patches to apply or if you want to patch separately later. If you only need to patch the library programs, specify PATCH.

```
PATCH FILE INPUT LOCATION <SY:<[200,200]>?
```

BUILD only asks the patch questions if you either typed BUILD/PATCH or PATCH in response to the previous question. If you transferred the patches from the Autopatch distribution medium to the public disk structure, then you must respond to this question with the same device name and account location you specified during the PATCPY operation (See Section 6.4.2). You may have placed the patches on the public structure (SY:) in account [200,200]. If you did, press LINE FEED and accept the default. However, if your DIGITAL distributed Autopatch kit is on a disk and is physically and logically mounted, type dev:[1,2], where dev is the device name and unit number of the Autopatch distribution medium.

```
SAVE PATCHED SOURCES <NO>?
```

You can retain the compiled and patched library programs if you type YES or Y, then press RETURN. If you decide not to save them, press LINE FEED. You may find it unnecessary to save the patched sources, since reproducing them is not difficult and retaining them on disk ties up valuable disk space. If you do not save the sources, BUILD skips the next patch question and asks the ADDITIONAL CONTROL FILE IS question instead. If you save them, BUILD asks where you want them placed.

```
WRITE PATCHED SOURCES TO <SY:<[200,200]>?
```

Provide BUILD with a device name, unit number, and account location for the patched sources. For example, you might want to place the sources on an RK05, on drive number 1 in account [3,154]; type DK1:[3,154]; press

RETURN. Another alternative is to place the sources on magnetic tape. If neither of these alternatives is desirable, accept the default which allows BUILD to position the sources in account [200,200] on the public disk structure (SY:).

```
RUN-TIME SYSTEM <xxxxxx>?
```

BUILD prints the name of the system default run-time system in the default field. If the default that BUILD prints in angle brackets is your run-time system choice, press LINE FEED. Otherwise, specify the run-time system under which this package is to be run. Press RETURN and BUILD asks the next question if your response was not BASIC-PLUS.

```
USE CUSP COMPILER 'CSPCOM' <YES>?
```

If you selected either the RSX or BP2COM Run-Time System, BUILD asks this queston. Choosing RSX causes BUILD to print a YES default; selecting BASIC-PLUS-2 causes BUILD to print a NO default. In either case, press LINE FEED.

BUILD prints the LOCATE ERROR PACKAGE ON question as its next prompt if BUILD encounters no problems.

BUILD may not accept your response to the RUN-TIME SYSTEM question and thus will not have asked the previous question. Instead, it notifies you of an error by printing one of the following messages:

1) `xxxxxx IS NOT A KEYBOARD MONITOR`

2) `RUN-TIME SYSTEM MUST HAVE A DEFAULT EXECUTABLE EXTENSION OF .BAC OR .TSK`

3) `xxxxxx IS NOT INSTALLED`

After BUILD prints either of the first two messages, it reprompts the RUN-TIME SYSTEM question. Enter a new run-time system name that conforms to the restrictions indicated in the error message. If BUILD issues the xxxxxx IS NOT INSTALLED message, it indicates that it has found the specified run-time system in account [0,1], determined that it has a .RTS extension, but has also discovered the run-time system is not installed. Immediately after printing this message, BUILD asks, in the following question, if you want to install the run-time system.

```
ATTEMPT TO INSTALL xxxxxx <NO>?
```

The default field represents the run-time system BUILD will attempt to install. Press LINE FEED to return to the RUN-TIME SYSTEM prompt. Type YES and one of the following situations occurs:

1) BUILD installs the run-time system successfully and prints the message xxxxxx INSTALLED. BUILD then asks the CUSP COMPILER question if you selected RSX or BP2COM as your default RTS.

2) BUILD installs the run-time system, determines if it is a keyboard monitor and checks for the correct extension. If either condition is not met, BUILD prints one of the two following error messages:

   a. xxxxxx IS NOT A KEYBOARD MONITOR

   b. RUN-TIME SYSTEM MUST HAVE A DEFAULT EXECUTABLE EXTENSION OF .BAC OR .TSK

   After printing either of these messages, BUILD informs you that it is removing the previously installed run-time system by printing the xxxxxx WILL BE REMOVED message. The program returns to the RUN-TIME SYSTEM question.

3) BUILD may detect errors other than those already described. When it does, it prints the message:

```
RUN-TIME SYSTEM OPERATION FAILED <text>
```

   The <text> field can be any valid RSTS/E error message. After printing the error, BUILD returns to the RUN-TIME SYSTEM question.

After BUILD successfully installs the run-time system, it prints the following question.

```
LOCATE ERROR PACKAGE ON <SY:[1,2]>?
```

There are several programs in the standard system library that constitute the RSTS/E Error Package. BUILD gives you the option to locate the package anywhere on your disk structure. Type the device name, unit number, a colon (:), and an account number if you want to locate the Error Package in an account other than [1,2], for example [1,10]. Generally, it is advantageous to place the Error Package in an account other than [1,2], since that account can become crowded and thus difficult to access efficiently. If you do specify an account rather than accept the default and the account does not exist, BUILD asks if you want it created.

```
ATTEMPT TO CREATE ACCOUNT [m,n] <NO>?
```

If you want the account, represented by the field [n,m], to be created, type YES. Otherwise, press LINE FEED to return to the LOCATE ERROR PACKAGE prompt.

```
ADDITIONAL CONTROL FILE IS <NONE>?
```

Before BUILD begins to process the BUILD.CTL control file and before it creates the standard system library, it asks you if there are any other control files you want it to process. You can, at this point, specify the names of all the control files that are supplied on the mounted distribution medium. For instance, if the SPLER.CTL control file resides on your distribution kit, type SPLER.CTL in response to this question. BUILD

will process that control file after it creates the standard system library using the BUILD.CTL control file. Each time you specify a control file, BUILD prints a copying file message similar to the one that appears for the SPLER.CTL control file:

```
*** COPYING FILE dev:[1,2]SPLER.CTL TO BLD1.TMP ***
LOCATE <SYSTEM PACKAGE> ON <SY:[1,2]>
```

The <SYSTEM PACKAGE> field, when it appears on the console terminal, contains the name of the package that BUILD creates using the control file you specified in response to the ADDITIONAL CONTROL FILE IS question. Specifically, the field can contain SPOOLING PACKAGE, BACKUP PACKAGE, DEVTST PACKAGE. The BIGPRG control file is not a package; its individual programs may manually be put in different accounts after they are built. By default, the packages are located in the system library account [1,2]. If you want the programs there, press LINE FEED. Otherwise, specify your own disk and account to reduce clutter in the system library account. Type the device mnemonic, unit number, colon (:), account number, and press RETURN. BUILD reprompts with the ADDITIONAL CONTROL FILE IS question until you press LINE FEED. Accepting the <NONE> default indicates that you have no more files to process. As soon as you terminate your response, BUILD begins to read the control file, interpret the commands contained in the file, patch if specified, compile the programs, and place them in the system library account. BUILD notifies you when it finishes processing. It prints the following message:

```
*** BUILD COMPLETE ***
```

At this point, you may need to process other control files. If the system library distribution medium that you have already mounted contains more control files that you want BUILD to process, follow the procedures described at Step 3. However, if you have used BUILD to process all the control files on the kit and want to process more, dismount the exhausted kit and mount the distribution kit that contains the remaining control files. Before you physically dismount a disk kit you must logically dismount it using the UTILTY program. Type:

```
RUN $UTILTY
```

and press RETURN. The UTILTY program prints its header line and the pound sign (#) prompt as follows:

```
UTILTY V7.0 RSTS V7.0 TIME SHARING
#
```

In response to the pound sign prompt, type DISMOUNT dev:, where dev is the device mnemonic and unit number of the system library distribution medium. Append a colon (:) to your reply before you press RETURN. UTILTY logically dismounts the device and issues another pound sign

prompt. To the second prompt type CTRL/Z. The entire dialogue could appear as follows:

```
RUN $UTILTY
UTILTY V7.0 RSTS V7.0 TIME SHARING
#DISMOUNT DK0:
#^Z
```

Mount the system library distribution medium that contains the remaining control files and programs that you want BUILD to process. See Section 6.3.2 for these procedures. Continue the BUILD operation at Step 3.

3. Invoke the BUILD program, as you did in Step 2, and respond to the questions that result. This time through the dialogue, accept the default NO answer to the SYSTEM BUILD question by pressing LINE FEED. You can now go back to the SYSTEM BUILD question and reply to the remaining questions as you did before. When you get to the CONTROL FILE IS question, respond by typing the name of the control files you want BUILD to process. After you have built all the system libraries, go to Section 6.7.

6.7 Add Auxiliary Run-Time Systems

When you plan to include optional software such as BASIC-PLUS-2, COBOL, FORTRAN IV, or RPG II in your system, you should first install the run-time system support required by the optional software. Run-time system support includes the actual run-time systems and their associated utilities.

For the optional language processors, you need to include RSX Run-Time System support for the following languages:

BASIC-PLUS-2
COBOL
RPG II
FORTRAN IV PLUS

You also must install RMS-11K support for COBOL and RPG II, and optionally for BASIC-PLUS-2.

All optional software requires the RT11 Run-Time System and the PIP.SAV program, both provided on the RSTS/E distribution medium. Both are automatically part of your system.

Some optional software assumes the BASIC-PLUS Run-Time System. For these products you should ensure that the BASIC-PLUS Run-Time System is added, then SWITCH to it prior to performing the installation procedures. Refer to the appropriate installation manual for further information.

The following Sections, 6.7.1 and 6.7.2, describe the procedures you must follow to add the RSX and RMS11 Run-Time Systems to your system.

6.7.1 Adding RSX Run-Time System and Library

If your system default run-time system is RSX or BASIC-PLUS-2, you have already added the RSX Run-Time System and built the RSX utility programs. However, if you have not built the RSX Run-Time System or its utility programs, you may do so now.

To add RSX support, perform the following steps:

1. Mount the RSX distribution medium.

   a. If your distribution medium is magnetic tape, follow the tape mounting procedures described in Section 6.3.1. After mounting the magnetic tape, proceed to Step 2.

   b. If your distribution medium is disk, perform the disk mounting procedures described in Section 6.3.2. Proceed to Step 2 after you successfully mount the disk.

2. Run the BUILD program as described in Section 6.6 (Step 2) but respond to the SYSTEM BUILD question by pressing LINE FEED and reply with RSX to the CONTROL FILE IS question.

6.7.2 Adding RMS-11K Software

To add RMS-11K support, perform the following steps:

1. Mount the RMS-11K distribution medium.

   a. If your distribution medium is magnetic tape, follow the tape mounting procedures described in Section 6.3.1. After mounting the magnetic tape, proceed to Step 2.

   b. If your distribution medium is disk, follow the disk mounting procedures described in Section 6.3.2. Proceed to Step 2 after you successfully mount the disk.

2. Run the BUILD program as described in Section 6.6 (Step 2), but respond to the SYSTEM BUILD question with LINE FEED and reply RMS11 to the CONTROL FILE IS question.

Refer to the *RMS-11 Installation Guide*.

6.7.3 Building the SORT Utility Package

The SORT Utility Package allows you to read an input file, sort it, and write the data to an output file. In order to install this optional software on your RSTS/E system, you must first mount the distribution medium containing the SORT Utility Package, invoke the BUILD program, and answer the resulting BUILD dialogue questions. Both Sections 6.5 and 6.6 provide detailed descriptions of these questions. Since these sections describe the specific procedures for building the default run-time system and the system libraries, the

following is a discussion of the separate procedures you must follow in order to build the SORT program for your installation.

After you type RUN SY:$BUILD, BUILD presents you with a sequence of dialogue questions. They are duplicated here but their explanations are contained in the previously mentioned sections.

```
SYSTEM BUILD <NO> ? LF
SOURCE INPUT DEVICE <SY:> ? LF
LIBRARY OUTPUT DEVICE <SY:> ? LF
TARGET SYSTEM DEVICE <SY0:> ? LF
LIBRARY ACCOUNT <[1,2]> ? LF
CONTROL FILE IS ? SORT
DID YOU SYSGEN IN RSX DIRECTIVES AND RESIDENT LIBRARIES <NO> ?
```

Respond to the first five questions as your system requires. To the CONTROL FILE IS question you must type SORT. BUILD answers this particular response by printing the last question listed above. The response to this question determines which version of the SORT program is built on your system. If you answered YES to both the RSX DIRECTIVES and RESIDENT LIBRARIES configuration questions (Table 1-11) during the system generation process, then you may type YES in response to this question. Your YES response installs the SORT program which is able to use the RSX monitor emulator and resident library features. This version of the SORT program processes files more efficiently than the one that does not use them. If you did not generate both of these features (generating just one of them is not enough), you must press LINE FEED to accept the NO default response. The NO response tells BUILD to install the version of the SORT program that does not utilize either the RSX monitor emulation or resident library features.

6.8 Building Optional Software

If your system is to support any optional software, such as COBOL, FORTRAN, or RPG II, build that software after adding the requisite run-time system support. To obtain the build procedures, consult the installation guide for the software you plan to include. The documentation should include information on patching the software.

After building and patching the optional software, proceed to the next section to create the system message and start-up control files for your system.

6.9 Create System Message and Start-up Control Files

Now you can run PIP.SAV or an editor and create the required message or start-up control files. For information about PIP, refer to the *RSTS/E System User's Guide*. For information about editors, refer to the appropriate editor manual. The following five sections describe the procedures to follow when creating these files and contain references to further descriptions of the use and contents of the files.

6.9.1 System Message File NOTICE.TXT

The system prints the file NOTICE.TXT when you successfully log into the system as described in the *RSTS/E System User's Guide*. In this manner, you can relay to users information concerning operation of the installation or

changes or additions to the system. Before creating your own NOTICE.TXT file, you can print the sample file in the library on the console terminal. The following example illustrates the procedure:

```
RUN $PIP
*$NOTICE.TXT

WELCOME TO RSTS/E V7.0 TIME SHARING

*
```

You can create a tailored NOTICE.TXT file to replace the sample file by using the following procedure.

```
*SY:$NOTICE.TXT=KB:
HOURS OF OPERATION ARE:

MON-SAT          8 AM TO 5 PM

EVENINGS AND SUNDAYS BY REQUEST

CTRL/Z
*
```

The CTRL/Z at the end of the text file is necessary. It signals the end of the text, closes the file properly, and returns control to the PIP program as indicated by the asterisk (*) character. The system manager can update the file as needed.

6.9.2 System Help File HELP.TXT

When you type HELP at a logged-out terminal, the system prints the file HELP.TXT. You can print the sample file stored in the system library by typing the following command string. Note that this example assumes that the PIP program is still running from the previous procedures.

```
*$HELP.TXT

TO GET ON-LINE AND USE RSTS/E, FOLLOW THE
INSTRUCTIONS FOUND IN THE
RSTS/E SYSTEM USER'S GUIDE.

*
```

If the text is satisfactory, but you need to add some local information, use the append feature of the PIP program, delete the old file, and rename the new file to set the proper protection code.

```
*SY:$HELP.TXT<40>=SY:$HELP.TXT,KB:

ASK RALPH FOR A PROJECT-PROGRAMMER
NUMBER AND PASSWORD.

CTRL/Z
*
```

You can replace the sample HELP.TXT file by using a command string similar to the one shown in Section 6.9.1.

6.9.3 Control Files START.CTL and CRASH.CTL

The INIT.BAC (or INIT.TSK) system program requires two control files whenever it initializes the RSTS/E system for time sharing. The use and content of both of these files are explained in the *RSTS/E System Manager's Guide*. A sample file is provided on the distribution medium for each of these two control files. Being samples only, they may not work on your system and may need to be replaced or edited. The procedures described here show how to print the sample files and how to replace them with versions created to suit the needs of your installation.

These two control files must contain the information required to properly initialize the system for time-sharing operations. Before you attempt to modify or replace the contents of the example files, DIGITAL strongly recommends that you become thoroughly familiar with the information presented in the *RSTS/E System Manager's Guide*.

The first and second commands in the following example cause the system to print the sample CRASH.CTL and START.CTL files. The third and fourth commands cause the system to replace the sample files with the files typed at the terminal.

```
*$START.CTL
(SAMPLE FILE IS PRINTED.)
*$CRASH.CTL
(SAMPLE FILE IS PRINTED.)
*SY0:$START.CTL=KB:
(TYPE NEW VERSION.)
CTRL/Z
*SY0:$CRASH.CTL=KB:
(TYPE NEW VERSION.)
CTRL/Z
```

When you perform the preceding procedures, the system replaces the sample file in the system library with the versions typed. Be sure to replace the START.CTL and CRASH.CTL files on the system disk (SY0:).

The sample START.CTL and CRASH.CTL files use the following indirect command files:

1. RTS.CMD installs auxiliary run-time systems.
2. TTY.CMD sets terminal characteristics.
3. SPOOL.CMD initializes spoolers.
4. CCL.CMD defines CCL commands.
5. ANALYS.CMD analyzes crash dumps.
6. CLEAN.CMD logically cleans disks.

Edit these files as your installation requires, following the descriptions presented in the *RSTS/E System Manager's Guide*.

6.9.4 Terminal Speed Characteristics File TTYSET.SPD

There are some circumstances when you must create the optional terminal speed characteristics file, TTYSET.SPD, to set terminal speed characteristics at the start of each time-sharing session. Its use and contents are explained in the *RSTS/E System Manager's Guide*. Refer to that document for further instructions.

6.9.5 Standard Account File ACCT.SYS

You can use the REACT system program to create a large number of user accounts automatically. To use this feature, create the file ACCT.SYS in the system library. The contents of the ACCT.SYS file is explained in the *RSTS/E System Manager's Guide*. The sample ACCT.SYS file is copied by the BUILD program from the distribution medium. You can print and replace this sample file by performing the following procedures. Note that DIGITAL suggests that you make entries in ACCT.SYS to create a privileged and a nonprivileged account for yourself and create auxiliary accounts associated with the !, #, &, and % characters. Specify a privileged protection code for the file so this sensitive data will be erased when the file is deleted or replaced.

```
*$ACCT.SYS
(THE SAMPLE FILE IS PRINTED.)
*SY:$ACCT.SYS<188>=KB:
(TYPE NEW VERSION.)
CTRL/Z
*CTRL/Z

READY
```

The new version of ACCT.SYS replaces the sample ACCT.SYS in the system library. The PIP system program run terminates. Proceed to Section 6.10 to create the user accounts.

6.10 Creating User Accounts

Run the REACT system program and use the STANDARD function to create the user accounts in the MFD of the system disk. Refer to the *RSTS/E System Manager's Guide* for a description of the REACT system program. The following example illustrates the method used to create the user accounts from information in the ACCT.SYS file.

```
RUN $REACT
REACT    V7.0 RSTS V7.0 TIME SHARING
SYSTEM ACCOUNT MANAGER
FUNCTION? STANDARD
ALL ACCOUNTS IN ACCOUNT FILE ARE NOW ENTERED
FUNCTION? CTRL/Z

READY
```

REACT prints an identification message and a request for a function. If you type STANDARD or S, the REACT program creates user accounts from information in the ACCT.SYS file. When the standard function is completed,

REACT prints an advisory message and reprints the FUNCTION request. Type CTRL/Z to terminate REACT.

At this point, you have built the system and have made the RSTS/E system fully operational. To ensure that you have the correct run-time system installed as the default run-time system and also to ensure that the START.CTL control files are functional, shut down the system. Section 6.11 contains a description of these procedures.

6.11 Shut Down System, Specify Default Run-Time System, and Create Recovery Media

The procedure that you use to shut down the system depends on which run-time system you have selected for your default during time-sharing operations. If you selected BASIC-PLUS or RSX, follow the shutdown procedures described in Step 1a. Perform the procedures in Step 1b if BASIC-PLUS-2 will be your default run-time system.

1. Shut down the system.

   a. Follow these instructions to shut down a system using BASIC-PLUS or RSX as the default run-time system.

      Type RUN $SHUTUP, to which SHUTUP responds with its identification header line:

      ```
      SHUTUP V7.0 RSTS V7.0 TIME SHARING
      ```

      Immediately after the header line appears, SHUTUP presents you with a sequence of dialogue questions. At this point refer to the *RSTS/E System Manager's Guide* for a complete explanation of the SHUTUP program. When you have successfully completed the SHUTUP operation, go to Step 2.

   b. Follow this sequence of instructions to shut down the system if you selected BASIC-PLUS-2 as the default run-time system for your time-sharing operations. In order for SHUTUP to succeed in bringing the system down, it must be run under the system default run-time system. The version of SHUTUP that you have just built runs under the BASIC-PLUS-2 Run-Time System. Therefore, you create a temporary version of SHUTUP which runs under RSX, which is the current system default RTS.

      ```
      >RUN $SHUTUP.RSX (RET)
      ```

      Type RUN $SHUTUP.RSX, then press RETURN in reply to the RSX angle bracket prompt. For a complete description of the SHUTUP procedures, refer to the *RSTS/E System Manager's Guide*. Continue at Step 2.

2. Perform this step if your system default run-time system is not set correctly. That is, it is temporarily set to RSX and you really want it to be BASIC-PLUS-2. To change your default run-time system to

BASIC-PLUS-2, you must bring the system down (as you have already done in Step 1) and use the DEFAULT option to install BASIC-PLUS-2 (BP2COM) as you default RTS. Perform these steps:

a. Respond to the OPTION: prompt by typing DEFAULT, then press RETURN. You are invoking the DEFAULT option to change your default run-time system from RSX to BASIC-PLUS-2. Since you have already used the DEFAULT option to set your system defaults, you can press LINE FEED to each question except the RUN-TIME SYSTEM question. To this question you must answer BP2COM. After you have answered that question, press LINE FEED until you are back to the OPTION: prompt.

b. Go to Step 3 to create a recovery medium for your installation.

3. For your protection, you should create a system recovery medium. By using the SAVE option of the SAVE/RESTORE program while you are running under INIT.SYS, you can create a copy of the generated system. Refer to Section 3.16 of this manual for a brief description of SAVE/RESTORE, then go to the *RSTS/E System Manager's Guide* for a more detailed discussion of this operation.

6.12 Start Time Sharing, Verify System Control Files, and Store Distribution and Recovery Media

Follow these steps to complete the generation of your system:

1. Start Time Sharing. After you shut down the system and create the system recovery media using the SAVE/RESTORE program, you can bring the system up again by typing START in response to the INIT OPTION: prompt. Terminate this response by pressing RETURN and you are ready to function under your system default run-time system. Proceed to Step 2.

2. Verify System Start-Up Control Files. When you start time sharing, the system prints on the system console (KB:) any errors that it encounters in the system start-up control files that you may have created in Section 6.9. If you altered the control files and they no longer run properly, correct these control file errors by using a text editor. After you apply the changes to the incorrect control files, you must run SHUTUP again to shut down the system, then restart the system for time sharing. If the system does not print any more error messages, you applied the correction successfully and are ready for time sharing. Proceed to Step 3.

3. Store Distribution and Recovery Media. For your protection place your distribution and recovery media in a secure location. The recovery media should be protected since it can replace the system disk if your system disk becomes corrupt. Keeping the distribution media available but in a safe place ensures that you will be able to reproduce your system disk when necessary.

Chapter 7
Generating RSTS/E Software During Time Sharing

You can generate additional RSTS/E V7.0 Monitors and/or BASIC-PLUS Run-Time Systems on-line during time sharing on a previously generated V7.0 system. These files can replace the existing versions or can be retained on the system disk for occasional use. To generate a monitor or run-time system, first ensure that the necessary system generation files are available and (when generating a run-time system) that sufficient contiguous space exists on the system disk. Next, answer the configuration questions and start the batch control file following essentially the same procedures as described in Chapter 4. When the batch run terminates, the monitor and/or run-time system generation is complete. You can then tailor (and install if necessary) the monitor and/or make the run-time system available for use.

7.1 Preparing for On-Line Generation

Before you can begin to generate a monitor or BASIC-PLUS Run-Time System on-line, the public disk structure must contain the system generation files and RT11 must be added as a run-time system. A pseudo keyboard must also be available. In addition, ensure that the system disk contains enough contiguous space for the run-time system or monitor file.

7.1.1 Finding Contiguous Space for BASIC-PLUS

Run-time system files must occupy contiguous disk space. Therefore, you should ensure that sufficient contiguous space exists on the system disk before you generate an additional BASIC-PLUS Run-Time System. If you previously allocated extra contiguous space as a dummy or extra-large file, you can simply delete or reduce the size of that file. If you did not originally plan extra contiguous space, you can use a BASIC-PLUS OPEN statement with the contiguous MODE specification to open a file of the approximate size. If the

system executes the statement without error, the space exists. If the statement fails, you must delete some files or transfer some files to other media in order to free contiguous disk space. You can then begin to generate the BASIC-PLUS Run-Time System.

7.1.2 Obtaining the System Generation Files

On-line generation of the monitor or BASIC-PLUS requires that the files SYSGEN.SAV, SYSBAT.SAV, MACRO.SAV, CREF.SAV, PIP.SAV, LINK.SAV, SILUS.SAV, HOOK.SAV, and ERR.STB be in the system library account [1,2]. The CREATE batch stream copies these files from the distribution medium to the SYSGEN system disk during the initial system generation.

If the Target system was written on a system tape or on a disk other than the SYSGEN disk, all the files may not be available on the system disk. Ascertain whether the files exist on the system disk. If not, follow the procedures in Chapter 2 to mount the distribution medium. Use the MOUNT command to logically mount the distribution disk read only. Then use UTILTY to add RT11 as a run-time system. The following is an example of this procedure:

```
RUN $UTILTY
UTILTY  V7.0 RSTS V7.0 *TIME SHARING*
#ADD RT11
#CTRL/Z

Ready
```

Follow the procedures in Chapter 4 to run the CREATE batch stream. This batch stream copies the remaining required files to the system disk under the logged-in account and chains to SYSGEN.SAV, mentioned above, which asks the configuration questions.

If the Target system was output to the SYSGEN system disk during the previous system generation and you specified NO to the DELETE FILES question, the files remained on the disk. In this case, you need not recopy them. You must, however, add the file RT11.RTS as a run-time system. Run the UTILTY program and use the ADD command to do so. You can then simply type the command RUN $SYSGEN, which runs the program SYSGEN.SAV, as in the following example.

```
RUN $SYSGEN

**12-MAY-79**


Beginning of RSTS/E system generation.

Questions come in long and short forms.
If you are familiar with them, answer
"S" for short; otherwise, answer "L" for
long form.
```

If you did specify YES to the DELETE FILES question; you cannot specify SY: as the distribution media during the on-line SYSGEN, but must then specify and physically mount the distribution medium.

7.2 Generating the Monitor or BASIC-PLUS Run-Time System

Answer the configuration questions to include the features required by the monitor and/or run-time system. The SYSGEN program asks a subset of the configuration questions if you are generating only a monitor or a run-time system. When generating a monitor or run-time system for an existing system disk, be sure to assign to the new file a different name from the installed file. If necessary, you can generate a monitor or run-time system for a new Target medium.

When you have answered all the configuration questions, type RUN $SYSBAT to start the batch process. When the execution of the batch file is complete, the new monitor or run-time system resides in account [0,1] or you can have the output go to any account on the Target system disk.

7.3 Tailoring a New Monitor

After the batch process ends, you can shut down the system and tailor the new monitor whenever it is convenient to do so. To tailor and install the monitor, follow the procedures in Sections 5.2 through 5.7. If the monitor runs on an existing system disk, you may not need to re-allocate system files. List the file status table (using the LIST suboption of the REFRESH initialization option) to ascertain any necessary changes.

7.4 Preparing the New Run-Time System for Use

You can use the new BASIC-PLUS Run-Time System as an auxillary run-time system or as the system default.

To use the new BASIC-PLUS Run-Time System as an auxiliary run-time system, run the UTILTY program. Issue the ADD command to add the run-time system for use under RSTS/E.

To install a new default run-time system, shut down the system. Use the REFRESH option (Section 3.8) to delete the current default run-time system (if you do not plan to use it again). Next, use the DEFAULT option (Section 3.9) and specify the new run-time system as the default. Finally, use the START option (Section 3.10) to start time sharing with the new default run-time system.

The new default run-time system needs a new system library. To create a new library, log into a privileged account and use the BUILD program. BUILD allows you to create the library on a public or private disk. Physically and logically mount the output disk, then physically mount the first volume of the system library distribution kit. Write-protect this volume. If the distribution medium is disk, use the MOUNT command (including the /RO switch) to logically mount the disk. Then type RUN $BUILD to run the BUILD program. Refer to Chapter 6 for information on the BUILD procedure.

The BUILD COMPLETE and READY messages signal the end of the BUILD procedure.

Appendix A
System Generation Error Messages

A.1 Initialization Code Error Messages

The RSTS/E system initialization code routines make many checks to ensure the consistency of system structures. Initialization routines compare existing structures with their definitions and with references in other parts of the system. The checks must be successful; if not, the routines detect a consistency error, which indicates that the system is corrupted.

The initialization routines may also encounter errors while attempting to execute initialization options. The error text for many of these errors is preceded by the message FATAL RSTS/E SYSTEM INITIALIZATION ERROR. The initialization code prints a descriptive error message and returns to the OPTION: prompt. If such an error occurs, follow the error recovery procedures in Table A–1. If these procedures are unsuccessful, consult your DIGITAL Software Support Specialist.

For many of the errors, no recovery procedures exist. If such an error occurs, you should submit a Software Performance Report (SPR) as noted in the recovery procedures column for that error message.

Table A–1: Initialization Code Error Messages

Message and Recovery Procedure
ACCOUNT [1,2] MISSING FROM OUTPUT DISK Reinitialize the disk as a system disk and create the library account.
BAD [0,1] DIRECTORY Reboot the system disk and retry the operation. If the retry fails, use DSKINT to reinitialize the disk.
BADB.SYS NOT FOUND - RESULTS UNPREDICTABLE Reboot the system disk and retry the operation. If the retry fails, use DSKINT to reinitialize the disk.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
BUFF.SYS NOT FOUND OR TOO SMALL-DECTAPE DISABLED Warning message only. Shut down the system and use REFRESH to create the file at the required size.
CANNOT REFRESH THIS DISK Reinitialize the disk.
CANNOT START WITH THIS SWAP MAX AND MEMORY TABLE Use DEFAULT to change the swap max and/or memory allocation table.
CLUSTER 1 (REQUIRED FOR MFD) CONTAINS A BAD BLOCK If the pack cluster size for the disk is greater than the device cluster size, use DSKINT to reinitialize the disk with a lower pack cluster size. If the error recurs, use a different disk.
CLUSTER ALLOCATED TO [P,PN] filnam.ext IS NOT ON A PACK CLUSTER BOUNDARY CLEAN asks whether to delete the file, then confirms your response.
[P,PN] CLUSTER MAP IN UFD DISAGREES WITH MFD CLEAN asks whether to zero the account and confirms your response.
DEFAULT RTS HAS INVALID SIZE PARAMETERS Regenerate the run-time system.
DEFAULT RTS NOT FOUND OR INVALID Ensure that a valid run-time system is on the system disk. Regenerate the run-time system if necessary.
DEVICE xx: DOES NOT INTERRUPT - DEVICE DISABLED Use HARDWR to set the correct vector address for xx: or call the DIGITAL field service engineer.
DEVICE ERROR WHEN TRYING TO BOOTSTRAP DEVICE Ensure that the device is on-line and ready. If the error recurs, try a different device.
DEVICE HUNG OR WRITE-LOCKED Ensure that the device is on-line and ready. If the error recurs, try a different device.
DIRECTORY ENTRY FOR [P,PN] filnam.ext CONTAINS PACK CLUSTER NUMBER WHICH IS TOO BIG CLEAN asks whether to delete the file and confirms your response.
DIRECTORY ERROR DETECTED IN RDB Reinitialize the disk.
DIRECTORY ERROR - FILE NOT FOUND Reinitialize the disk.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
[0,1] DIRECTORY NOT FOUND Reinitialize the disk.
DISK BLOCK 0 (REQUIRED FOR BOOTSTRAPS) IS BAD Reinitialize the disk. If the error recurs, use a different disk.
DISK ERROR DURING DSKINT BUILD PHASE Reinitialize the disk. If the error recurs, use a different disk.
DISK HUNG OR DATA ERROR DURING OVERLAY Ensure that the device is on-line and ready. If the error recurs, try a different device.
DISK STRUCTURE IS IRREVOCABLY CORRUPT Reinitialize the disk.
DOUBLY ALLOCATED BLOCK FOUND AT DEVICE CLUSTER nn, THE BLOCK IS ALLOCATED TO [p,pn] filnam.ext AND [p,pn] filnam.ext CLEAN lets you choose the file to delete, then confirms your response.
DRIVE NOT READY: Ensure that the disk drive is on-line and READY. Press LINE FEED to retry the operation. Type any other character to abort the operation.
DSKINT ERROR - ATTEMPT TO FORMAT UNFORMATTABLE DISK Submit an SPR.
DSKINT OR SYSGEN ERROR - DSKINT ALLOCATION FAILURE Submit an SPR.
EOF READING INIT.SYS Submit an SPR.
ERR FILE INVALID Copy the file ERR.ERR from the distribution medium to the system disk and use the DEFAULT option to install ERR.ERR as the system default.
ERR FILE NOT FOUND Copy the file ERR.ERR from the distribution medium to the system disk and use the DEFAULT option to install ERR.ERR as the system default.
ERROR DETECTED WHILE READING ERROR RECORD SECTOR #n Warning message only. Error occurred during reading of factory error records. Disregard the error message.
ERROR - KB INTERFACES OUT OF SEQUENCE Regenerate your monitor. If the problem recurs, submit an SPR.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
ERROR-NO SETUP FOR DISK xx: Regenerate your monitor. If the problem recurs, submit an SPR.
ERROR-UNKNOWN DISK xx: Regenerate your monitor. If the problem recurs, submit an SPR.
EXCESSIVE BAD CLUSTERS If you need to use the current disk, use DSKINT to increase the pack cluster size. If the error recurs, use a different disk.
FATAL DISK ERROR DURING CONTROL RESET Retry the DSKINT. If the error recurs, call the DIGITAL field service engineer to repair the disk drive.
FATAL ERROR - NO SMALL BUFFERS LEFT Regenerate the system and configure more small buffers.
FATAL I/O DURING OVERLAY Ensure that the device is on-line and ready. If the error recurs, try a different device.
xxx FILE NOT FOUND WHEN REMOVING IT Warning message only. xxx is SIL, RTS, or ERR. The initialization code did not find a file when trying to make it deletable.
[P,PN] filnam.ext HAS A BAD BLOCK CLEAN asks whether to delete the file and confirms your response.
[P,PN] filnam.ext HAS FIRST DCN OUT OF RANGE CLEAN asks whether to zero the account and confirms your response.
[P,PN] filnam.ext HAS INVALID ACCOUNTING ENTRY LINK CLEAN asks whether to delete the file and confirms your response.
filnam.ext HAS ILLEGAL FORMAT AND CANNOT BE COPIED Submit an SPR if DIGITAL supplied the file on the distribution medium. Regenerate your system monitor if the system generation process created the file.
FORMATTING FAILURE: Press LINE FEED to retry. Type anything else to abort the DSKINT and return to the OPTION: prompt. Ensure that the disk drive is write enabled. This error may indicate a bad disk pack or a bad disk drive.
[P,PN] HAS A BAD BLOCK CLEAN asks whether to delete the account and confirms your response.
[P,PN] HAS HOLES IN CLUSTER MAP CLEAN asks whether to zero the account and confirms your response.
[P,PN] HAS INCONSISTENT CLUSTER MAPS CLEAN asks whether to zero the account and confirms your response.

(continued on next page)

Table A–1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
[P,PN] HAS INVALID CLUSTER SIZE CLEAN asks whether to delete the account and confirms your response.
ILLEGAL CONTROLLER FOR TU58 Submit an SPR.
ILLEGAL INTERFACE INDEX nn Regenerate your monitor. If the error recurs, submit an SPR.
INIT BUG - BAD DISK INDEX Submit an SPR.
INIT BUG - CAN'T ALLOCATE FILE 2ND TIME Submit an SPR.
INIT BUG - CAN'T CHECK PARITY Submit an SPR.
INIT BUG - CAN'T FIND [0,1] AGAIN Submit an SPR.
INIT BUG - CAN'T FIND FILE TO DELETE Submit an SPR.
INIT BUG - CLEAN FAILED TO FIND ALLOCATION ERROR Submit an SPR.
INIT BUG - DIDN'T GET SAME CLUSTER 2ND TIME Submit an SPR
INIT BUG - DIDN'T GET SAME FILE CLUSTER 2ND TIME Submit an SPR.
INIT BUG - DON'T KNOW HOW TO START Submit an SPR.
INIT BUG - FAILED TO CREATE FILE Submit an SPR.
INIT BUG - FAILED TO FIND FILE AGAIN Submit an SPR.
INIT BUG - FAILED TO FIND FILE JUST CREATED Submit an SPR.
INIT BUG - FILE EXISTS WHEN TRYING TO CREATE Submit an SPR.
INIT BUG -xxx-file type FILE NOT FOUND 2ND TIME Submit an SPR.
INIT BUG - xxx - FILE NOT FOUND WHEN REMOVING IT Submit an SPR.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
INIT BUG - FILE SIZE COMPUTED WRONG Ensure that the system device you are using contains a valid system. If so, submit an SPR.
INIT BUG - FLOAT TABLE ERROR Submit an SPR.
INIT BUG - INSTALL NOT SYNCHRONIZED at xxxxxx Submit an SPR.
INIT BUG - NO SATT.SYS AT WIPEOUT TIME Submit an SPR.
INIT BUG - NO UFD FOUND IN CREATE Submit an SPR.
INIT BUG - RNB TO WRONG DISK Submit an SPR.
INIT BUG - SATT.SYS NONEXISTENT AT TIME OF WOMP Submit an SPR.
INIT BUG - SET NEW TABLE TOO SMALL Submit an SPR.
INIT BUG - UNKNOWN BAE DEVICE Submit an SPR.
INIT BUG - START LINKED TOO LOW Submit an SPR.
INIT LINK BUG - DEFBUF NOT ALIGNED Submit an SPR.
INIT LINK BUG - DSTBL TOO LOW Submit an SPR.
INIT LINK BUG - FIBUF NOT ALIGNED Submit an SPR.
INIT LINK BUG - INSBUF NOT ALIGNED Submit an SPR.
INIT LINK BUG - SATBUF NOT ALIGNED Submit an SPR.
INIT.SYS NOT FOUND - RESULTS ARE UNPREDICTABLE Reboot the system disk and retry the operation. If the retry fails, reinitialize the disk.
INPUT FILE MISSING FROM SYSTEM DEVICE Retry the procedure that generated the error. If the error recurs, submit an SPR.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
INSTALLED MONITOR DOES NOT SUPPORT THIS SYSTEM DISK Regenerate a monitor that supports the system disk or use the COPY option to transfer the monitor to a disk it supports.
INSTALLED SIL INVALID The installed SIL is invalid as a monitor SIL. Use the INSTALL option to install a valid SIL.
INVALID DATA IN ERROR RECORD SECTOR #n Warning message only. The error occurred during reading of factory error records. Disregard the error message.
INVALID RETRIEVAL ENTRIES FOR FILE [p,pn] filnam.ext - FIXED BY CLEAN Warning message. CLEAN truncates the file.
I/O TO UNOPENED FILE Submit an SPR.
[P,PN] IS NOT A VALID ACCOUNT NUMBER CLEAN asks whether to delete the account and confirms your response.
MFD NAME ENTRY CONTAINS A BAD LINK, CLEAN WILL DELETE ALL [1,1] FILES AND ALL ACCOUNTS BEYOND [p,pn] filnam.ext CLEAN confirms your response.
MONITOR SIL CHANGED - REINSTALL IT Use the INSTALL option to install the monitor SIL.
MONITOR SIL NOT FOUND Use the INSTALL option again to install the SIL. If the error recurs, submit an SPR.
MT, MS, MM ERROR OR INVALID FORMAT ON TAPE Ensure that the tape drive heads are clean and correctly aligned. If the error recurs, try using a different drive.
NO LIBRARY ACCOUNT ON THIS DISK Reinitialize the disk and create a library account.
NO ROOM FOR DIRECTORY ON OUTPUT DISK Delete files or reinitialize the disk to create sufficient contiguous space on the disk for the file. Or use a different disk.
NO ROOM FOR FILE ON OUTPUT DISK Delete files, reintialize the disk to create sufficient contiguous space on the disk for the new file, or use a different disk.
NO ROOM FOR 2 JOBS IN SWAP.SYS Use REFRESH to increase the size of SWAP.SYS so that it can accomodate two jobs of size SWAP MAX.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
NOT ENOUGH ROOM IN LOW MEMORY FOR MONITOR Generate a smaller monitor.
NOT ENOUGH ROOM IN MEMORY FOR RUN TIME SYSTEM Generate a smaller monitor or run-time system.
ONE OR MORE SYSTEM FILES MISSING Reinitialize the disk.
OPTION ATTEMPTED DURING BOOTSTRAP PHASE Rebootstrap the system and retry the operation. If the retry fails, submit an SPR.
OPTION NOT AVAILABLE The option you requested is not available until you bootstrap the system disk.
OUTPUT DISK IS DIRTY - CANNOT PROCEED Use REFRESH to clean the disk or use DSKINT to reinitialize the disk.
OUTPUT DISK IS NOT A SYSTEM DISK Reinitialize the disk as a system disk.
OVERLAY HANDLER IN ERROR Submit an SPR.
OVR NOT IN SIL Regenerate the monitor.
PACK CLUSTER SIZE IS NOT 1, 2, 4, 8, OR 16 Reinitialize the disk.
PARITY CSR FOUND, BUT NOT RELATING TO MEMORY Call the DIGITAL field service engineer.
PARITY CSR CONTROLS MORE THAN 31K Call the DIGITAL field service engineer.
PERMANENTLY MAPPED REGION OF MONITOR IS TOO LARGE Regenerate to create smaller monitor. Configure fewer small buffers or fewer devices.
PRIORITY OF xx:INTERRUPT (PRn) IS TOO HIGH - DEVICE DISABLED Call the DIGITAL field service engineer to install the device correctly.
QUESTION ATTEMPTED DURING AUTO-RESTART If the system disk needs cleaning, start the system by typing START or LINE FEED, thereby cleaning the disk. If any other problem occurs, submit an SPR.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
REQUESTED DISK DRIVE NOT FOUND Request a disk that is on the system.
REQUIRED MODULE xxxxxx HAS INVALID LENGTH Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx HAS INVALID TRANSFER ADDRESS Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx HAS WRONG LOAD ADDRESS Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx IS IMPROPERLY LINKED Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx IS MISSING A REQUIRED SYMBOL Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx NOT FOUND IN SIL Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx OUT OF SEQUENCE IN SIL Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx TOO LARGE Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED MODULE xxxxxx TOO SMALL Regenerate the monitor. If the error recurs, submit an SPR.
REQUIRED SYMBOL xxxxxx MISSING FROM MONITOR Regenerate the monitor. If the error recurs, submit an SPR.
RSTS/E REQUIRES AT LEAST 48K WORDS OF MEMORY Your configuration is too small for the system.
RSTS/E REQUIRES EIS! Correct the hardware configuration to include EIS instructions.
RSTS/E REQUIRES A CLOCK! Correct the hardware configuration to include a KW11P or KW11L clock.
RSTS/E REQUIRES MEMORY MANAGEMENT HARDWARE! Correct the hardware configuration to include a memory management unit.
SATT.SYS IS OVER 16 BLOCKS LONG If the file structure on the disk is sound, submit an SPR. Otherwise, reinitialize the disk.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
SATT.SYS NON-EXISTENT AT TIME OF READ If the file structure on the disk is sound, submit an SPR. Otherwise, reinitialize the disk.
SATT.SYS NOT FOUND - RESULTS UNPREDICTABLE Reboot the system and retry the operation. If the error recurs, reinitialize the disk.
filnam.SIL NOT FOUND - PLEASE INSTALL A SIL The SIL that you previously installed is not on the disk. Use the INSTALL option to install a monitor SIL.
SWAP.SYS NOT CONTIGUOUS OR TOO SMALL Use the REFRESH option to create a contiguous SWAP.SYS of the correct size.
SWAP.SYS NOT PRESENT IN [0,1] Use the REFRESH option to create SWAP.SYS in [0,1]
SYMBOL xxxxxx NOT FOUND IN MONITOR SYMBOL TABLE Regenerate the monitor. If the problem recurs, submit an SPR.
SYSTEM DISK DISABLED IN MONITOR Use the SET option to enable the system disk device.
TOO MANY BAE DEVICES Submit an SPR.
TOO MANY BLOCKS IN DEVICE CONFIGURATION TABLE Regenerate the monitor.
TOO MANY xx: CONTROLLERS GENERATED Ensure that any edits to CONFIG.MAC are correct. If there are no editing errors, regenerate the system.
TOO MANY RH OR UNIBUS DEVICES Submit an SPR.
TOO MANY SUBLINES FOR nn: Ensure that any edits to CONFIG.MAC are correct. If there are no editing errors, regenerate the system.
TOO MANY UNIBUS DEVICES ON THIS 11/70 First, disable unnecessary devices with HARDWR or SET. If the error condition persists, use DEFAULT to lock all memory addresses above 124K. (The computer runs in 18-bit addressing mode instead of 22-bit addressing mode.) If the error condition is present after you lock memory, or if the computer has 124K words of memory or fewer, submit an SPR.

(continued on next page)

Table A–1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
TOO MUCH MODIFICATION TO MONITOR REQUIRED Regenerate to produce a monitor that is more closely configured to your system hardware.
TU58 DEVTBL PACKET MISSING Submit an SPR.
TWO MAGTAPE UNITS HAVE THE SAME UNIT NUMBERS Examine unit switches on magnetic tape drives and ensure that no two have the same unit number.
UFD HAS SIZE TOO LARGE FOR FILE [P,PN] filnam.ext - FIXED BY CLEAN Warning message only. CLEAN corrects the condition.
UFD HAS SIZE TOO SMALL FOR FILE [P,PN] filnam.ext - FIXED BY CLEAN Warning message only. CLEAN corrects the condition.
[0,1] UFD NOT FOUND Reinitialize the disk.
UNABLE TO CREATE REQUESTED FILES(S) Delete some files and retry the procedure, or request smaller files. Also, try using the FILE suboption of REFRESH to create files one at a time.
UNEXPECTED OVERLAY TRAP Submit an SPR.
UNEXPECTED TRAP THROUGH THE VECTOR AT nnn, TRAP OCCURRED FROM PC = nnnnnn. Submit an SPR.
UNKNOWN DEVICE BOOTED Submit an SPR.
UNKNOWN RH CONTROLLER PRESENT Call the DIGITAL field service engineer to correct the hardware configuration.
UNRECOVERABLE DISK ERROR ON xxn: Ensure that the disk is mounted and write enabled (if necessary). If the disk is properly mounted, this error indicates a fatal disk error. Reformat and reinitialize the disk, or use a different disk.
USER-DEFINED ADDRESS FOR DEVICE xxn:NOT FOUND - DEVICE DISABLED Use HARDWR to set the correct CSR address for xx:, or call the DIGITAL field service engineer.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
USING KW11L CLOCK Warning message only. The installed SIL's defaults indicate for a KW11P clock is preferred, but the KW11P clock is not present. RSTS/E uses the KW11L clock instead.
USING KW11P CLOCK AT LINE FREQUENCY Warning message only. The installed SIL is configured for KW11L clock; but the KW11L clock is not present. RSTS/E uses the KW11P clock instead.
VECTOR FOR DEVICE xx: (nnnn) ALREADY IN USE - DEVICE DISABLED Use HARDWR to set the correct vector address for xx:, or call the DIGITAL field service engineer.
WARNING - BAD BLOCK DOUBLY ALLOCATED TO BADB.SYS Warning message only.
WARNING - DCN IN BADB.SYS TOO BIG Warning message only. The file structure on the disk being cleaned appears invalid.
WARNING**DBn:IS DUAL PORTED, PROCEED WITH CAUTION Warning message only.
WARNING - DCN IN BADB.SYS NOT ON PACK CLUSTER BOUNDARY Warning message only.
WARNING - xxx FILE NOT FOUND - PLEASE SET DEFAULTS The SIL you are installing specifies a default run-time system or error message file that is not present. Use the DEFAULT option to specify a valid file.
WARNING - FILE filnam.ext NOT FOUND WHEN REMOVING OLD SIL Warning message only.
WARNING-LINK IN BADB.SYS IS BAD. BAD BLOCKS MAY BE LOST. Warning message only.
WARNING - MAIN MEMORY (cache) DISABLED AT STARTUP. RSTS/E WILL NOT USE (cache). SYSTEM MAY RUN SLOWLY. Warning message only. (cache) is CACHE, CACHE GROUP 0, or CACHE GROUP 1.
WARNING - MAIN MEMORY (cache) IS FAILING REPEATEDLY. RSTS/E WILL NOT USE (cache) .SYSTEM MAY RUN SLOWLY. Warning message only. (cache) is CACHE, CACHE GROUP 0, or CACHE GROUP 1.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
WARNING - ODT IN THE SIL IS IN AN ILLEGAL FORMAT Warning message only.
WARNING - SUBLINES FOR xx:ARE OUT OF SEQUENCE Warning message only, but the system may crash. Regenerate the monitor.

A.2 RT11 Run-Time System Error Messages

The RT11 Run-Time System can generate the errors described in Tables A-2 and A-3.

Table A-2: Recoverable RT11 Run-Time System Errors

Message and Meaning
?ADDR? You specified an illegal address with an E, D, or B command.
?BAD LOAD? RT11 encountered an error when reading the program into memory.
?BAD PPN? You typed an illegal PPN in response to a LIB or PPN command.
?BAD START ADDRESS? The program start address was odd or out of bounds.
?FIL NOT FND? The specified file cannot be found.
?FILE? You specified no filename or an illegal filename with the R, RUN, or GET command.
?ILL CMD? You typed an illegal command. The command includes an unrecognized command, a syntax error in a command string, a command line longer than 510 characters, or an attempt to change to an illegal size (2 <size< swap max for this job).
?ILL DEV? The command string includes an illegal device name.
?NO RESTART? You typed the RESTART command, but the program is not restartable.
?OVR CORE? The program is too large to fit into memory.

(continued on next page)

Table A–3: RT11 Run-Time System Fatal Execution Errors

Message and Meaning
?M-BPT TRAP The program issued a BPT instruction, but the job has an illegal vector location.
?M-FP TRAP A floating point trap occurred.
?M-HALT The program halted.
?M-ILL EMT The program issued an invalid monitor call.
?M-IOT TRAP The program issued an IOT instruction, but the job has an illegal vector location.
?M-OVLY ERR The RT11 Run-Time System encountered an error while reading a program overlay. This message may indicate a hardware error.
?PROGRAM LOST - SORRY An unrecoverable error occurred. The run-time system resets user core image.
?M-TOO MANY OPEN CHANNELS The job attempted to open more than 15 channels or attempted to open two DECtape files at once.
?M-TRAP TO 4 The program trapped to the vector at location 4.
?M-TRAP TO 10 The program trapped to the vector at location 10.
?M-TRAP TRAP The job issued the TRAP instruction, but the job has an illegal vector location.

A.3 Batch Error Messages

During the execution of the batch streams associated with CREATE.SAV and SYSBAT.SAV, two types of errors may occur. The RT11 Run-Time System returns most errors. The batch program translates these errors to their BASIC-PLUS equivalents and prints the BASIC-PLUS error message text. You can find a discussion of BASIC-PLUS error messages in the *BASIC-PLUS Language Manual.* The batch program itself may generate several other errors. Table A–4 summarizes these errors.

Table A-4: BATCH Error Messages

Message and Meaning
CREATE NOT RUN FROM DISTRIBUTION MEDIUM The CREATE program can be run only from the distribution medium.
DEVICE NOT MOUNTED The batch stream attempted to dismount a device that was not mounted.
ERROR CHAINING TO $SYSGEN.SAV The CREATE program could not find the $SYSGEN.SAV file.
ERROR DURING PSEUDO KEYBOARD INPUT An error occurred during input to the pseudo keyboard.
ERROR DURING PSEUDO KEYBOARD OUTPUT An error occurred during output to the pseudo keyboard.
ERROR OPENING OR READING $LOGIN.SAV The CREATE program could not find the $LOGIN.SAV file on the distribution medium, or an error occurred while reading the file.
ERROR OPENING OR READING SYSGEN.CTL FILE The SYSBAT program could not find the SYSGEN.CTL file, or an error occurred while reading the file.
INVALID CARD A line contained a command in an incorrect format.
INVALID SWITCH A switch used in the command field or in the specification field is undefined or in an incorrect format.
JOB FAILED TO LOG IN The job cannot log in because the LOGIN program or the requested account was missing.
LOGINS HAVE NOT BEEN ENABLED Logins must be enabled before the batch stream can be processed.
MOUNT ERROR The volume to be mounted was not correct (pack IDs do not match) or the device was already in use.
TOO MANY MOUNTED DEVICES The job requested the mounting of more than twelve devices.
TWO MAGTAPE UNITS HAVE THE SAME UNIT NUMBERS TU16/TE16/TU45/TU77 Examine unit switches on magnetic tape drives and ensure that no two have the same unit number.

Appendix B
Disk Device Sizes, System Module Sizes, and BASIC–PLUS Module Sizes

The following table lists the device cluster size and device size (in 256-word blocks) for each of the disk devices supported by RSTS/E.

Table B-1: Disk Device Sizes

Disk Device	Device Cluster Size	Device Size
RF11	1	1024 *(number of platters)
RS03	1	1024
RS04	1	2048
RK05	1	4800
RK05F	1	4800 for each unit; 2 units for each drive
RL01	1	10220
RL02	1	20460
RK06	1	27104
RK07	1	53768
RP02	2	40000
RP03	2	80000
RM02	4	131648
RM03	4	131648
RP04	4	167200
RP05	4	167200
RP06	8	334400

Table B-2 supplies the approximate memory sizes of software modules on RSTS/E. Table B-3 supplies approximate memory sizes for BASIC-PLUS modules. By summing the values given, you can estimate the total size of the system.

Table B-2: System Module Sizes

Module	Decimal Words	Comments
Monitor Options		
FIP Buffering	496	
Small Buffers	16 per buffer	
System-Wide Logical Names	5 per name	Up to 50 logical names allowed.
Large Files	279	
RSX Emulator	1617	
Resident Libraries	930	
Data Caching	1104	
Resident FIP Functions		
Disk Handling (w/o large files)	1824	
Disk Handling (with large file)	2068	
Send/Receive	466	
Simple SYS Calls	589	
File Delete/Rename	256	
Login/Attach	390	
Directory Lister	605	
Disk Support		
RF Disk	51	RF11
RS Disk	52	RS03/RS04
RK Disk (nonoverlapped)	108	RK05/RK05F
RK Disk (overlapped)	246	
RL Disk (nonoverlapped)	316	RL01/RL02
RL Disk (overlapped)	382	
RM Disk (nonoverlapped)	299	RK06/RK07
RM Disk (overlapped)	386	
RP Disk (nonoverlapped)	135	RP02/RP03
RP Disk (overlapped)	242	
RR Disk (nonoverlapped)	332	RM02/RM03
RR Disk (overlapped)	455	
RB Disk (nonoverlapped)	332	RP04/RP05/RP06
RB Disk (overlapped)	455	
Queue Optimize	45	For moving head disks.
ECC Module	99	For RM, RR or RB disks.
UNIBUS Disk Overhead	34	For all but RM02/RM03 and RP04/RP05/RP06 disks.
MASSBUS Disk Overhead	47	For RM02/RM03 and RP04/RP05/RP06 disks.
Device Support		
TU16/TE16/TU45/TU77 Tape	851	Add 19 per unit for DDB.
TU10/TE10/TS03 Tape	761	Add 19 per unit for DDB.

Table B-2: System Module Sizes (Cont.)

Module	Decimal Words	Comments
Device Support (cont.)		
TS04	765	Add 45 per unit for DDB.
DECtape	439	Add 4 per unit for DDB.
TU58	893	Add 12 per unit for DDB.
Floppy Diskette	853	Add 14 per unit for DDB.
Pseudo Keyboards		Add 6 per unit for DDB.
Paper Tape Reader	133	Add 8 per unit for DDB.
Paper Tape Punch	133	Add 8 per unit for DDB.
Line Printer	600	Add 16 per unit for DDB.
XBuff Line Printer	672	Add 16 per unit for DDB.
CR11/CM11 Card Reader	263	Add 89 per unit for DDB.
CD11 Card Reader	274	Add 89 per unit for DDB.
Card Decode Table	128	
DMC11 Synchronous Line Interface	1200	Add 24 per unit for DDB.
Big Buffer	48	For TU16/TE16/TU45 /TU77 or TU10/TE10 /TS03 magnetic tape, but no DECtape.
Big Buffer	256	For DECtape.
Terminal Option Support		
Terminals		Add 21 per unit for DDB.
Echo Control	238	Add 4 per unit for DDB.
Multi-Terminal Service	166	
2741 Support	200	Add 2 per unit for DDB.
Single Line	+100	
DH11	+100	
DZ11	+100	
Code Table	+128 per code	Up to four codes allowed.

Table B-3: BASIC-PLUS Module Sizes

Module	Decimal Words and Description
Math Packages	
MA2	2320 2-word without FIS or FPP
MA2I	1993 2-word with FIS
MA2F	1940 2-word with FPP
MA4	3089 4-word without FIS or FPP
MA4F	2310 4-word with FPP

Table B-3: BASIC-PLUS Module Sizes (Cont.)

Module	Decimal Words and Description
Log Functions	
XL2	336 2-word log function without FIS or FPP
XL2I	336 2-word log function with FIS
XL2F	249 2-word log function with FPP
XL4	475 4-word log function without FIS or FPP
XL4F	317 4-word log function with FPP
Trig Functions	
XT2	324 2-word trig function without FIS or FPP
XT2I	324 2-word trig function with FIS
XT2F	247 2-word trig function with FPP
XT4	419 4-word trig function without FIS or FPP
XT4F	311 4-word trig function with FPP
Optional Features	
Common Polynomial Calculation	31 2-word floating point without FPP
	47 4-word floating point without FPP
Matrices (MX)	943
String Arithmetic (SF)	990
Print Using (PU,PX)	1121

NOTE

FPP is compatible with PDP 11/34, 11/45, 11/50, 11/55, 11/60 and 11/70 processors. FIS is compatible with PDP 11/35 and 11/40 processors.

Appendix C
Address and Vector Assignments

The RSTS/E system initialization code performs a hardware configuration check each time the system disk (or distribution medium) is bootstrapped. In the absence of any information to the contrary, the initialization code assumes that all devices attached to the UNIBUS have been assigned addresses according to the manufacturing standards. The initialization code determines interrupt vectors automatically by forcing each supported device to interrupt. Although the HARDWR initialization option allows you to declare non-standard address and vector assignments, DIGITAL recommends that the standard configuration rules be followed whenever possible.

Several devices have Floating Addresses. This means that the presence or absence of any floating address device will affect the assignment of addresses to other floating address devices. Similarly, many devices have Floating Vectors. According to the standard, interrupt vectors must be assigned in a specific sequence and the presence of one type of device will affect the correct assignment of interrupt vectors for other devices. Finally, there are many options that have fixed addresses and vectors. This appendix presents the algorithms for assignment of floating addresses and vectors. It also lists the fixed assignments for devices supported by RSTS/E.

C.1 Floating Addresses

Currently the floating address devices include the DJ11 and DH11 multiplexers; the DQ11, DU11, and DUP11 synchronous line interfaces; the LK11; the DMC11 interprocessor link; the DZ11 multiplexer and the KMC11 micro-processor. The following ground rules apply to these devices and future floating address devices:

1. Only new devices will be assigned floating addresses. Devices now in production will keep their old addresses.
2. Future devices may float both their address and interrupt vectors.

3. The floating address space starts at 760010(8) and proceeds upward to 764000(8).

4. A gap in the address space (no SLAVE SYNC) implies that a device does not exist.

5. The first address of a new type device will always be on a 2↑N word boundary, where N is the first integer greater than or equal to LOG_2M and M is the number of device registers.

Number of Registers In Device	Possible Boundaries
1	Any Word
2	XXXXX0,XXXXX4
3,4	XXXXX0
5,6,7,8	XXXX00,XXXX20,XXXX40,XXXX60
9 thru 16	XXXX00,XXXX40

6. A "gap" of at least one word will be left after each type of device, starting on the same boundary the device would start on. Note that the gap must be at least one word in length but may be longer than one word. Gap length is determined by the boundary on which the next must be addressed contiguously.

Address 760010 is reserved for the first DJ11. Since the DJ11 has four registers, additional DJ11's are assigned addresses modulo 10 (base 8) immediately following the first DJ11 (i.e., 760010, 760020, etc.). The modulo 10 (base 8) address following the last DJ11 is left empty and is known as the DJ11 gap. If there are no DJ11's, the gap is at 760010. If there is one DJ11, the gap will be at 760020. All gaps must be at least one word in length.

After all DJ11 addresses and the DJ11 gap are defined, the address for the first DH11 can be assigned. DH11's have eight registers which implies a modulo 20 (base 8) boundary. The address of the first DH11 is the first modulo 20 address following the DJ11 gap. If there are no DJ11's (DJ11 gap at 760010), the first DH11 is assigned address 760020. Similarly, if there is one DJ11, the DJ11 gap will begin at 760020 and the next available modulo 20 boundary is 760040. All additional DH11's are assigned addresses modulo 20 immediately after the first DH11. The DH11 gap begins on the 20 boundary following the last DH11.

After all DH11 addresses and the DH11 gap are defined, DQ11, DU11, DUP11, LK11, DMC11, DZ11, and KMC11 addresses and the required gaps can be assigned in sequence. Addresses for any future floating address devices will be assigned in a similar manner.

Floating Address Worksheet

The algorithm for assignment of floating addresses can be confusing for a large configuration with multiple units of several types of floating address devices. The floating address worksheet that follows is a graphic aid that should eliminate some confusion and relieve configuration problems. The worksheet allows

you to assign device addresses quickly without referring to the formal rules. Instructions for use of the worksheet are presented below and two configuration examples follow. A blank worksheet is also provided for general use.

The worksheet is divided into four sections covering the address range 760010 through 762000. Although the floating address area continues up to address 764000, the worksheet should cover most configurations. If necessary, you can create a second worksheet by adding 2000 to all addresses listed.

The following are the instructions for the use of the worksheet:

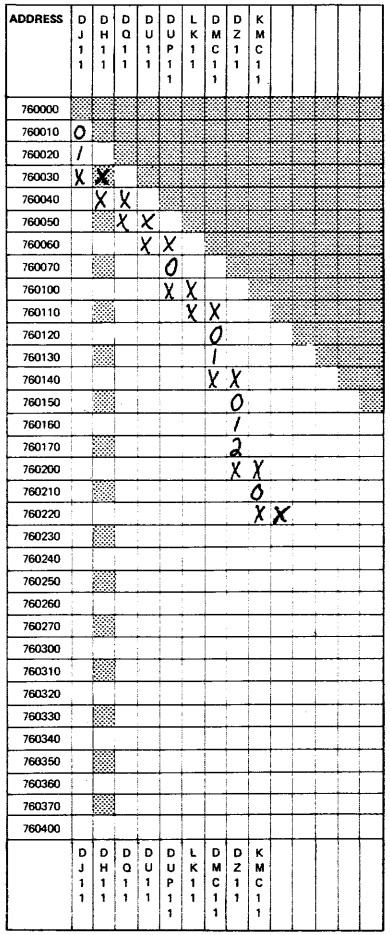
1. Record the quantity of each type of floating address device in the space provided on the worksheet.
2. Beginning at the upper left of the worksheet at address 760010 and proceeding down the DJ11 column, record the unit numbers for all DJ11's in the configuration. Begin with unit 0 and end with unit n–1. (There are n DJ11's in the configuration.)
3. Immediately below the last DJ11 unit, mark an X for the required DJ11 address gap. Also mark an X in the box immediately to the right (DH11 column).

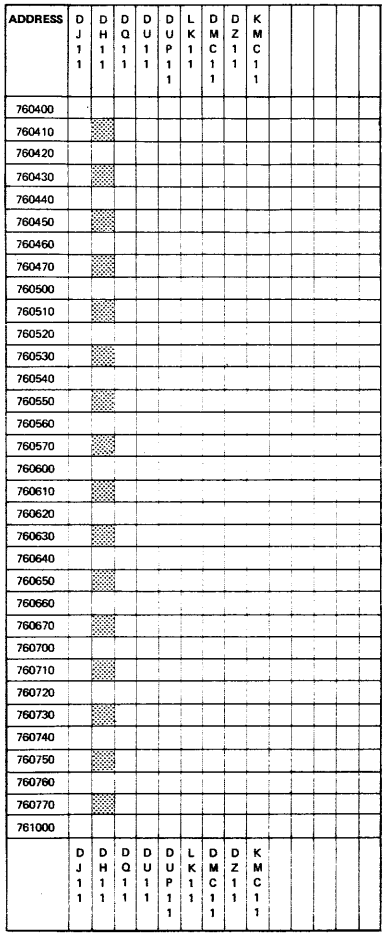
   In general, when numbering device units down the appropriate column, use only the unshaded boxes. The shaded boxes represent illegal addresses for the particular device type. Since the gap address must also be a legal device address, use only an unshaded box for the gap X when numbering down a column.

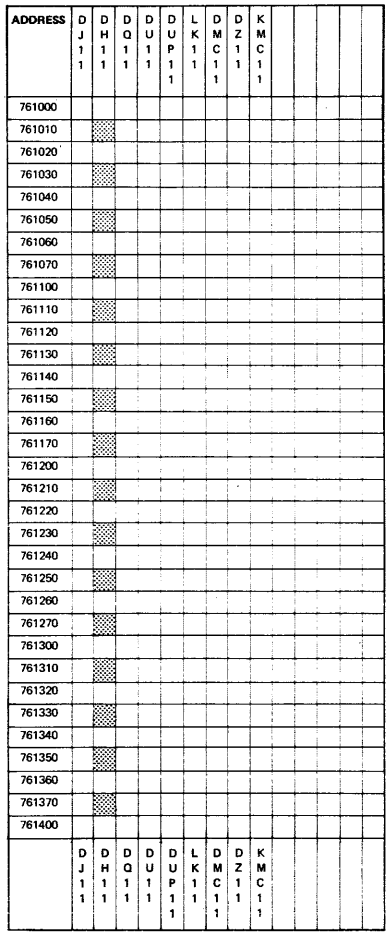
   In marking an X in the column to the right of a device address gap, use shaded boxes since the X in the next column merely provides a starting point for numbering units of the next device type. If there are no units of a particular device type, enter only the gap X's on the worksheet.

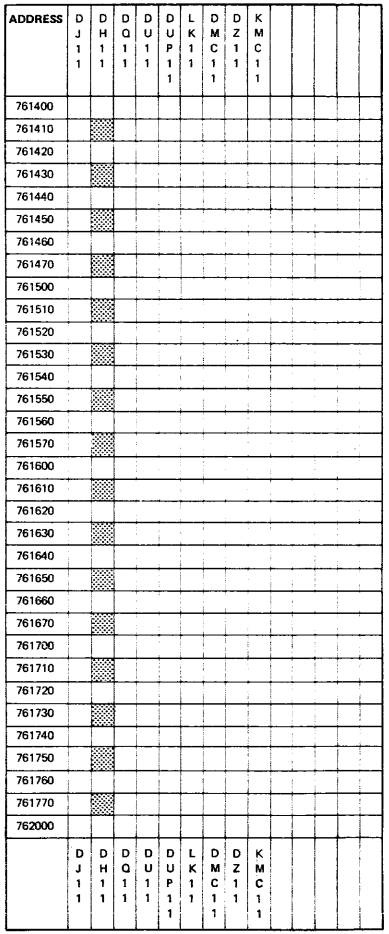
   If you use all available space in one section of the worksheet, simply copy the entries on the last line of the full section to the top line of the next section. Then continue numbering in the new section.
4. Continuing just below the X in the DH11 column, number all DH11 units. Once again, start with unit 0 and continue to unit n–1. Skip the shaded boxes in numbering down the column. In the first unshaded box below the last DH11 unit, mark an X for the DH11 gap. Also mark an X in the box to the right, whether it is shaded or unshaded.
5. Continue with the remaining floating address devices. In each case, number units from 0 to n–1 down the column beginning in the first unshaded box below the X. Mark an X in the next unshaded box below the last unit and in the box immediately to the right of the last unit (whether that box is shaded or unshaded).
6. After you have recorded all floating address devices, you can read the UNIBUS address for each device unit directly from the worksheet.

FLOATING ADDRESS WORKSHEET (EXAMPLE 1)









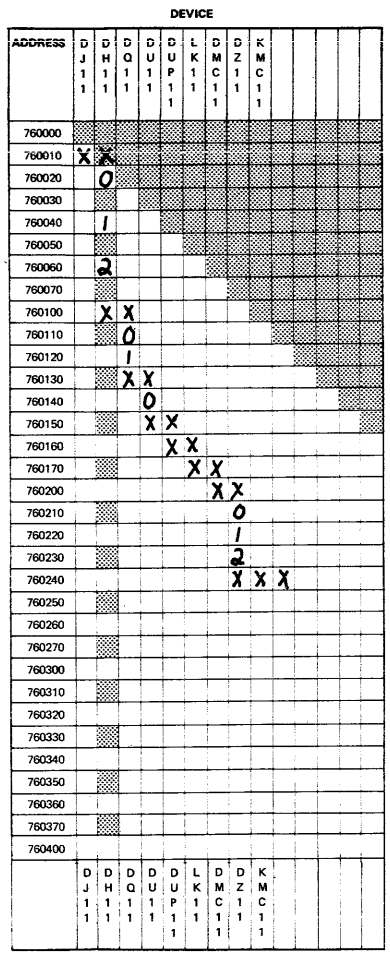
	QTY (n)		QTY (n)
DJ11	2	DMC11	2
DH11	0	DZ11	3
DQ11	0	KMC11	1
DU11	0		
DUP11	1		
LK11	0		

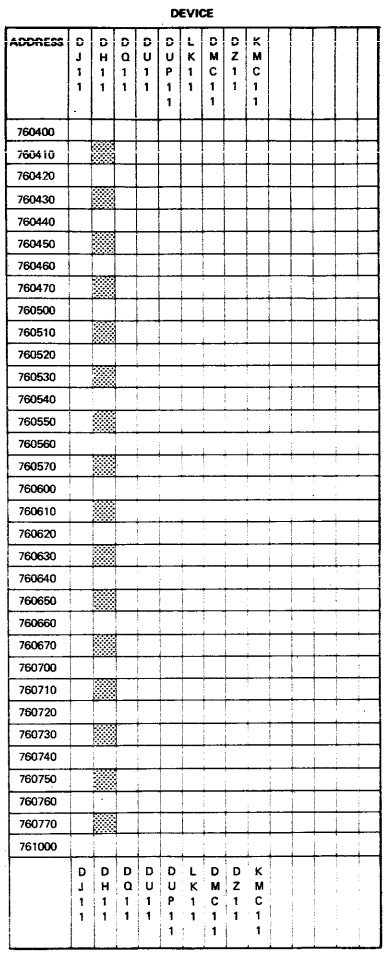
DEV	UNIT	ADDRESS
DJ	0	760010
DJ	1	760020
DUP	0	760070
DMC	0	760120
DMC	1	760130
DZ	0	760150

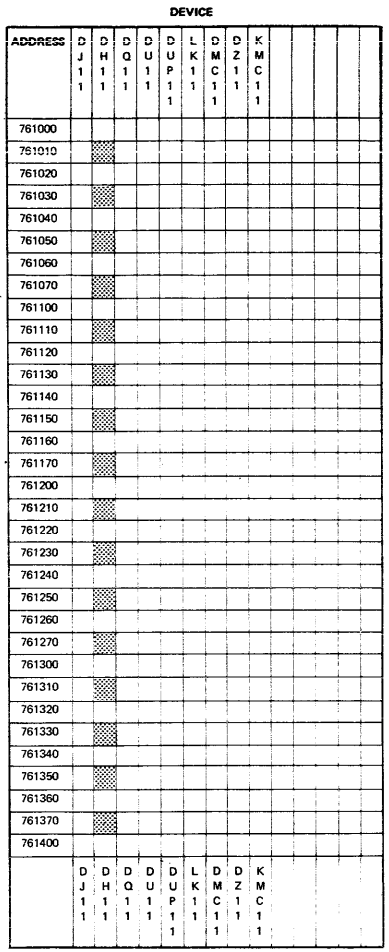
DEV	UNIT	ADDRESS
DZ	1	760160
DZ	2	760170
KMC	0	760210

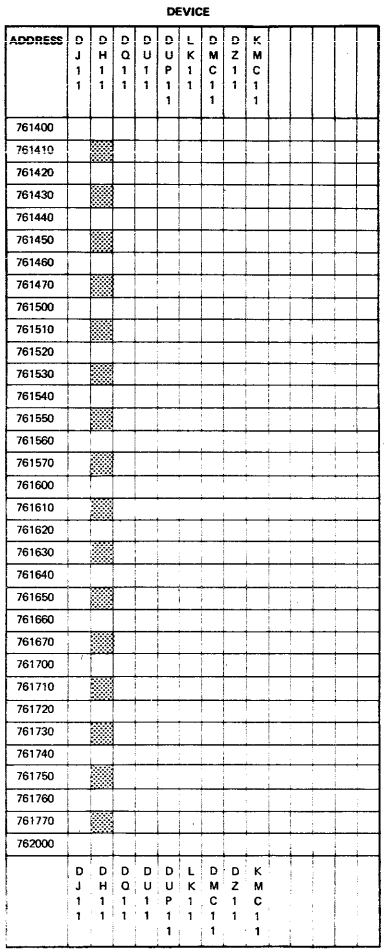
DEV	UNIT	ADDRESS

FLOATING ADDRESS WORKSHEET (EXAMPLE 2)









	QTY (n)		QTY (n)
DJ11	0	DMC11	0
DH11	3	DZ11	3
DQ11	2	KMC11	0
DU11	1		
DUP11	0		
LK11	0		

DEV	UNIT	ADDRESS
DH	Ø	760020
DH	1	760040
DH	2	760060
DQ	Ø	760110
DQ	1	760120
DU	Ø	760140

DEV	UNIT	ADDRESS
DZ	Ø	760210
DZ	1	760220
DZ	2	760230

DEV	UNIT	ADDRESS

FLOATING ADDRESS WORKSHEET

DEVICE

ADDRESS	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				
760000													
760010													
760020													
760030													
760040													
760050													
760060													
760070													
760100													
760110													
760120													
760130													
760140													
760150													
760160													
760170													
760200													
760210													
760220													
760230													
760240													
760250													
760260													
760270													
760300													
760310													
760320													
760330													
760340													
760350													
760360													
760370													
760400													
	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				

DEVICE

ADDRESS	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				
760400													
760410													
760420													
760430													
760440													
760450													
760460													
760470													
760500													
760510													
760520													
760530													
760540													
760550													
760560													
760570													
760600													
760610													
760620													
760630													
760640													
760650													
760660													
760670													
760700													
760710													
760720													
760730													
760740													
760750													
760760													
760770													
761000													
	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				

DEVICE

ADDRESS	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				
761000													
761010													
761020													
761030													
761040													
761050													
761060													
761070													
761100													
761110													
761120													
761130													
761140													
761150													
761160													
761170													
761200													
761210													
761220													
761230													
761240													
761250													
761260													
761270													
761300													
761310													
761320													
761330													
761340													
761350													
761360													
761370													
761400													
	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				

DEVICE

ADDRESS	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				
761400													
761410													
761420													
761430													
761440													
761450													
761460													
761470													
761500													
761510													
761520													
761530													
761540													
761550													
761560													
761570													
761600													
761610													
761620													
761630													
761640													
761650													
761660													
761670													
761700													
761710													
761720													
761730													
761740													
761750													
761760													
761770													
762000													
	DJ11	DH11	DQ11	DU11	DUP11	LK11	DMC11	DZ11	KMC11				

QTY (n)		QTY (n)
DJ11		DMC11
DH11		DZ11
DQ11		KMC11
DU11		
DUP11		
LK11		

DEV	UNIT	ADDRESS

DEV	UNIT	ADDRESS

DEV	UNIT	ADDRESS

C.2 Floating Vectors

Many devices have floating vectors. The vector assignment sequence is normally the same sequence as that in which the devices enter production. A vector for a new hardware option is not inserted before the vector for a device that is already in production. Gaps in the vector assignments are not required. The floating vectors begin at address 300 and proceed continuously upwards. The vector assignment sequence for current devices is defined below.

Device	First Address	Next Addr.	Vector Size	Max # Units	BR Level	RSTS/E Notes
DC11	174000	+10	10	32	BR5	
KL11,DL11A,B	176500	+10	10	16	BR4	NON-CONSOLE
DP11	174770	-10	10	32	BR5	2780 ONLY***
DM11A	175000	+10	10	16	BR5	NOT SUPPORTED
DN11	175200	+10	4	16	BR4	NOT SUPPORTED
DM11BB	170500	+10	4	16	BR4	
DR11A,C	167770	-10	10*	32	BR5	NOT SUPPORTED
PA611 READER	172600	+4	4*	16	BR4	NOT SUPPORTED
PA611 PUNCH	172700	+4	4*	16	BR4	NOT SUPPORTED
DT11 (DT03-FP)	174200	+2	10*	8	BR7	NOT SUPPORTED
DX11	176200	+40	10*	4	BR4	NOT SUPPORTED
DL11C,D,E	175610	+10	10*	31	BR4	
DJ11	FLOAT	+10	10*	16	BR5	
DH11	FLOAT	+20	10*	16	BR5	
GT40	172000		20*		BR4	NOT SUPPORTED
LPS11	170400	+40	30*	14	BR5,6	NOT SUPPORTED
DQ11	FLOAT	+10	10*	16	BR5	NOT SUPPORTED
KW11W	172400	NA	10*	1		NOT SUPPORTED
DU11	FLOAT	+10	10*	16	BR5	2780 ONLY***
DUP11	FLOAT	+10	10*	16	BR5	2780 ONLY***
DV11	175000	+40	20*	4	BR5,6	NOT SUPPORTED
LK11	FLOAT	+10	10*	1	BR4	NOT SUPPORTED
DMC11	FLOAT	+10	10*	16	BR5	DECNET/E ONLY**
DZ11	FLOAT	+10	10*	8	BR5	
KMC11	FLOAT	+10	10*	16	BR5	
TS04	172524	+4	4	4	BR5	Second, third, and fourth units

*The first vector for the first device of this type must always be on a 10(8) boundary.
**DECnet/E limits the maximum number of units to sixteen.
***Also supported at BR6 under RSTS/2780.

C.3 Fixed Address and Vectors

The following table lists the devices supported under RSTS/E that have fixed addresses and vectors.

Device		Address	Vector	BR Level	RSTS/E Notes
RF11		277460	204	BR5	UP TO 8 PLATTERS
RS03/RS04		172040	204	BR5	UP TO 8 DRIVES
RK05/RK05F		177400	220	BR5	UP TO 8 DRIVES*
RL01/RL02		174400	160	BR5	UP TO 4 DRIVES
RK06/RK07		177440	210	BR5	UP TO 8 DRIVES
RP02/RP03		176710	254	BR5	UP TO 8 DRIVES
RM02/RM03		176300	150	BR5	UP TO 8 DRIVES
RP04/RP05/RP06		176700	254	BR5	UP TO 8 DRIVES
RX01/RX02		177170	264	BR5	UP TO 8 DRIVES
DECtape		177340	214	BR6	UP TO 8 DRIVES
TU10/TE10/TS03/TS04		172520	224	BR5	UP TO 8 DRIVES
TS04		172520	224	BR5	UP TO 8 DRIVES
TU16/TE16/TU45/TU77		172440	224	BR5	First drive only
LP11,LS11	(LP0)	177514	200	BR4	UP TO 8 DRIVES
	(LP1)	164004	170	BR4	UP TO 8 DRIVES
	(LP2)	164014	174	BR4	DEPENDING ON
	(LP3)	164024	270	BR4	SPEED.
	(LP4)	164034	274	BR4	
	(LP5)	164044	774	BR4	
	(LP6)	164054	770	BR4	
	(LP7)	164064	764	BR4	
CR11,CM11		177160	230	BR5	
CD11		177160	230	BR4	
KW11L		177546	100	BR6	
KW11P		172540	104	BR6	
KG11		170700	NONE	NONE	
KL11,DL11A,DL11B		177560	60	BR4	2780 ONLY CONSOLE INTERFACE

*Each RK05F must be counted as two drives.

C.4 RH70 BAE and CS3 Addresses

The following table lists the four possible RH70 High Speed I/O Controller addresses, their Bus Address Extension (BAE) and Control addresses, their Bus Address Extension (BAE) and Control Status 3 (CS3) addresses, and their usages.

Usage	Address	BAE	CS3
RS03/RS04 only	172040	172070	172072
TU16/TE16/TU45/TU77 only	172440	172474	172476
mixed/nonstandard	176300	176350	176352
RP04/RP05/RP06 or RM02/RM03	176700	176750	176752

Appendix D
RSTS/E System Library Control Files

There are five system library control files on the RSTS/E distribution kit and Table D–1 summarizes the function of each. Because all RSTS/E systems require the standard system library, you must run the BUILD program using the BUILD.CTL file. Build the other libraries only if you plan to include their optional features on your system.

Table D–1: Control Files for the BUILD Program

File	Function
BUILD.CTL	Builds and patches the standard system library required for all systems.
SPLER.CTL	Builds the Spooling Package system library files.
BIGPRG.CTL	Builds files for certain large programs.
BACKUP.CTL	Builds files for the BACKUP Package library.
DEVTST.CTL	Builds the Device Testing Package.

D.1 BUILD.CTL File

Commands in the BUILD.CTL file create a standard system library for all systems. Table D–2 lists and describes the programs and files contained in the standard library. Also, included in Table D–2 are manual references which you can use to find more detailed descriptions of each program and file. The references that Table D–2 provides point to sections in this manual, to the *RSTS/E System User's Guide (SUG)*, the *RSTS/E System Manager's Guide (SMG)*, or the *RSTS/E Text Editor Manual (TEM)*.

Table D–2: BUILD.CTL Programs and Files

Program or File Name	Protection	Description	Manual Reference
CPATCH.BAC	<124>	Creates system library patching command files.	SMG
AUTOED.BAC	<124>	Editor for system library patching.	SMG
ATPK.BAC	<232>	Processes command files.	SMG
LOGIN.BAC	<232>	Logs users into system.	SUG
LOGOUT.BAC	<232>	Logs users off system.	SUG
PATCPY.BAC	<124>	Copies patch files.	SMG
PBUILD.BAC	<124>	Builds system library patching files.	SMG
UTILTY.BAC	<124>	Performs system utility routines.	SMG
INIT.BAC	<124>	Initializes system at start of time sharing.	SMG
SHUTUP.BAC	<124>	Performs system shut down.	SMG
ERRBLD.BAC	<124>	Builds error data file for use by ERRDIS package.	SMG
ERRINT.BAC	<124>	Validates or initializes ERRLOG.FIL.	SMG
ERRCPY.BAC	<124>	Copies hardware error data to a disk file.	SMG
DIRECT.BAC	<232>	Lists device directories.	SUG
TTYSET.BAC	<232>	Sets terminal characteristics.	SMG SUG
SYSTAT.BAC	<232>	Reports system status.	SMG SUG
EDIT package	<104>	Text editor.	TEM
BUILD.BAC	<124>	Builds and patches system library files.	Chapter 6, Section 7.4
ERRDIS package	<124>	Formats error data.	SMG
ANALYS Package	<124>	Analyzes system crash information and retrieves error data.	SMG
ODT.BAC	<124>	Octal debugging tool.	SMG
REACT.BAC	<124>	Creates user accounts.	SMG
REORDR.BAC	<124>	Restructures user file directories for optimal performance.	SMG
DSKINT.BAC	<124>	Initializes formatted disks.	SMG
UMOUNT.BAC	<232>	Mounts and dismounts private disks.	SUG
COPY.BAC	<104>	Copies entire tapes and disk cartridges.	SUG

(continued on next page)

Table D–2: BUILD.CTL Programs and Files (Cont.)

Program or File Name	Protection	Description	Manual Reference
FILCOM.BAC	<104>	Compares ASCII files.	SUG
QUOLST.BAC	<232>	Lists disk quota and usage data for current user.	SUG
MONEY.BAC	<104>	Performs system accounting functions.	SMG SUG
GRIPE.BAC	<232>	Records user comments.	SMG SUG
TALK.BAC	<232>	Provides inter-terminal communications.	SMG
PLEASE.BAC	<232>	Prints requests at terminal and interacts with OPSER package.	SMG
INUSE.BAC	<104>	Prints terminal "INUSE" warning message.	SUG
SWITCH.BAC	<232>	Changes the private default run-time system.	SUG
ONLCLN.SAV	<124>	Cleans disks during time sharing.	SMG
NOTICE.TXT	<40>	Sample system notices text file.	SUG
HELP.HLP	<40>	Sample system help message text file.	SUG
RTS.CMD	<60>	Sample indirect command file for adding auxiliary run-time systems.	SMG
TTY.CMD	<60>	Sample indirect command file for setting terminal characteristics.	SMG
CCL.CMD	<60>	Sample indirect command file for defining CCL commands.	SMG
START.CTL	<60>	Sample system start-up control file.	SMG
CRASH.CTL	<60>	Sample system crash recovery control file.	SMG
ANALYS.CMD	<60>	Sample indirect command file for crash analysis.	SMG
CLEAN.CMD	<60>	Sample indirect command file for cleaning disks.	SUG
UTILTY.HLP	<40>	UTILTY program help message file.	SMG
DIRECT.HLP	<40>	DIRECT program help message file.	SUG
ERRDIS.HLP	<60>	Error display program help file.	SMG
ACCT.SYS	<188>	Sample system accounts file.	SMG
COPY.HLP	<40>	COPY program help message file.	SUG

D.2 SPLER.CTL File

Commands in the SPLER.CTL file create programs and files for the Spooling Package. Table D–3 contains the name, the protection code, and a brief description of each of these programs and files. Use the manual references, also contained in Table D–3, to find a more detailed explanation of each component in the Spooling Package. The references direct you to either the *RSTS/E System User's Guide (SUG)* or the *RSTS/E System Manager's Guide (SMG)*.

Table D–3: SPLER.CTL Programs and Files

Program or File Name	Protection	Description	Manual Reference
OPSER package	<124>	Operator services package.	SMG
CHARS.BAC	<124>	Creates the character generation file, CHARS.QUE.	SMG
QUE.BAC	<232>	Creates requests for spooling programs.	SUG
QUE Management Package	<124>	Queue management package.	SMG
SPOOL.CMD	<60>	Sample command file for starting up spooling programs.	SMG
BATDCD.BAC	<124>	Creates BATCH program command decoding file BATCH.DCD.	SMG
SPOOL package	<124>	Line printer spooling package.	SMG
BATCH package	<124>	Batch control spooling package.	SMG SUG

D.3 BIGPRG.CTL File

Commands in the BIGPRG.CTL file create programs that are used with certain peripheral devices and optional software. Table D–4 contains the name, the protection code, and a brief description of each program in the BIGPRG command file. In addition, Table D–4 contains a manual reference that you can use to find a more detailed description of each program. The references direct you to the *RSTS/E System User's Guide (SUG)*, the *RSTS/E Programmer's Utilities Manual (PUM)*, or the *RSTS/E System Manager's Guide (SMG)*.

Table D–4: BIGPRG.CTL Programs and Files

Program or File Name	Protection	Description	Manual Reference
VT5DPY.BAC	<232>	Displays system status on VT05. Created from DISPLY.BAS and VT05.DPY.	SMG
VT50PY.BAC	<232>	Status display program for VT50 and VT52. Created from DISPLY and VT50.DPY. Also used on VT100.	SMG
FIT.BAC	<232>	Transfers files to and from diskettes, DECtape IIs, and RT11 formatted disks.	SUG
FLINT.BAC	<104>	Copies files between IBM-compatible diskettes and RSTS/E disks.	SUG
PMDUMP.BAC	<104>	Provides post-mortem dump of low memory and user job area.	SUG
BPCREF Package	<104>	Creates cross-reference listing for BASIC–PLUS programs.	SUG
RUNOFF.BAC	<104>	Formats typed or printed manuscripts.	
MAKSIL.BAC	<124>	Generates a Save Image Library from a Task Image File.	PUM
SAVRES.SAV	<124>	SAVEs, RESTOREs, and IMAGE copies entire disk packs.	SMG

D.4 BACKUP.CTL File

Commands in the BACKUP.CTL file create programs for the BACKUP Package. Table D–5 describes the contents of this package and provides the names of the RSTS/E documentation manuals which can help you locate a more detailed description of the BACKUP Package. The references direct you to either the *RSTS/E System Manager's Guide (SMG)* or the *RSTS/E System User's Guide (SUG).*

Table D–5: BACKUP.CTL Programs and Files

Program or File Name	Protection	Description	Manual Reference
BACKUP package	<232>	Transfers information from disk to tape or disk and restores the information to the original volume. The package contains 15 programs, two of which do not have a protection code of <232>. BACENT.BAC and BACPRM.BAC have protecton codes of <124>.	SMG SUG
BACDSK.BAC	<232>	Writes BACKUP file structure on disks.	SMG

D.5 DEVTST.CTL File

Commands in the DEVTST.CTL file create executable programs for the Device Testing Package. Table D–6 contains a description of each program in this package. For a complete explanation of the DEVTST package, refer to the *RSTS/E System Manager's Guide (SMG).*

Table D–6: DEVTST.CTL Programs

Program or File Name	Protection	Description
DSKSEK.BAC	<124>	Tests the normal operation of non-file structured disk controllers.
DSKEXR.BAC	<124>	Tests the normal operation of all file structured disks.
LPEXER.BAC	<124>	Test prints a rotating pattern of ASCII characters and specified number of pages and is used to test any line printer.
PPEXER.BAC	<124>	Tests the normal operation of the paper tape punch by punching random patterns on the paper tape for input into the PREXER.
PREXER.BAC	<124>	Tests the normal operation of the paper tape reader.
DXEXER.BAC	<124>	Tests the normal operation of the diskette controller.
DTEXER.BAC	<124>	Tests the normal operation of the DECtape controller and drives.
CPEXER.BAC	<124>	Tests the CPU to verify that it is performing properly.
CPUTST.BAC	<124>	Tests the integrity of CPU addresses.
KBEXER.BAC	<124>	Tests terminals.
MTEXER.BAC	<124>	Checks the normal operation of magnetic tape controllers and drives.

Appendix E
System Generation Examples

The two sample RSTS/E system generations that follow are provided here to give you an overall view of the entire generation process and ultimately to help you generate your RSTS/E system. Since the size of your system effects some of the decisions you must make during the generation process, two system generations are provided, one created for a small and the other for a large system configuration. For those that have, for example, two RK05's, one RP04, and approximately 128K words of memory, follow the sample generation of the small system which begins on page 2. Those installations that have more peripherals and larger memory (450K words) can follow the large system sample generation beginning on page 67. It must be stressed that these examples should only be used as rough guidelines. Generating your system exactly like one of the samples may cause your system to run less efficiently than it might otherwise. Therefore, determine the size and needs of your system and generate it accordingly.

The instructions that the SYSGEN program provides for each of the questions in the system generation process are included in the samples for your convenience. These instructions can be invoked by simply pressing RETURN in response to any of the questions. Also, you have the option before you answer the configuration questions (page E-13 and page E-77) to select the short or long form of the question. The long form option was selected for both generations and when selected may help you choose the proper response. If you choose the short form, the long form explanations can be invoked by pressing RETURN.

As a final note, it is suggested that you study these examples before you generate your system. They may help you to avoid problems which can cost you time and effort.

System Generation Example — Small System Configuration

```
Enabling only console, disks, and tapes.


RSTS V7.0 (DK0)


Option:
Please enter one of the valid RSTS/E system initialization
options, or type 'HELP' for a help message: HELP

The valid RSTS initialization options are:
        DSKINT  Initialize disk to RSTS file structure
        COPY    Copy minimal system to disk
        PATCH   Patch a file
        HARDWR  Set controller characteristics
        INSTALL Install a monitor SIL
        REFRESH Manipulate files in [0,1]
        DEFAULT Set monitor defaults
        SET     Set device characteristics
        START   Start timesharing
        <LF>    Start timesharing (fast)
        BOOT    Bootstrap a device
        LOAD    Load a stand-alone program
        UNISYS  Disable all but console terminal
        FILL    Set console fill for INIT
        SAVRES  SAVE or RESTORE a RSTS/E disk
        HELP    Type this HELP message
Only the first two characters need be typed.


Option: DSKINT

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
12:04 AM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 4:48PM

Disk?
Disk type (DC,DF,DS,DK,DL,DM,DP,DB,DR)? DB
Unit?
Physical unit number (0-7)? 0

This disk pack appears to be a RSTS/E formatted
disk with the following characteristics:

Pack ID :               SAMPL2
Pack Cluster Size :     4
Pack is currently :     Private,
                        Update access date on writes.

Pack ID?
Up to 6 alphanumeric characters? SMLV70
Pack cluster size?
4, 8, or 16? 8
SATT.SYS base?
Type a block number to locate the file SATT.SYS at a specific
place on the disk, or type <LF> to let RSTS find a location.
SATT.SYS base? 20000
MFD password?
Up to 6 alphanumeric characters? WHERE
```

```
MFD cluster size?
8 or 16? 8
Pre-extend directories <no>?
Type YES to force the MFD and accounts [0,1] and [1,2]
be pre-extended to their maximum size when created.
Pre-extend directories <no>? YES
PUB, PRI, or SYS?
Public (PUB), private (PRI), or system (SYS) disk? SYS
Library password?
Up to 6 alphanumeric characters? WHATME
Library UFD cluster size?
8 or 16? 16
Library account base?
Type a block number to locate the library account at a specific
place on the disk, or type <LF> to let RSTS find a location.
Library account base? 20000
Date last modified <yes>?
Type 'YES' to maintain date of last modification in the
directory on this disk.
Type 'NO' to maintain the date of last access.
Should this disk retain last-modified information? YES
New files first <no>?
Type 'YES' to force new directory entries to be
added to the front of the directory.
Type 'NO' to force new entries to be added to
the end.
Should directory entries be added to the front? NO
Use previous bad block info <yes>?
If the disk you are initializing is already a RSTS
file-structured disk, there is a file which tells where
bad pack clusters are on the disk.  Type 'YES' to use
this information in creating the new bad block file for
this disk; type 'NO' to ignore the previous bad block
file.  Use previous bad block info <yes>? YES
Format <no>?
Should the pack be formatted (Y or N)? NO
Patterns?
Number of patterns to use in checking for bad blocks (0-8).
Time required per pattern (minutes):
DF=.25/platter, DK=1, DM=2.5, DP & DB=10.
How many patterns should be used in checking the disk? 8
Proceed (Y or N)?
Type 'Y' to proceed with DSKINT, 'N' to abort it? YES

Pattern # 8

DBO Error       RPCS1   RPWC    RPDA    RPCS2   RPDS    RPER1   RPDC
                144250  171152  010000  040300  150700  100000  000602
                144250  171152  010000  040300  150700  100000  000602
Recoverable
                144250  177553  010000  040300  150700  100000  000603
                144250  177553  010000  040300  150700  100000  000603
                144250  177553  010000  040300  150700  100000  000603
 Block Cluster
162108   20263
                144250  176553  010000  040300  150700  100000  000604
                144250  176553  010000  040300  150700  100000  000604
Recoverable

Pattern # 7

DBO Error       RPCS1   RPWC    RPDA    RPCS2   RPDS    RPER1   RPDC
                144250  174326  003005  040300  150700  100000  000601
Recoverable
                144250  177553  010000  040300  150700  100000  000603
                144250  177553  010000  040300  150700  100000  000603
                144250  177553  010000  040300  150700  100000  000603
```

```
 Block Cluster
162108    20263
                  144250   176553   010000   040300   150700   100000   000604
                  144250   176553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
162526    20315

Pattern # 6

DBO Error         RPCS1    RPWC     RPDA     RPCS2    RPDS     RPER1    RPDC
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
Recoverable
                  144250   176553   010000   040300   150700   100000   000604
                  144250   176553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
 Block Cluster
162526    20315

Pattern # 5

DBO Error         RPCS1    RPWC     RPDA     RPCS2    RPDS     RPER1    RPDC
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
 Block Cluster
162108    20263
                  144250   176553   010000   040300   150700   100000   000604
                  144250   176553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
162526    20315

Pattern # 4

DBO Error         RPCS1    RPWC     RPDA     RPCS2    RPDS     RPER1    RPDC
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
 Block Cluster
162108    20263
                  144250   176553   010000   040300   150700   100000   000604
                  144250   176553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
162526    20315

Pattern # 3

DBO Error         RPCS1    RPWC     RPDA     RPCS2    RPDS     RPER1    RPDC
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
 Block Cluster
162108    20263

Pattern # 2

DBO Error         RPCS1    RPWC     RPDA     RPCS2    RPDS     RPER1    RPDC
                  144250   174325   003005   040300   150700   100100   000601
                  144250   174325   003005   040300   150700   100100   000601
                  144250   177726   003005   040300   150700   100000   000601
```

```
 Block Cluster
161066    20132
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
162108    20263
                  144250   176553   010000   040300   150700   100000   000604
                  144250   176553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
                  144250   177553   010000   040300   150700   100000   000604
162526    20315

Pattern # 1

DBO Error         RPCS1    RPWC     RPDA     RPCS2    RPDS     RPER1    RPDC
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
                  144250   177553   010000   040300   150700   100000   000603
 Block Cluster
162108    20263


Option: COPY

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
06:06 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 6:06 PM

To which disk?
Type the name of the disk which is to receive the RSTS/E system.
The disk must already be initialized.
Valid disk names are DF, DS, DK, DL, DM, DP, DB, and DR.

To which disk? DB
Unit?
Physical unit number (0-7)? 0

Enabling only console, disks, and tapes.


RSTS V7.0 (DBO)

Option: HARDWR

  HARDWR suboption?

  Valid HARDWR suboptions are:

        LIST     List hardware configuration
        DISABLE  Disable a controller
        ENABLE   Enable a disabled controller
        CSR      Enter non-standard controller address
        VECTOR   Enter non-standard vector address
        UNITS    Associate a disk type with a controller
        DM       Set DM11BB/DH11 associations
        TU58     Set TU58/DL11 associations
        HERTZ    Set AC line hertz
        SWITCH   Set console switch register characteristics
        RESET    Reset all user CSR's & vectors, enable all devices
        EXIT     (or <LF>) Exit from HARDWR option

  Only the first two characters need be typed
```

```
  HARDWR suboption? LIST

  Name   Address  Vector   Comments
  TT:     177560    060
  RK:     177400    220    RK05F units: none
  RB:     176700    254    Units: 0(RP04)
  DE0:    175610    300    Units:
  DE1:    175620    310    Units:
  DL0:    160050    320
  XM0:    160100    330
  XM1:    160110    340
  XM2:    160120    350
  XM3:    160130    360
  DZ0:    160150    370
  DZ1:    160160    400
  XK0:    160200    410

  KW11L   177546    100
  SR      177570
  DR      177570

  Hertz = 60.

  HARDWR suboption? EXIT

Option: INSTALL

Sil?

Type the filename of the monitor save image library.

Directory of all .SIL files in [0,1]:

SYSGEN.SIL

Sil? SYSGEN
  Rebooting . . .



RSTS V7.0 (DB0)


Option: REFRESH

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
06:08 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 6:08 PM

Disk?
Type the name of the disk to refresh (DC,DF,DS,DK,DM,DP, or DB).
Type <LF> to refresh the system disk.

Disk? DB
Unit?
Physical unit number (0-7)? 0

Clean?
Type 'YES' if you want the disk cleaned before REFRESHing.
Type 'NO' to skip the clean operation.

Clean? YES

Disk is being cleaned - wait ...
```

```
REFRESH suboption?

Valid REFRESH suboptions are:

LIST    List the file status table
CHANGE  Change the system file allocation
FILE    Change the characteristics of a file in [0,1]
BADS    Examine or change the bad block file
EXIT    (or <LF>) to exit from REFRESH

Only the first two characters need be typed

REFRESH suboption? LIST

File                    File          Current  Minimum    Start
Name      Required?  Flags Status      Size     Size       LBN

System files:

SWAP   .SYS   YES             CRE                64
SWAP0  .SYS    NO              OK
SWAP1  .SYS    NO              OK
SWAP3  .SYS    NO              OK
OVR    .SYS    NO              OK                57
ERR    .SYS    NO              OK                16
BUFF   .SYS    NO              OK
CRASH  .SYS    NO              OK                24

Others:

BADB   .SYS             NOD              32
SATT   .SYS         NOD CTG               6            20004
INIT   .SYS         NOD CTG             418
ERR    .ERR             CTG              16              604
SYSGEN.SIL          NOD CTG             204
RT11   .RTS             CTG              20              828


REFRESH suboption? CHANGE

SWAP.SYS changes?
SWAP.SYS is required on the system disk to  bring  up  timesharing.
It must be big enough to hold at least two jobs at the system  swap
max.  When the system is brought up,  SWAP.SYS will be in the third
swap file position.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

SWAP.SYS changes? YES

  Size?
  Type 'OLD' or <LF> to default to the minimum size of 64 blocks.
  Otherwise, enter the file size in 256 word blocks.

  Size? 10*28K

  Base?
  Type 'OLD', '0', or <LF> to let RSTS find a location.
  Enter a logical block number to locate the file at a specific
  place on the disk.

  Base? 20000

SWAP0.SYS changes?
This file may be used as an additional swapping file if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.
```

```
SWAP0.SYS changes? YES

  Size?
  Enter the file size in 256 word blocks.

  Size? 15*28K

  Base?
  Type 'OLD', '0', or <LF> to let RSTS find a location.
  Enter a logical block number to locate the file at a specific
  place on the disk.

  Base? 20000

SWAP1.SYS changes?
This file may be used as an additional swapping file if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

SWAP1.SYS changes? NO

SWAP3.SYS changes?
This file may be used as an additional swapping file if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

SWAP3.SYS changes? NO

OVR.SYS changes?
OVR.SYS may be used to hold the non-resident system code if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

OVR.SYS changes? NO

ERR.SYS changes?
ERR.SYS may be used to hold the system error message text if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

ERR.SYS changes? NO

BUFF.SYS changes?
BUFF.SYS is used for DECtape operations.
It must contain at least 3 blocks per supported DECtape.
BUFF.SYS is required on the system disk if DECtape is to be used.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

BUFF.SYS changes? NO

CRASH.SYS changes?
CRASH.SYS is used to hold a dump of the monitor's tables
if the system crashes and the crash dump option is enabled.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

CRASH.SYS changes? YES

  Size?
  Type 'OLD' or <LF> to default to the minimum size of 24 blocks.
  Otherwise, enter the file size in 256 word blocks.
```

```
    Size? 80

    Base?
    Type 'OLD', '0', or <LF> to let RSTS find a location.
    Enter a logical block number to locate the file at a specific
    place on the disk.

    Base? 0

  Other files?
  Type the NAME.EXT of a file to be created or deleted during
  this CHANGE operation.  Type <LF> if there are no more files.

  Other files?

  REFRESH suboption? EXIT

Option: DEFAULT

No defaults are currently set in SYSGEN.SIL

You currently have: JOB MAX = 2, SWAP MAX = 16K.

JOB MAX or SWAP MAX changes?

JOB MAX or SWAP MAX may be changed as follows:


 1) JOB MAX may never be greater than 2,  which  is  the  Job  maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory  (1K=1024  words),  may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N Jobs, where
       N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
    truncated to an integer.  The sum of the  N's  for  the  four  swap
    files  determines the number of Jobs which may log on.  This number
    may be increased on line by adding swap files (up to a  maximum  of
    4,  including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP  MAX  *  8]
    blocks long, so that it can hold two Jobs.

Type 'YES' to change JOB MAX or SWAP MAX.  Type 'NO' to leave the
maxima as they stand.  Any changes? YES

  New JOB MAX?

  Type 'NO' if you don't want to change the current JOB MAX.
  To enter a new JOB MAX, type a number between 1 and 2.

  New JOB MAX? 2

  New SWAP MAX?

  Type 'NO' if you don't want to change the current  SWAP MAX.
  To enter a new SWAP MAX, type a number between 8 and 31 (K).

  New SWAP MAX? 28

You currently have: JOB MAX = 2, SWAP MAX = 28K.

JOB MAX or SWAP MAX changes? NO
```

```
Run Time System?

Specify the name of the Run Time System to be used as the  system
default.  The named Run Time System must exist on the system disk
in account [0,1] with extension '.RTS'.

Directory of all valid run time systems:

RT11.RTS

Name of default Run Time System? RT11

Error message file?

Specify the name of a file in [0,1] with extension '.ERR'
which contains the RSTS/E error message text.

Directory of valid error message files:

ERR.ERR

Name of error message file? ERR

Installation name?

Enter the installation name as a string of up to 15 characters.

New installation name? RSTS/E SYSGEN

  Memory allocation table:

    0K: 00000000 - 00127777 (  22K) : EXEC
   22K: 00130000 - 00147777 (   4K) : RTS (RT11)
   26K: 00150000 - 00757777 (  98K) : USER
  124K: 00760000 - End              : NXM


  Table subortion?

  Valid table subortions are:

  LIST    List the current memory allocation table
  PARITY  List the parity memory configuration
  RESET   Let RSTS reset the default memory configuration
  LOCK    Lock out some memory
  UNLOCK  Unlock some locked memory
  RTS     Move the Run Time System to a special location
  MAP     Specify a portion of XBUF to be mapped with UMR's
  XBUF    Allocate extended buffer space for disk/message caching
  EXIT    (or <LF>) when you are satisfied with the table

  Only the first two characters need be typed

  Table subortion? EXIT

You currently have crash dump disabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.

Enable crash dump? YES

Mastape labelling default <none>?

Type 'ANSI' to select ANSI standard mastape labelling for system default.
Type 'DOS' to select DOS format mastape labelling for system default.
```

```
magtape labelling default <none>? DOS

Preferred clock <L>?

Choose the clock which, if available, should be used during timesharing.
Type 'L' to use the KW11-L line frequency clock.
Type 'P' to use the KW11-P programmable clock.
Type <LF> for no change.

Preferred clock <L>? L

Date format <ALPHABETIC>?

Type 'A' or 'N' to choose the format for the system date.
Type 'ALPHABETIC' for alphabetic date (e.g. 31-Dec-76).
Type 'NUMERIC' for numeric date (e.g. 76.12.31).
Type <LF> for no change.

Date format <ALPHABETIC>? A

Time format <AM/PM>?

Type 'AM' or '24' to choose the format for the system time.
Type 'AM/PM' for AM/PM format time (e.g. 01:30 PM).
Type '24-HOUR' for numeric time (e.g. 13:30).
Type <LF> for no change.

Time format <AM/PM>? AM/PM

Power fail delay <1>?
When power is restored after a power failure, RSTS/E will
delay the recovery for 1 to 300 seconds to allow all
devices to become ready.  Specify the number of seconds
you want to delay.

Power fail delay <1>? 300


Option: START

You currently have: JOB MAX = 2, SWAP MAX = 28K.

JOB MAX or SWAP MAX changes?

JOB MAX or SWAP MAX may be changed as follows:


 1) JOB MAX may never be greater than 2,  which  is  the  job  maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory  (1K=1024  words),  may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N jobs, where
        N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
    truncated to an integer.  The sum of the  N's  for  the  four  swap
    files  determines the number of jobs which may log on.  This number
    may be increased on line by adding swap files (up to a  maximum  of
    4,  including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP  MAX  *  8]
    blocks long, so that it can hold two jobs.

Type 'YES' to change JOB MAX or SWAP MAX.  Type 'NO' to leave the
maxima as they stand.  Any changes? NO
```

```
Any memory allocation changes?

If you wish to specify a certain portion of memory as unavailable to
RSTS or as dedicated buffer space, or if you wish to locate the Run Time
System at some special address (e.g. in MOS memory), answer 'YES'.  To
leave the memory allocation unchanged from the last specified table,
answer 'NO'.

Any memory allocation changes? NO

You currently have crash dump enabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.

Enable crash dump? YES

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
06:32 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 6:32 PM
DF0: disabled - no RF: controller
DS0: disabled - no RS: controller
DS1: disabled - no RS: controller
DL0: disabled - no RL: controller
DL1: disabled - no RL: controller
DM0: disabled - no RM: controller
DM1: disabled - no RM: controller
DP0: disabled - no RP: controller
DP1: disabled - no RP: controller
DR0: disabled - no RR: controller
DR1: disabled - no RR: controller
DB1: disabled - unit not present
LP0: disabled - no LP0: controller
MT0: disabled - no TM: controller
MT1: disabled - no TM: controller
MM0: disabled - no TU: controller
MM1: disabled - no TU: controller
MS0: disabled - no MS0: controller
MS1: disabled - no MS1: controller

19 devices disabled

?Can't find file or account
.MOUNT DK0:SYSGNG/RO
.R DK0:CREATE.SAV



  ^C
  HELLO 1/2
  Password:
  1 other user is logged in under this account

  .
  .ASSIGN DK0: IN

  .R IN:PIP.SAV
  *SY:$*.*<232>=IN:$LOGIN.SAV,$LOGOUT.SAV,$PIP.SAV
  *SY:$*.*<104>=IN:$UTILTY.SAV
  *SY:$*.*<104>=IN:$MACRO.SAV,$CREF.SAV,$LINK.SAV
  *SY:$*.*<104>=IN:$SILUS.SAV,$HOOK.SAV,$SYSGEN.SAV
```

```
*SY:$*.*<124>=IN:$SYSBAT.SAV
*SY:$*.*<104>=IN:$ONLPAT.SAV
*DK:$*.*< 40>=IN:$ERR.STB,$PIPSAV.TXT
*SY:[0,1]*.*<40>=IN:$TECO.RTS
*SY:[0,1]*.*/MO:16=SY:[0,1]TECO.RTS
*SY:$*.*<104>/RTS:TECO=IN:$TECO.TEC
*^C

.DEASSIGN IN

.DISMOUNT DK0:

.R LOGOUT
Confirm: Y
Saved all disk files; 576 blocks in use
Job 2 User 1,2 logged off KB1 at 22-Apr-79 06:33 PM
1 other user still logged in under this account
System RSTS V7.0-07 RSTS/E SYSGEN
Run time was 3 seconds
Elapsed time was 1 minute
Good evening



**22-Apr-79**


Beginning of RSTS/E  system  generation.


Questions come in long and short  forms.
If  you  are  familiar with them, answer
"S" for short; otherwise, answer "L" for
long form.

Form ?                              #S #     L

The  system  will  automatically  supply
answers to all of its prompts.  You have
the  option  of  accepting  the  answer,
supplying  a  different  answer,  or
requesting the full printed message. The
hardware answers will be meaningful only
if you  are  generating a system for the
computer  that you are currently running
on.  If you are generating a system  for
this  computer,  type "YES";  otherwise,
type "NO".

Same system ?                       #Y #     YES

The  RSTS/E  system  is  distributed  on
magtape;  RK05 (DK), RL01 (DL), and RK06
and RK07 (DM)  cartridge disks;  or  may
already  have  been  transferred  to the
system  disk (SY).  For magtape,  a dis-
tinction  must be made between the TU10,
TE10,  and  TS03 drives,  which use  the
device name "MT"; the TU16, TE16,  TU45,
```

```
and TU77 drives, which use the device
name "MM"; and the TS04 drive, which
uses the device name "MS". Enter the
type of distribution medium for this
system generation (MT, MM, MS, DK, DL,
DM, or SY).

Distribution medium ?              *DK*     DK

The generated system can be written onto
the current system disk (SY); another
disk drive (DF, DK, DL, DM, DP, DR, or
DB); TU10, TE10, or TS03 magtape (MT);
TU16, TE16, TU45, or TU77 magtape (MM);
TS04 magtape (MS); or DECtape (DT).
Using the current system disk (SY) as
the output medium is recommended only if
the system type is DM, DP, DR, or DB.

Output medium ?                    *SY*     SY

RF disk drives have limited storage cap-
acity. If an RF drive is being used as
the system disk during the SYSGEN pro-
cedure, files will have to be deleted
from that disk after they are used. When
the system disk is an RK05 or RL01 and
output to SY has been chosen, files will
also have to be deleted after they are
used to leave enough room for the system
library. Should files be deleted after
they are used (YES or NO)?

Delete files ?                     *NO*     YES

If there is a line printer available for
use during SYSGEN it may be used to
print the system load maps and,
optionally, to print assembly listings
of the system tables and terminal
service modules. If you have a printer
and want the assembly listings and/or
load maps printed during SYSGEN, answer
"YES". Otherwise answer "NO".

LP for SYSGEN ?                    *NO*     NO

This program can be used to generate a
monitor and/or a BASIC-PLUS Run-Time
System. Do you wish to generate a
monitor (YES or NO)?

Generate monitor ?                 *Y *     YES

The monitor Save Image Library (SIL)
will have a name of from 1 to 6 alpha-
numeric characters and an extension of
"SIL". Please specify the name you want.

Monitor name ?                     *RSTS*   RSTSV7

The system generation process can auto-
matically patch the generated monitor.
You must have a monitor patch file on
any RSTS/E file structured medium. Would
you like to automatically patch the
generated monitor (YES or NO)?
```

```
Monitor patching ?                    *??*    NO

You have the option of generating the
BASIC-PLUS Run-Time System in addition
to generating the monitor.  Do you want
to generate BASIC-PLUS at this time
(YES or NO)?

Generate BASIC-PLUS ?                 *Y *    YES

The BASIC-PLUS Save Image Library (SIL)
will have a name of from 1 to 6 alpha-
numeric characters and an extension of
"RTS".  Please specify the name you want.

BASIC-PLUS RTS name ?                 *BASIC* BASIC

The system generation process can auto-
matically patch the generated BASIC-
PLUS.  You must have a BASIC-PLUS patch
file on some RSTS/E file structured
medium.  Would you like to automatically
patch the generated BASIC-PLUS (YES
or NO)?

BASIC-PLUS patching ?                 *??*    NO

You have the option of installing RSX
or BASIC-PLUS-2 as the system default
run-time system.  Will you want RSX as
the system default run-time system
(YES or NO)?

RSX as default RTS ?                  *NO*    NO


Now you must specify the hardware con-
figuration on which this RSTS/E system
will run.


The next few questions deal with the
numbers and types of terminal interfaces
on the system.

Serial ASCII terminals connected direct-
ly to the computer and those connected
through leased private telephone lines
(not dial-up) may use either of two
classes of single line interfaces (or
several multiplexers, discussed later).
The first class includes the KL11, LC11,
DL11A, and DL11B interfaces.  Specify the
total number of these single line inter-
faces (1 to 16 - include the console
terminal).

KL11,LC11,DL11A,DL11B's ?             *01*    1

The second class of single line inter-
faces used to connect terminals locally
or through leased telephone lines (not
dial-up) includes the DL11C and DL11D
interfaces.  How many DL11C's and DL11D's
are on this system (0 to 31)?
```

```
DL11C, DL11D's ?                    *00*    0

There are two kinds of individual inter-
faces for automatic answer datasets used
on the dial-up telephone network.  The
first of these is the DC11.  How many
DC11-DA lines do you have (0 to 32)?

DC11's ?                            *00*    0

The second kind of individual line
dial-up interface is the DL11E.  How many
DL11E's are on this system (0 to 31)?

DL11E's ?                           *02*    2

Each DJ11 multiplexer can connect up to
16 terminals to the system.  Please enter
the total number of DJ11's attached to
this system (0 to 16).

DJ11's ?                            *00*    0

Each DH11 multiplexer can connect up to
16 terminals to the system.  Please enter
the total number of DH11's attached to
this system (0 to 16).

DH11's ?                            *00*    0

Each DZ11 multiplexer can connect up to
8 terminals to the system.  Please enter
the total number of DZ11's attached to
this system (0 to 16).

DZ11's ?                            *02*    2

For this DZ11 unit, enter the number of
lines which will be used now or in the
forseeable future.  A response of 8 will
permit all lines to be used.  If the num-
ber of lines enabled (n) is less than 8,
RSTS/E will not be confisured for and
will not recosnize lines n thru 7 on
this DZ11 unit.  Enter the number of
lines enabled (0 to 8).

DZ11 unit 00 lines enabled ?        *08*    8

DZ11 unit 01 lines enabled ?        *08*    8

The DZ11-A and DZ11-B include partial
modem control, while the DZ11-C and
DZ11-D do not.  If you have a DZ11-A or
DZ11-B and wish to include support
for datasets on DZ11's answer "YES".
Otherwise answer "NO".

Dataset support for DZ11's ?        *NO*    YES

Pseudo keyboards permit interactive jobs
to be run without tying up a real termi-
nal.  They are primarily intended for use
by a batch control program which feeds
commands to one or more pseudo keyboards
dedicated to runnins backsround tasks.
```

```
How many pseudo keyboards would you like
to have (1 to 127)?

Pseudo keyboards ?                #04#     8

RSTS/E is capable of supporting IBM 2741
compatible terminals on DL11D, DL11E,
and DC11 single line interfaces, or on
DH11 or DZ11 multiplexers. If you do not
want any 2741 support then answer "NO".
Otherwise answer "YES".

2741 support ?                    #NO#     NO

An optional feature of the RSTS/E termi-
nal service allows one job to interact
with several terminals through special
forms of the Record I/O GET and PUT
statements. This feature is useful in
applications where the same basic func-
tion is performed on several terminals
and a separate job for each is undesir-
able or at least inefficient. Would you
like to include this feature(YES or NO)?

Multi-terminal service ?          #Y #     YES

Echo control is an optional feature of
the RSTS/E terminal service which allows
any full duplex terminal to function
like a block mode terminal. This feature
enables a program to define fixed length
input fields and to defer echoing of all
typed characters until they are actually
requested. It is useful in data entry
applications or wherever the appearance
of terminal output must be precisely
controlled. Would you like to include
this feature in your system (YES or NO)?

Echo control ?                    #Y #     NO

The RSTS/E terminal service can be built
to respond to CTRL/T by printing a one-
line status report describing the job's
status. This report includes the job
name, RTS name, run state, job and RTS
sizes, and total and incremental CPU
times. The job is not disturbed when the
report is printed. Would you like to
have this feature in your monitor (YES
or NO)?

One-line status report ?          #Y #     YES


The next questions deal with the numbers
and kinds of disk units on this system.

The RF11 controller is used to control
up to 8 of the RS11 256K word fixed-head
disks. If this system has none of these
disks, answer NO; otherwise, answer YES.

RF/RS11's ?                       *NO*     NO

The RS04/RS03 disk system consists of an
RH11 device controller and from one to
```

```
eight RS03 (256K) or RS04 (512K word)
fixed-head disk drives. Please enter the
total number of RS03 and RS04 drives on
this system (0 to 8).

RS03/RS04's ?                          *00*     0

The RK11 controller is used to control
up to 8 of the RK05 1.2 million word
moving-head cartridge disk drives. Note
that an RK05F is equivalent to 2 RK05's.
How many RK05 drives are there (0 to 8)?

RK05's ?                               *08*     2

By using the overlapped seek driver, you
can increase the efficiency of disk I/O
at the expense of some memory. Type
YES to use the overlapped seek driver.
Type NO to use the non-overlapped seek
driver.

Overlapped seek ?                      *Y *     YES

The RL11 controller is used to control
any combination of up to four RL01 (2.6
million word) or RL02 (5.2 million word)
top loading cartridge disk drives. Enter
the total number of RL01 and RL02 drives
on this system (0 to 4).

RL01/RL02's ?                          *00*     0

The RK611 controller is used to control
any combination of up to eight RK06 (6
million word) or RK07 (12 million word)
top loading cartridge disk drives. Enter
the total number of RK06 and RK07 drives
on this system (0 to 8).

RK06/RK07's ?                          *00*     0

The RP11 controller is used to control
any combination of up to eight RP02 (10
million word) or RP03 (20 million word)
moving-head disk pack drives. Enter the
total number of RP02 and RP03 drives on
this system (0 to 8).

RP02/RP03's ?                          *00*     0

The RM02/3 disk system consists of an
RH11 controller and up to eight RM02
or RM03 moving-head disk pack drives.
Type the total number of RM02 or RM03
drives in this configuration (0 to 8).

RM02/RM03's ?                          *00*     0

The RP04/5/6 disk system consists of an
RH11 controller and any combination of
up to eight RP04 (44 million word), RP05
(44 million word), or RP06 (88 million
word) moving-head disk pack drives. Type
the total number of RP04, RP05, and RP06
drives in this configuration (0 to 8).
```

```
RP04/RP05/RP06's ?                    *01*     1


The next few questions deal with the
peripheral devices attached to this
RSTS/E system.

The TU16/TE16 mastape system consists of
an RH11 massbus interface, TM02/TM03
controller and from one to eight TU16,
TE16, TU45, or TU77 drives. If this
system has no TU16, TE16, TU45, or TU77
mastape drives answer 0; otherwise, how
many TU16, TE16, TU45, and TU77 drives
exist on this system (1 to 8)?

TU16/TE16/TU45/TU77's ?               *00*     0

The TM11/TMA11/TMB11 mastape controller
can support up to eight TU10, TE10, or
TS03 mastape drives. Please enter the
number of TU10, TE10, and TS03 drives on
this system (0 to 8).

TU10/TE10/TS03's ?                    *00*     0

The TS04 mastape system consists of a
TS11 controller and a TS04 drive. RSTS/E
supports up to 8 TS04 systems. If this
system has no TS04 mastape drives answer
0; otherwise, how many TS04's exist on
this system (1 TO 8)?

TS04's ?                              *00*     0

The TC11 DECtape controller can control
up to 8 single drives. If this system
has no DECtape at all, answer 0; other-
wise, how many single DECtape drives,
not TU56's, are there (1 to 8 - note
that each TU56 dual drive has 2).

DECtapes ?                            *00*     0

The TU58 DECtape-II system consists of
two drives and a controller, connected
through a DL11 interface. RSTS/E sup-
ports up to four TU58 systems for a
maximum of eight drives. Please enter
the number of TU58 drives attached to
this system (0 to 8).

TU58's ?                              *00*     0

The RSTS/E system can have up to eight
line printers of the LP11, LS11, or LV11
type. These printers are referred to by
the device names LP0: through LP7:. If
there is no line printer, answer 0;
otherwise, enter the number of printers
(1 to 8).

Printers ?                            *00*     0

The RX11 or RX211 floppy disk system
consists of a UNIBUS interface and an
RX01 (single density) or RX02 (double
```

```
density) floppy disk subsystem. The RX01
and RX02 each include  a disk controller
and  two  floppy  disk  drives.   RSTS/E
supports  up  to   four  RX11  or  RX211
systems for a maximum of  eight  drives.
Please  enter  the number of floppy disk
drives attached to this system (0 to 8).

RX01/RX02's ?                          *00*     0

Does  this  system  have a CR11  punched
card reader or a CM11 marked card reader
(YES or NO)?

CR11/CM11 card reader ?                *NO*     NO

Does this system have a CD11  high-speed
punched card reader (YES or NO)?

CD11 card reader ?                     *NO*     NO

Is there a high-speed paper tape  reader
(YES or NO)?

P.T. reader ?                          *NO*     NO

Is there a high-speed paper  tape  punch
(YES or NO)?

P.T. punch ?                           *NO*     NO

The DMC11  network link is a synchronous
communication  line interface which im-
lements the DDCMP line protocol in hard-
ware.  At least one unit is required for
DECnet communications.  How many DMC11's
are attached to this system (0 to 16)?

DMC11's ?                              *04*     4

DECnet/E is a set of  modules which im-
lement  the  network  services  protocol
and user interfaces  required for DECnet
communication.  The DECnet/E software is
sold and distributed as a separate pack-
age.  It is not included in the standard
RSTS/E kit.  Do you have  a DECnet/E kit
and wish  to include  DECnet  support in
this system (YES or NO)?

DECnet network support ?               *Y *     Y

The  DECnet/E  package is distributed on
magtape;  RK05 (DK), RL01 (DL), and RK06
and RK07 (DM)  cartridge disks;  or may
already  have  been  transferred  to the
system  disk  (SY).  For magtape,  a dis-
tinction  must be made between the TU10,
TE10,  and  TS03 drives,  which use  the
device name "MT"; the TU16, TE16,  TU45,
and  TU77  drives,  which use the device
name "MM"; and  the  TS04  drive,  which
uses  the  device  name "MS".  Enter the
type  of  distribution  medium  for  this
DECnet/E generation (MT, MM, MS, DK, DL,
DM, or SY).
```

```
DECnet/E distribution medium ?  #DK#     DK/A

The system generation process can auto-
matically patch the generated DECnet/E
support.  You must have a DECnet/E patch
file on any RSTS/E file structured
medium.  Would you like to automatically
patch the DECnet/E support (YES or NO)?

DECnet/E patching ?             #??#     NO

The KMC11 is an intelligent micro-
processor controller which, when loaded
with appropriate micro-codes, can be
used to control various types of peri-
pherals.  How many KMC11 units do you
have on this system (0 to 16)?

KMC11's ?                       #01#     0

The LP driver can be made to take advan-
tage of the extended buffer pool rather
than always buffering character output
from the small buffer pool.  This will
particularly benefit those systems which
have an increased contention for system
small buffers.  Do you want the extended
buffering for LP (YES or NO)?

Extended buffering for LP ?     #Y #     NO

The RSTS/E 2780 package emulates the
operation of the IBM 2780 Model 1 data
transmission terminal.  The package per-
mits the RSTS/E system to communicate
with any IBM system which supports the
device, or another RSTS/E 2780 system.
The 2780 package is sold and distributed
as a separate package.It is not included
in the standard RSTS/E kit.  Do you have
the 2780 package and wish to include it
in this system (YES or NO)?

2780 support ?                  #NO#     NO


The remaining questions deal with the
capacity and features of this RSTS/E
system provided at the system manager's
option.

An optional feature of RSTS/E is the
ability to read and write files which
are longer than 65535 blocks.  Including
large file support also reduces file
creation and access times and makes
disk update mode significantly faster.
Including large file support will make
your monitor 2K larger, and will use
more small buffers for each open file.
Do you want your system to handle large
files (YES or NO)?

Large files ?                   #Y #     YES

With sufficient hardware RSTS/E can han-
dle up to 63 simultaneous jobs.  What is
```

```
the maximum number of Jobs (JOBMAX) to
be used at this installation (1 to 63)?

Maximum Jobs ?                    #10#    20

Small buffers are 16 word blocks in mon-
itor storage that are dynamically allo-
cated as input and output buffers, file
parameter blocks, etc. Storage may be
allocated for 30 to 999 small buffers.
The recommended minimum is at least 10
for each possible job. How many small
buffers would this installation like to
have (30 to 999)?

Small buffers ?                   #260#   260

Logical names can be assigned to devices
on a system wide basis. The assignment
table consists of five words for each
assignment. Please enter the maximum
number of system wide logical assign-
ments that will be in use at any one
time (5-50).

System wide logicals ?            #10#    10

You can add special statistics gathering
code to the monitor. This code includes
tables that record job and disk transfer
statistics. Would you like to include
the statistics gathering code (YES or
NO)?

Monitor statistics ?              #NO#    NO

An optional feature of the RSTS/E system
allows the file processor (FIP) to use
free buffers, or dedicated sections of
memory (called the extended buffer pool)
to store directory information. This
improves the speed of directory process-
ing by not rereading frequently accessed
directory information. If you want FIP
buffering type YES, otherwise type NO.

FIP buffering ?                   #Y #    YES

An extended version of FIP buffering is
available under RSTS/E which allows jobs
to specify, on a file by file basis,
that user data files are to be cached in
the extended buffer pool.  This caching
is in addition to the FIP directory
buffering. Extended data buffering can
also cache clusters of data, and do read
ahead of user data.  It requires you to
allocate at least 2K words to the
extended buffer pool. Do you want to
include extended data buffering in your
system (YES or NO)?

Extended data buffering ?         #NO#    NO

At the cost of a physically larger
monitor, the disk drivers and their
subroutines can be built into a separate
```

```
monitor "phase". If you want to maximize
the size of your small buffer pool, you
should answer "YES". Build monitor with
a separate disk driver phase(YES or NO)?

Disk driver phase ?                 *Y *     NO

An optional feature of RSTS/E allows
programs to reduce I/O for overlaying by
attaching to shareable memory-resident
code. If you have at least 124K words of
memory, and intend to use the RMS-11K
Resident Library, answer 'YES'.

Resident libraries ?                *Y *     NO

The RSTS/E monitor can be made to take
over some of the function of the RSX Run
Time System. Programs which normally run
under the RSX Run-Time System don't need
any run time system, so they can grow to
31K, or use the address space for a
resident library. This option makes the
monitor about 1K larger. Do you want to
include RSX directives in your monitor
(YES or NO)?

RSX directives ?                    *NO*     NO

If there is sufficient memory available
on this system, the most frequently used
non-resident disk handling code can be
made resident in order to provide better
system performance. Should this disk
processing be done by resident code (YES
or NO)?

Resident disk handling ?            *Y *     YES

The routines to implement the simple SYS
calls are normally non-resident. Overall
system performance can be improved by
making this code resident. Do you want
the simple SYS call code resident (YES
or NO)?

Resident simple SYS calls ?         *NO*     NO

Non-resident code is used to delete or
rename a file. If you want the file
delete/rename code to be resident type
"YES", otherwise type "NO".

Resident file delete/rename ?       *NO*     NO

Non-resident code is used to do logins,
attaches, and assign attributes. If you
want the login, attach, and attribute
code resident, type "YES", else answer
"NO".

Res. login/attach/attribute ?       *NO*     NO

Non-resident code is used to list disk
directories (CATALOG command) and do
file lookups. If you want the directory
lister and file lookup code resident,
type "YES", otherwise answer "NO".
```

```
Resident catalog/lookup ?          #NO#     NO


The following questions deal with the
BASIC-PLUS run-time system

Will this software run on a computer
with a floating point processor (YES
or NO)?

FPP ?                              *NO*     NO

Will this software run on a computer
with the floating instruction set
(YES or NO)?

FIS ?                              *NO*     NO

Floating point numbers are represented
internally as two 16-bit words, giving
seven significant digits. It is possible
to maintain 17 significant digits by us-
ing 4 words per number. The four word
math packages also include the scaled
arithmetic feature. Would this instal-
lation prefer to use 2 or 4 word math?

Math precision ?                   #02#     4

It is possible to save space in the
BASIC-PLUS system by omitting the loga-
rithmic functions SQR,EXP,LOG,and LOG10,
if they are not needed.Does this instal-
lation need to compute these functions
(YES or NO)?

Log functions ?                    #Y #     YES

It is possible to save space in the
BASIC-PLUS system by omitting the trigo-
nometric functions SIN,COS,TAN, and ATN,
if they are not needed.Does this instal-
lation need to compute these functions
(YES or NO)?

Trig functions ?                   #Y #     YES

Special output formatting can be done
using the "PRINT USING" statement.
Would this installation like to have
this optional feature (YES or NO)?

Print using ?                      #Y #     NO

BASIC-PLUS permits the user to operate
on an entire matrix using just a single
statement. These statements are the
"MAT" statements. Would this installa-
tion like to have this optional feature
(YES or NO)?

Matrices ?                         #NO#     NO

An optional feature of BASIC-PLUS allows
arithmetic operations to be performed on
numbers represented by strings. This
```

```
feature  can be used  to obtain  greater
accuracy  in arithmetic  operations.  Do
you want string arithmetic (YES or NO)?

String arithmetic ?                $NO$     NO


The system generation  dialog is finish-
ed. If you have any special requirements
which require editing the generated file
CONFIG.MAC(system configuration file) or
SYSGEN.CTL(batch control file)  you  may
do it now.  When  ready type "R SYSBAT".

.R SYSBAT


SYSGEN  batch  processing  has  started.
If any problems develop during the batch
process  it  may  be aborted  by  typing
"Control/C". To restart type "R SYSBAT".




  ^C
  HELLO 1/2
  Password:
  1 other user is logged in under this account

  .
  .SIZE 20


MOUNT AN-C887A-BC (DECNET PACKAGE) ON A DISK DRIVE

READY AND WRITE PROTECT THE DRIVE

Mount DK:"DECNTA"-write locked
Unit ? 1
  .ASSIGN  DK1: DECNTA

  .R PIP.SAV
  **.*=DECNTA:$NSPSUB.OBJ,$NSP.OBJ,$NET.OBJ
  *^C


Dismount DK1:
  .DEASSIGN  DECNTA


MOUNT AN-2771G-BC ON A DISK DRIVE

READY AND WRITE PROTECT THE DRIVE

Mount DK:"SYSGNG"-write locked
Unit ? 0
  .ASSIGN  DK0: SYSGNG

  .ASSIGN SYSGNG: IN

  .R PIP.SAV
  **.*=IN:$COMMON.MAC
  *SY:$*.*/PR:NOWARN=IN:$SYSLIB.OBJ
```

```
**.*=IN:$OVLHD.OBJ
**.*=IN:$LIBR.SAV,$PATCH.SAV,$PAT.SAV
**.*=IN:$MINCOP.BAS
*^C

.R PIP.SAV
*TBL.OBJ,TTDINT.OBJ,TTDVR.OBJ/DE:NOWARN
*TBL.LST,TTDINT.LST,TTDVR.LST/DE:NOWARN
*RSTS.SAV,TER.SAV,DSK.SAV/DE:NOWARN
*EMT.SAV,FIP.SAV,RSX.SAV,OVR.SAV/DE:NOWARN
*RSTS.MAP,TER.MAP,DSK.MAP/DE:NOWARN
*EMT.MAP,FIP.MAP,RSX.MAP,OVR.MAP/DE:NOWARN
*RSTS.STB,TER.STB,DSK.STB/DE:NOWARN
*EMT.STB,FIP.STB,RSX.STB,OVR.STB/DE:NOWARN
*NSP.SAV,TRN.SAV,XMDVR.SAV,RJ2780.SAV/DE:NOWARN
*NSP.MAP,TRN.MAP,XMDVR.MAP,RJ2780.MAP/DE:NOWARN
*NSP.STB,TRN.STB,XMDVR.STB,RJ2780.STB/DE:NOWARN
*^C

.R MACRO.SAV
*TTDVR=IN:$COMMON,$KERNEL,DK:CONFIG,IN:$CHECK,$KBDEF,$TTDVR
ERRORS DETECTED:  0
*^C

.R MACRO.SAV
*TTDINT=IN:$COMMON,$KERNEL,DK:CONFIG,IN:$CHECK,$KBDEF,$TTDINT
ERRORS DETECTED:  0
*^C

.R MACRO.SAV
*TBL=IN:$COMMON,$KERNEL,DK:CONFIG,IN:$CHECK,$TBL
ERRORS DETECTED:  0
*^C

.R LINK.SAV
*RSTS/Z,RSTS/A/W,RSTS=TBL,$ERR.STB/X/B:0/E:#20200/U:#1000/I/C
*NSPSUB/C
*TTDINT/C
*IN:$RSTS
Extend section? MORBUF
Round section? MORBUF
Library search? SYDLRG
Library search? BUF
Library search? ALLDSK
Library search? DKSEEK
Library search?
*^C

.R LINK.SAV
*TER/Z,TER/A/W,TER=IN:$TER,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*TTDVR/C
*IN:$RSTS
Round section? TERPAT
Library search? TTSYST
Library search?
*^C

.R LINK.SAV
*XMDVR/Z,XMDVR/A/W,XMDVR=IN:XMP,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*IN:$RSTS
Round section? XMDPAT
Library search? XMDVRM
Library search?
*^C

.R LINK.SAV
```

```
*EMT/Z,EMT/A/W,EMT=IN:$EMT,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*IN:$RSTS
Round section? EMTPAT
Library search?
*^C

.R LINK.SAV
*FIP/Z,FIP/A/W,FIP=IN:$FIPLRG,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*IN:$RSTS
Round section? FIPPAT
Library search? OPL
Library search? SND
Library search?
*^C

.R LINK.SAV
*NSP/Z,NSP/A/W,NSP=NSP,FIP.STB/X/B:#117000/U:#1000
Round section? NSPPAT
*^C

.R LINK.SAV
*OVR/Z,OVR/A/W,OVR=IN:$OVRLRG,DK:NSP.STB/X/B:#1000/C
*NET/C
*IN:$RSTS
*^C

.R PIP.SAV
*TBL.OBJ,TTDINT.OBJ,TTDVR.OBJ/DE
*NSPSUB.OBJ,NSP.OBJ,NET.OBJ/DE
*^C

.R SILUS.SAV
*SY0:[0,1]RSTSV7.SIL,TT:=RSTS,TER/M,EMT/M,FIP/M/C
*XMDVR/M/C
*NSP/M/C
*OVR/M/C
*IN:$ODT,$DEFALT
Directory of SIL RSTSV7.SIL on 22-Apr-79 at 07:42 PM

 Name    Ident     Load     Size   Transfer Total

RSTS     07.007   000000   067000   000001    14K
TER      07.007   120000   015000   000001    17K
EMT      07.007   120000   016000   000001    21K
FIP      07.007   120000   023000   000001    26K
XMP      07.007   120000   005000   000001    27K
NSP      06C.00   120000   020000   000001    31K
OVR      07.007   002000   100000   000001    47K
ODT      07.007   140000   012520   142522    50K
DEFALT   07.007   001000   002000   000001    50K

Resident monitor size is 31K (with 261 small buffers)
512 small buffers can be added to this system (773 total)
32 small buffers can be added without a size change (293 total)



*^C

.RUN LIBR.SAV
*SY:$SYSLIB=SY:$SYSLIB,DK:OVLHD/U
*^C

.R PIP.SAV
```

```
*RSTS.SAV,RSTS.STB/DE
*TER.SAV,TER.STB/DE
*EMT.SAV,EMT.STB/DE
*FIP.SAV,FIP.STB/DE
*XMDVR.SAV,XMDVR.STB/DE
*OVR.SAV,OVR.STB/DE
*NSP.SAV,NSP.STB/DE
*^C

.R PIP.SAV
*BASIC.SAV,BASIC.STB/DE:NOWARN
*^C

.R LINK.SAV
*BASIC/Z,BASIC/A/W,BASIC=IN:$RTS,DK:$ERR.STB/X/H:#177776/U:#4000/C
*IN:$MA4/C
*IN:$XL4/C
*IN:$XT4/C
*IN:$IO/C
*IN:$SN/C
*IN:$VE
Round section? PA
*^C

.R SILUS.SAV
*BASIC.RTS,TT:=BASIC
Directory of SIL BASIC .RTS on 22-Apr-79 at 07:43 PM

 Name    Ident     Load     Size   Transfer Total

BASIC    07.007   104000   073776   000001    15K




*^C

.R PIP.SAV
*BASIC.SAV,BASIC.STB/DE
*^C

.DEASSIGN IN


Dismount DK0:
.DEASSIGN  SYSGNG

.R PIP.SAV
*SY0:[0,1]*.*/MODE:16.=BASIC.RTS
*BASIC.RTS/DE
*^C

.R LOGOUT
Confirm: Y
Saved all disk files; 1008 blocks in use
Job 2 User 1,2 logged off KB1 at 22-Apr-79 07:43 PM
1 other user still logged in under this account
System RSTS V7.0-07 RSTS/E SYSGEN
Run time was 12 minutes, 53.2 seconds
Elapsed time was 17 minutes
Good evening
```

```
Batch Job completed.

.R UTILTY.SAV
*NO LOGINS
*SHUTUP


RSTS V7.0-07 RSTS/E SYSGEN (DBO)

Option: INSTALL RSTSV7


Option: DEFAULT

No defaults are currently set in RSTSV7.SIL

You currently have: JOB MAX = 20, SWAP MAX = 16K.

JOB MAX or SWAP MAX changes?

JOB MAX or SWAP MAX may be changed as follows:


 1) JOB MAX may never be greater than 20, which is the Job maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory (1K=1024 words), may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N Jobs, where
       N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
    truncated to an integer. The sum of the N's for the four swap
    files determines the number of Jobs which may log on. This number
    may be increased on line by adding swap files (up to a maximum of
    4, including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP MAX * 8]
    blocks long, so that it can hold two Jobs.

Type 'YES' to change JOB MAX or SWAP MAX. Type 'NO' to leave the
maxima as they stand. Any changes? YES

  New JOB MAX? 20

  New SWAP MAX?

  Type 'NO' if you don't want to change the current SWAP MAX.
  To enter a new SWAP MAX, type a number between 8 and 31 (K).

  New SWAP MAX? 28

You currently have: JOB MAX = 20, SWAP MAX = 28K.

JOB MAX or SWAP MAX changes? NO

Run Time System?

Specify the name of the Run Time System to be used as the system
default. The named Run Time System must exist on the system disk
in account [0,1] with extension '.RTS'.

Directory of all valid run time systems:

RT11.RTS
BASIC.RTS
```

```
Name of default Run Time System? BASIC

Error message file?

Specify the name of a file in [0,1] with extension '.ERR'
which contains the RSTS/E error message text.

Directory of valid error message files:

ERR.ERR

Name of error message file? ERR

Installation name?

Enter the installation name as a string of up to 15 characters.

New installation name? Small System

  Memory allocation table:

    0K: 00000000 - 00173777 (  31K) : EXEC
   31K: 00174000 - 00267777 (  15K) : RTS (BASIC)
   46K: 00270000 - 00757777 (  78K) : USER
  124K: 00760000 - End              : NXM


  Table subportion? EXIT

You currently have crash dump disabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.

Enable crash dump? YES

Preferred clock <L>?

Choose the clock which, if available, should be used during timesharing.
Type 'L' to use the KW11-L line frequency clock.
Type 'P' to use the KW11-P programmable clock.
Type <LF> for no change.

Preferred clock <L>? L

Date format <ALPHABETIC>?

Type 'A' or 'N' to choose the format for the system date.
Type 'ALPHABETIC' for alphabetic date (e.g. 31-Dec-76).
Type 'NUMERIC' for numeric date (e.g. 76.12.31).
Type <LF> for no change.

Date format <ALPHABETIC>? A

Time format <AM/PM>?

Type 'AM' or '24' to choose the format for the system time.
Type 'AM/PM' for AM/PM format time (e.g. 01:30 PM).
Type '24-HOUR' for numeric time (e.g. 13:30).
Type <LF> for no change.

Time format <AM/PM>? AM

Power fail delay <1>?
When power is restored after a power failure, RSTS/E will
```

```
delay the recovery for 1 to 300 seconds to allow all
devices to become ready.  Specify the number of seconds
you want to delay.

Power fail delay <1>? 300


Option: START

You currently have: JOB MAX = 20, SWAP MAX = 28K.

JOB MAX or SWAP MAX changes?

JOB MAX or SWAP MAX may be changed as follows:


 1) JOB MAX may never be greater than 20,  which  is  the  Job  maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory  (1K=1024  words),  may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N Jobs, where
       N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
    truncated to an integer.  The sum of the  N's  for  the  four  swap
    files  determines the number of Jobs which may log on.  This number
    may be increased on line by adding swap files (up to a  maximum  of
    4,  including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP  MAX  *  8]
    blocks long, so that it can hold two Jobs.

Type 'YES' to change JOB MAX or SWAP MAX.  Type 'NO' to leave the
maxima as they stand.  Any changes? NO

Any memory allocation changes?

If you wish to specify a certain portion of  memory  as  unavailable  to
RSTS or as dedicated buffer space, or if you wish to locate the Run Time
System at some special address (e.g.  in MOS memory), answer 'YES'.   To
leave  the  memory  allocation  unchanged from the last specified table,
answer 'NO'.

Any memory allocation changes? YES

  Table subportion? LIST

  Memory allocation table:

     0K: 00000000 - 00173777 (  31K) : EXEC
    31K: 00174000 - 00267777 (  15K) : RTS (BASIC)
    46K: 00270000 - 00757777 (  78K) : USER
   124K: 00760000 - End              : NXM


  Table subportion? XBUF

    Extended buffer address range is? 46K+8

  Table subportion? EXIT

You currently have crash dump enabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.
```

```
Enable crash dump? YES

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
08:08 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 8:08 PM
?Can't find file or account
?Program lost-Sorry

Ready

MOUNT DK0:SYSL1G/RO

Ready

RUN DK0:$BUILD
BUILD   V7.0-07 RSTS V7.0-07 Small System
System Build <No> ? YES
Source Input Device <DK0:> ? DK0:
Library Output Device <SY:> ? SY:
Target System Device <SY0:> ? SY0:
Library Account <[1,2]> ? [1,2]

*** Copying file DK0:[1,2]BUILD.CTL to BLD01.TMP ***

Locate logical 'LB:' on <SY:[1,1]> ? SY:[1,208]

%Can't find file or account - SY:[1,208]
Attempt to create account SY:[1,208] <No>?
Account SY:[1,208] created with your password
Function (Build/Patch, Patch, Build) <Build/Patch> ? BUILD
Run-Time System <BASIC > ? BASIC
Locate ERROR Package on <SY:[1,2]> ? SY:[1,27]

%Can't find file or account - SY:[1,27]
Attempt to create account SY:[1,27] <No>? YES
Account SY:[1,27] created with your password
Additional Control File is <None> ?
COMPILE SY:[1,2]BUILD
OLD DK0:[1,2]LOGIN.BAS
COMPILE SY0:[1,2]LOGIN<232>
OLD DK0:[1,2]ATPK.BAS
COMPILE SY:[1,2]ATPK
RUN SY:[1,2]ATPK
BLD01.TMP/RTS:[0,1]BASIC.RTS/LOG/DEL

Ready


Ready


Ready


Ready


Ready


Ready

ATPK    V7.0-07 RSTS V7.0-07 Small System
*
Ready
```

```
ASSIGN SY0:SYSDSK

Ready

ASSIGN SY:SYSTEM

Ready

ASSIGN [1,2]

Ready

ASSIGN DK0:INPUT

Ready

!********** BUILD.CTL - STANDARD LIBRARY PROGRAMS
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.



SCALE 0

Ready

OLD DK0:[1,2]CPATCH.BAS

Ready

COMPILE SY:[1,2]CPATCH

Ready

SCALE 0

Ready

OLD DK0:[1,2]AUTOED.BAS

Ready

COMPILE SY:[1,2]AUTOED

Ready


SCALE 0

Ready

OLD DK0:[1,2]BUILD .BAS

Ready

COMPILE SY:[1,2]BUILD

Ready

SCALE 0

Ready
```

```
OLD DK0:[1,2]ATPK.BAS

Ready

COMPILE SY:[1,2]ATPK

Ready

SCALE 0

Ready

OLD DK0:[1,2]LOGIN.BAS

Ready

COMPILE SY0:[1,2]LOGIN<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]LOGOUT.BAS

Ready

COMPILE SY0:[1,2]LOGOUT<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]PATCPY.BAS

Ready

COMPILE SY:[1,2]PATCPY

Ready

SCALE 0

Ready

OLD DK0:[1,2]PBUILD.BAS

Ready

COMPILE SY:[1,2]PBUILD

Ready

SCALE 0

Ready

OLD DK0:[1,2]UTILTY.BAS
```

```
Ready

COMPILE SY0:[1,2]UTILTY

Ready

SCALE 0

Ready

OLD DK0:[1,2]INIT  .BAS

Ready

COMPILE SY0:[1,2]INIT

Ready

SCALE 0

Ready

OLD DK0:[1,2]SHUTUP.BAS

Ready

COMPILE SY0:[1,2]SHUTUP

Ready

SCALE 0

Ready

OLD DK0:[1,2]ERRBLD.BAS

Ready

COMPILE SY:[1,27]ERRBLD

Ready

RUN SY:[1,27]ERRBLD
ERRBLD  V7.0-07 RSTS V7.0-07 Small System

Ready

SCALE 0

Ready

OLD DK0:[1,2]ERRINT.BAS

Ready

COMPILE SY:[1,27]ERRINT

Ready

SCALE 0

Ready
```

```
OLD DK0:[1,2]ERRCPY.BAS
Ready
COMPILE SY:[1,2]ERRCPY
Ready

SCALE 0
Ready
OLD DK0:[1,2]DIRECT.BAS
Ready
COMPILE SY:[1,2]DIRECT<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]TTYSET.BAS
Ready
COMPILE SY:[1,2]TTYSET<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]SYSTAT.BAS
Ready
COMPILE SY:[1,2]SYSTAT<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]EDIT  .BAS
Ready
COMPILE SY:[1,2]EDIT<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]EDITCH.BAS
Ready
```

```
COMPILE SY:[1,2]EDITCH<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]ERRDIS.BAS
Ready
COMPILE SY:[1,27]ERRDIS
Ready

SCALE 0
Ready
OLD DK0:[1,2]ERRDET.BAS
Ready
COMPILE SY:[1,27]ERRDET
Ready

SCALE 0
Ready
OLD DK0:[1,2]ANALYS.BAS
Ready
COMPILE SY:[1,27]ANALYS
Ready

SCALE 0
Ready
OLD DK0:[1,2]ANALY1.BAS
Ready
COMPILE SY:[1,27]ANALY1
Ready

SCALE 0
Ready
OLD DK0:[1,2]ODT    .BAS
Ready
COMPILE SY:[1,2]ODT
Ready
```

```
SCALE 0

Ready

OLD DK0:[1,2]REACT .BAS

Ready

COMPILE SY:[1,2]REACT

Ready

SCALE 0

Ready

OLD DK0:[1,2]REORDR.BAS

Ready

COMPILE SY:[1,2]REORDR

Ready

SCALE 0

Ready

OLD DK0:[1,2]DSKINT.BAS

Ready

COMPILE SY:[1,2]DSKINT

Ready

SCALE 0

Ready

OLD DK0:[1,2]UMOUNT.BAS

Ready

COMPILE SY:[1,2]UMOUNT<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]COPY  .BAS

Ready

COMPILE SY:[1,2]COPY<40>

Ready

SCALE 0

Ready
```

```
OLD DK0:[1,2]FILCOM.BAS
Ready
COMPILE SY:[1,2]FILCOM<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]QUOLST.BAS
Ready
COMPILE SY:[1,2]QUOLST<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]MONEY .BAS
Ready
COMPILE SY:[1,2]MONEY<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]GRIPE .BAS
Ready
COMPILE SY:[1,2]GRIPE<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]TALK  .BAS
Ready
COMPILE SY:[1,2]TALK<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]PLEASE.BAS
Ready
```

```
COMPILE SY:[1,2]PLEASE<232>

Ready


SCALE 0

Ready

OLD DK0:[1,2]INUSE .BAS

Ready

COMPILE SY:[1,2]INUSE<40>

Ready


SCALE 0

Ready

OLD DK0:[1,2]SWITCH.BAS

Ready

COMPILE SY:[1,2]SWITCH<232>

Ready


RUN SY:[1,2]PIP.SAV
*SY:[1,2]ONLCLN.SAV/RTS:RT11=DK0:[1,2]ONLCLN.SAV
*^Z

Ready


RUN SY:[1,2]PIP.SAV
*SY:[1,2]NOTICE.TXT<40> /PR:NOWARN=DK0:[1,2]NOTICE.TXT/AS/NO
*SY:[1,2]HELP  .TXT<40> /PR:NOWARN=DK0:[1,2]HELP  .TXT/AS/NO
*SY:[1,2]START.TMP=KB:
@SY0:[1,2]RTS.CMD
@SY0:[1,2]TTY.CMD
;@SPOOL.CMD[1,2]
@SY0:[1,2]CCL.CMD
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,208]LB
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,27]ERRINT
FORCE KB0: 100
FORCE KB0: NO
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
^Z
*SY0:[1,2]START .CTL     /PR:NOWARN=SY:[1,2]START.TMP/AS
*SY:[1,2]START .TMP      /DE:NOWARN
*SY0:[1,2]TTY   .CMD     /PR:NOWARN=DK0:[1,2]TTY   .CMD/AS/NO
*SY0:[1,2]RTS   .CMD     /PR:NOWARN=DK0:[1,2]RTS   .CMD/AS/NO
*SY0:[1,2]CCL   .CMD     /PR:NOWARN=DK0:[1,2]CCL   .CMD/AS/NO
*SY:[1,2]CRASH .TMP                =KB:
```

```
@SY0:[1,2]RTS.CMD
@SY0:[1,2]ANALYS.CMD
@SY0:[1,2]CLEAN.CMD
@SY0:[1,2]TTY.CMD
;@SPOOL.CMD[1,2]
@SY0:[1,2]CCL.CMD
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,208]LB
FORCE KB0: EXIT
FORCE KB0: RUN SY:[1,2]QUE
FORCE KB0: Q SY:[1,27]ANALYS.DMP/DE
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,27]ERRINT
FORCE KB0: 100
FORCE KB0: YES
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
^Z
*SY0:[1,2]CRASH .CTL     /PR:NOWARN=SY:[1,2]CRASH .TMP/AS
*SY:[1,2]CRASH .TMP      /DE:NOWARN
*SY:[1,2]ANALYS.TMP                =KB:
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,27]ANALYS
FORCE KB0: [0,1]CRASH.SYS
FORCE KB0: SY:[1,27]ANALYS.DMP/WIDE
FORCE KB0: SY:[1,27]ERRCRS.FIL
FORCE KB0: BYE/F
ATTACH
^Z
*SY0:[1,2]ANALYS.CMD     /PR:NOWARN=SY:[1,2]ANALYS.TMP/AS/NO
*SY:[1,2]ANALYS.TMP      /DE:NOWARN
*SY0:[1,2]CLEAN .CMD     /PR:NOWARN=DK0:[1,2]CLEAN .CMD/AS/NO
*SY:[1,2]UTILTY.HLP                =DK0:[1,2]UTILTY.HLP/AS/NO
*SY:[1,2]DIRECT.HLP<40>            =DK0:[1,2]DIRECT.HLP/AS/NO
*SY:[1,27]ERRDIS.HLP               =DK0:[1,2]ERRDIS.HLP/AS/NO
*SY:[1,2]ACCT   .SYS<188>         /PR:NOWARN=DK0:[1,2]ACCT   .SYS/AS/NO
*SY:[1,2]COPY   .HLP<40>           =DK0:[1,2]COPY   .HLP/AS/NO
*^Z

Ready

RUN SY:[1,2]UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Small System
#LOGINS
#EXIT

Ready



!*** BUILD Complete ***

Ready

RUN $BUILD
BUILD   V7.0-07 RSTS V7.0-07 Small System
System Build <No> ? NO
Source Input Device <SY:> ? DK0:
```

```
Library Output Device <SY:> ? SY:
Target System Device <SY0:> ? SY0:
Library Account <[1,2]> ? [1,2]
Control File is ? SPLER

*** Copying file DK0:[1,2]SPLER.CTL to BLD01.TMP ***

Function (Build/Patch, Patch, Build) <Build/Patch> ? BUILD
Run-Time System <BASIC > ? BASIC
Locate SPOOLING Package on <SY:[1,2]> ? SY:[1,111]

%Can't find file or account - SY:[1,111]
Attempt to create account SY:[1,111] <No>? YES
Account SY:[1,111] created with your password
Additional Control File is <None> ?

Ready

ASSIGN SY0:SYSDSK

Ready

ASSIGN SY:SYSTEM

Ready

ASSIGN [1,2]

Ready

ASSIGN DK0:INPUT

Ready


!********** SPLER.CTL - SPOOLING PROGRAM BUILD
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.



SCALE 0

Ready

OLD DK0:[1,2]QUE.BAS

Ready

COMPILE SY:[1,2]QUE    <232>

Ready


SCALE 0

Ready

OLD DK0:[1,2]QUEMAN.BAS

Ready

COMPILE SY:[1,111]QUEMAN

Ready


SCALE 0
```

```
Ready

OLD DK0:[1,2]QUMRUN.BAS

Ready

COMPILE SY:[1,111]QUMRUN

Ready

SCALE 0

Ready

OLD DK0:[1,2]OPSER.BAS

Ready

COMPILE SY:[1,111]OPSER

Ready

SCALE 0

Ready

OLD DK0:[1,2]OPSRUN.BAS

Ready

COMPILE SY:[1,111]OPSRUN

Ready

SCALE 0

Ready

OLD DK0:[1,2]CHARS .BAS

Ready

COMPILE SY:[1,111]CHARS

Ready

RUN SY:[1,111]CHARS
CHARS   V7.0-07 RSTS V7.0-07 Small System

Ready

SCALE 0

Ready

OLD DK0:[1,2]SPOOL .BAS

Ready

COMPILE SY:[1,111]SPOOL

Ready
```

```
SCALE 0

Ready

OLD DK0:[1,2]SPLIDL.BAS

Ready

COMPILE SY:[1,111]SPLIDL

Ready

SCALE 0

Ready

OLD DK0:[1,2]SPLRUN.BAS

Ready

COMPILE SY:[1,111]SPLRUN

Ready

SCALE 0

Ready

OLD DK0:[1,2]BATDCD.BAS

Ready

COMPILE SY:[1,111]BATDCD

Ready

RUN SY:[1,111]BATDCD
BATDCD  V7.0-07 RSTS V7.0-07 Small System

Ready

SCALE 0

Ready

OLD DK0:[1,2]BATCH .BAS

Ready

COMPILE SY:[1,111]BATCH

Ready

SCALE 0

Ready

OLD DK0:[1,2]BATIDL.BAS

Ready

COMPILE SY:[1,111]BATIDL
```

```
Ready

SCALE 0

Ready

OLD DK0:[1,2]BATDEC.BAS

Ready

COMPILE SY:[1,111]BATDEC

Ready

SCALE 0

Ready

OLD DK0:[1,2]BATRUN.BAS

Ready

COMPILE SY:[1,111]BATRUN

Ready

RUN SY:[1,2]PIP.SAV
*SY:[1,2]SPOOL .TMP=KB:
DETACH
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,111]OPSER
FORCE KB: DETACH
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,111]QUEMAN
FORCE KB: DETACH/PRIORITY:0
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,111]SPOOL
FORCE KB: LP0:/HEAD:2
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,111]BATCH
FORCE KB: BA0:/ERROR:FATAL/NOQUEUE/NODELETE
ATTACH
^Z
*SY0:[1,2]SPOOL.CMD/PR:NOWARN=SY:[1,2]SPOOL.TMP/AS
*SY:[1,2]SPOOL.TMP/DE:NOWARN
*^Z

Ready

RUN SY:[1,2]CPATCH
CPATCH  V7.0-07 RSTS V7.0-07 Small System
File to patch - SY0:[1,2]START.CTL
*KB:
*:G/;@SPOOL.CMD/-11C/@SPOOL.CMD/EX
Patch from _KB:[1,2].CMD complete.
*^Z
File to patch - ^Z

Ready

RUN SY:[1,2]CPATCH
CPATCH  V7.0-07 RSTS V7.0-07 Small System
File to patch - SY0:[1,2]CRASH.CTL
```

```
$KB:
*:G/;@SPOOL.CMD/-11C/@SPOOL.CMD/EX
Patch from _KB:[1,2].CMD complete.
$^Z
File to patch - ^Z

Ready



!*** BUILD Complete ***

Ready



RUN $UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Small System
#DISMOUNT DK0:
#^Z

Ready

MOUNT DK0:SYSL2G/RO

Ready

RUN $BUILD
BUILD   V7.0-07 RSTS V7.0-07 Small System
System Build <No> ? NO
Source Input Device <SY:> ? DK0:
Library Output Device <SY:> ? SY:
Target System Device <SY0:> ? SY0:
Library Account <[1,2]> ? [1,2]
Control File is ? BIGPRG

*** Copying file DK0:[1,2]BIGPRG.CTL to BLD01.TMP ***

Function (Build/Patch, Patch, Build) <Build/Patch> ? BUILD
Run-Time System <BASIC > ? BASIC
Additional Control File is <None> ? BACKUP

*** Copying file DK0:[1,2]BACKUP.CTL to BLD01.TMP ***

Locate BACKUP Package on <SY:[1,2]> ? SY:[1,56]

%Can't find file or account - SY:[1,56]
Attempt to create account SY:[1,56] <No>? YES
Account SY:[1,56] created with your password
Additional Control File is <None> ? DEVTST

*** Copying file DK0:[1,2]DEVTST.CTL to BLD01.TMP ***

Locate DEVTST Package on <SY:[1,2]> ? SY:[1,117]

%Can't find file or account - SY:[1,117]
Attempt to create account SY:[1,117] <No>? YES
Account SY:[1,117] created with your password
Additional Control File is <None> ?

Ready

ASSIGN SY0:SYSDSK

Ready
```

```
ASSIGN SY:SYSTEM

Ready

ASSIGN [1,2]

Ready

ASSIGN DK0:INPUT

Ready

!********** BIGPRG.CTL - LARGE PROGRAM BUILD
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.


SCALE 0

Ready

OLD DK0:[1,2]DISPLY.BAS

Ready

APPEND DK0:[1,2]VT05  .DPY

Ready

COMPILE SY:[1,2]VT5DPY<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]DISPLY.BAS

Ready

APPEND DK0:[1,2]VT50  .DPY

Ready

COMPILE SY:[1,2]VT50PY<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]FIT.BAS

Ready

COMPILE SY:[1,2]FIT<232>

Ready

SCALE 0

Ready
```

```
OLD DK0:[1,2]FLINT.BAS
Ready
COMPILE SY:[1,2]FLINT<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]PMDUMP.BAS
Ready
COMPILE SY:[1,2]PMDUMP<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BPCREF.BAS
Ready
COMPILE SY:[1,2]BPCREF<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BPCRF1.BAS
Ready
COMPILE SY:[1,2]BPCRF1<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]RUNOFF.BAS
Ready
COMPILE SY:[1,2]RUNOFF<40>
Ready

SCALE 0
Ready
OLD DK0:[1,2]MAKSIL.BAS
Ready
```

```
COMPILE SY:[1,2]MAKSIL

Ready

RUN SY:[1,2]PIP.SAV
*SY:[1,2]SAVRES.SAV<124>/RTS:RT11=DK0:[1,2]SAVRES.SAV
*^Z

Ready

RUN SY:[1,2]PIP.SAV
*SY:[1,2]BPCREF.HLP<40>=DK0:[1,2]BPCREF.HLP/AS/NO
*SY:[1,2]FIT.HLP<40>=DK0:[1,2]FIT.HLP/AS/NO
*SY:[1,2]RUNOFF.RNO<40>=DK0:[1,2]RUNOFF.RNO/AS/NO
*^Z

Ready

!********** BACKUP.CTL - BACKUP PROGRAM BUILD
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.



SCALE 0

Ready

OLD DK0:[1,2]BACKUP.BAS

Ready

COMPILE SY:[1,56]BACKUP<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]BACLST.BAS

Ready

COMPILE SY:[1,56]BACLST<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]BACCON.BAS

Ready

COMPILE SY:[1,56]BACCON<232>

Ready

SCALE 0
```

```
Ready
OLD DK0:[1,2]BACDIR.BAS
Ready
COMPILE SY:[1,56]BACDIR<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACMNT.BAS
Ready
COMPILE SY:[1,56]BACMNT<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACLAB.BAS
Ready
COMPILE SY:[1,56]BACLAB<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACDSK.BAS
Ready
COMPILE SY:[1,56]BACDSK<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACKTO.BAS
Ready
COMPILE SY:[1,56]BACKTO<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACCOM.BAS
```

```
Ready
COMPILE SY:[1,56]BACCOM<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACDMP.BAS
Ready
COMPILE SY:[1,56]BACDMP<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACDEL.BAS
Ready
COMPILE SY:[1,56]BACDEL<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACLOD.BAS
Ready
COMPILE SY:[1,56]BACLOD<232>
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACENT.BAS
Ready
COMPILE SY:[1,56]BACENT
Ready

SCALE 0
Ready
OLD DK0:[1,2]BACFRM.BAS
Ready
```

```
COMPILE SY:[1,56]BACFRM<232>

Ready

SCALE 0

Ready

OLD DK0:[1,2]BACPRM.BAS

Ready

COMPILE SY:[1,56]BACPRM

Ready

RUN SY:[1,56]BACPRM
BACPRM  V7.0-07 RSTS V7.0-07 Small System

Ready

!********** DEVTST.CTL - DEVICE EXERCISER PROGRAMS
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.


SCALE 0

Ready

OLD DK0:[1,2]DSKSEK.BAS

Ready

COMPILE SY:[1,117]DSKSEK

Ready

SCALE 0

Ready

OLD DK0:[1,2]DSKEXR.BAS

Ready

COMPILE SY:[1,117]DSKEXR

Ready

SCALE 0

Ready

OLD DK0:[1,2]LPEXER.BAS

Ready

COMPILE SY:[1,117]LPEXER

Ready

SCALE 0
```

```
Ready

OLD DK0:[1,2]PPEXER.BAS

Ready

COMPILE SY:[1,117]PPEXER

Ready

SCALE 0

Ready

OLD DK0:[1,2]PREXER.BAS

Ready

COMPILE SY:[1,117]PREXER

Ready

SCALE 0

Ready

OLD DK0:[1,2]DXEXER.BAS

Ready

COMPILE SY:[1,117]DXEXER

Ready

SCALE 0

Ready

OLD DK0:[1,2]DTEXER.BAS

Ready

COMPILE SY:[1,117]DTEXER

Ready

! ERRORS WILL RESULT WHEN THE CPEXER PROGRAM IS BUILT
! USING CSPCOM OR BASIC PLUS IF THE NECESSARY MATH OPTIONS
! WERE NOT SELECTED.
SCALE 0

Ready

OLD DK0:[1,2]CPEXER.BAS

Ready

COMPILE SY:[1,117]CPEXER

Ready

SCALE 0
```

```
Ready

OLD DK0:[1,2]CPUTST.BAS

Ready

COMPILE SY:[1,117]CPUTST

Ready

SCALE 0

Ready

OLD DK0:[1,2]KBEXER.BAS

Ready

COMPILE SY:[1,117]KBEXER

Ready

SCALE 0

Ready

OLD DK0:[1,2]MTEXER.BAS

Ready

COMPILE SY:[1,117]MTEXER

Ready



!*** BUILD Complete ***

Ready

RUN $PIP
*$NOTICE.TXT

WELCOME TO RSTS/E V7.0 TIME SHARING



*SY:$NOTICE.TXT=KB:

 WHAT A WAY TO START YOUR DAYRSTS/E^Z
*SY:$NOTICE.TXT=KB:

 WHAT A WAY TO START YOUR DAY RSTS/E V7.0!!!
 ^Z
*$HELP.TXT

TO GET ON-LINE AND USE RSTS/E, FOLLOW THE
INSTRUCTIONS FOUND IN THE
RSTS/E SYSTEM USER'S GUIDE.
```

```
*$HELP.TXT=KB:


SEE ANDY IF YOU NEED A PRIVILEGED ACCOUNT NUMBER.
^Z
*$START.CTL
@SY0:[1,2]RTS.CMD
@SY0:[1,2]TTY.CMD
@SPOOL.CMD[1,2]
@SY0:[1,2]CCL.CMD
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,208]LB
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,27]ERRINT
FORCE KB0: 100
FORCE KB0: NO
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
*$CRASH.CTL
@SY0:[1,2]RTS.CMD
@SY0:[1,2]ANALYS.CMD
@SY0:[1,2]CLEAN.CMD
@SY0:[1,2]TTY.CMD
@SPOOL.CMD[1,2]
@SY0:[1,2]CCL.CMD
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,208]LB
FORCE KB0: EXIT
FORCE KB0: RUN SY:[1,2]QUE
FORCE KB0: Q SY:[1,27]ANALYS.DMP/DE
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,27]ERRINT
FORCE KB0: 100
FORCE KB0: YES
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
*SY:$ACCT.SYS<188>=KB:
2,4,CLASSE,0,0,EDUCATION CLASS
4,16,LBRACC,0,0,LIBRARY ACCOUNT
16,256,ROGER,0,0,SECURITY ACCOUNT
8,128,YUSEIT,0,0,GENERAL ACCOUNT
^Z
*^Z

Ready

RUN $REACT
REACT   V7.0-07 RSTS V7.0-07 Small System
System Account Manager
Function? STANDARD
All Accounts in Account File are now Entered
Function? ^Z

Ready
```

```
RUN $SHUTUP
SHUTUP   V7.0-07   RSTS V7.0-07 Small System

10:24 PM 22-Apr-79  ******** Set-up   Dialogue   Phase  ********

Type 'ESC'('ALT') to any query to backup one (1) step

'OPSER' not running

Minutes until system shutdown (0-99) <5>?  0

10:24 PM 22-Apr-79  ******** Warning   Message   Phase  ********
Further LOGINs are now disabled

10:24 PM 22-Apr-79  ******** Initial Job Killing Phase  ********

10:24 PM 22-Apr-79  ******** Remove RTS/RES LIB  Phase  ********

10:25 PM 22-Apr-79  ******** SWAP File  Removal  Phase  ********

10:25 PM 22-Apr-79  ******** Disk    DISMOUNT    Phase  ********

10:25 PM 22-Apr-79  ******** Final   Shutdown    Phase  ********

Please wait for system to re-boot itself
```

```
RSTS V7.0-07 Small System (DBO)


Option: SAVRES

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
10:26 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 10:26PM


SAV/RES Function:

Please enter one of the valid SAV/RES functions,
or type 'HELP' for a help message: HELP

The valid SAV/RES functions are:
    SAVE        Make a safe copy of a RSTS/E file-structured disk.
    RESTORE     Restore a RSTS/E file-structured disk from a SAVE Set.
    IMAGE       Copy a volume image from a RSTS/E file-structured disk
                to a LIKE disk.
    IDENTIFY    List the characteristics of a SAVE Set or RSTS/E disk.
    HELP        Print this list of acceptable responses.
Only the first two characters need be typed.


SAV/RES Function: IDENTIFY
```

```
From Device?    .

Type 2 characters to specify the input device type,
followed by a single digit (0-7) to specify the unit
number.
Include a Save Set name or Pack ID if you want SAVRES
to ensure it matches the one on the volume.  This drive
should be WRITE-LOCKED.

From Device? DK0

          Device:       DK0:
         Pack ID:       SAMPL3
Pack Clustersize:       2
   Creation date:       Sunday, 22-Apr-79


SAV/RES Function: SAVE

From RSTS disk?

Type 2 characters to specify the input device type,
followed by a single digit (0-7) to specify the unit
number.
Include a  Pack  Id  if you want SAVRES to ensure it
matches the one on the volume.  This drive should be
WRITE-LOCKED.

From RSTS disk? DB0:

*** Pack ID/default Save Set Name is SMLV70

To Device?

Type 2 characters to specify the output device type,
followed by a single digit (0-7) to specify the unit
number.
Include a Save Set Name if you wish to override the
default.  This drive should have a SCRATCH volume
mounted, and must be WRITE-ENABLED.

To Device? DK0:RECMED

*** The volume on DK0: is a RSTS disk
*** Pack ID is SAMPL3

*** Pack will be reinitialized
Mount it anyway <NO>?
*** This is your last chance to prevent the
*** loss of any data on the output volume
Mount it anyway <NO>? YES

*** Save Set Name is RECMED

Expiration Date <21-Apr-80>?

Type the desired expiration date or press the LINE FEED
key to accept the date printed.

Expiration Date <21-Apr-80>? 21-APR-82

Verify (Yes or No) <NO>?

Type 'Yes' if you want SAVRES to compare the input and
output volumes at the end of each output volume.
Type 'No' or press the LINE FEED key if you do not want
SAVRES to perform this verification.
```

```
Verify (Yes or No) <NO>? YES

Proceed (Yes or No)?

Type 'Yes' to proceed with the operation.
Type 'No' to abort and return to the SAV/RES Function: prompt.

Proceed (Yes or No)? YES

*** Initializing first SAVE volume

*** Begin SAVE from DB0: to DK0: at 10:37 PM

*** Begin VERIFY pass from DB0: to DK0: at 10:38 PM

*** 0 differences found

 Dismount Device:        DK0:
        Set Name:        RECMED
           Seq #:        1
   Creation date:        Sunday, 22-Apr-79
 Expiration date:        Wednesday, 21-Apr-82

        Please label this volume!

Mount volume # 2 of SAVE Set RECMED
Device ?

Type 2 characters to specify  the output  device  type,
followed  by  a  single digit (0-7) to specify the unit
number.
This drive should be WRITE-ENABLED.

Mount volume # 2 of SAVE Set RECMED
Device ? DK1:

*** The volume on DK1: is a RSTS disk
*** Pack ID is SAMPL4

*** Pack will be reinitialized
Mount it anyway <NO>?
*** This is your last chance to prevent the
*** loss of any data on the output volume
Mount it anyway <NO>? YES

Proceed (Yes or No)?

Type 'Yes' to proceed with the operation.
Type 'No' to abort and return to the mount prompt.

Proceed (Yes or No)? YES

*** Begin SAVE from DB0: to DK1: at 10:40 PM

*** Begin VERIFY pass from DB0: to DK1: at 10:41 PM

*** 0 differences found

 Dismount Device:        DK1:
        Set Name:        RECMED
           Seq #:        2
   Creation date:        Sunday, 22-Apr-79
 Expiration date:        Wednesday, 21-Apr-82

        Please label this volume!

--- SAVE operation completed at 10:42 PM
```

```
                    Summary Report

SAVE of DB0:SMLV70 to Save Set RECMED

     Input Device:        DB0:
          Pack ID:        SMLV70
Pack Clustersize:         8
    Creation date:        Sunday, 22-Apr-79

    Output Device:        Disk
         Set Name:        RECMED
     # of volumes:        2
    Creation date:        Sunday, 22-Apr-79
  Expiration date:        Wednesday, 21-Apr-82

SAVE started on Sunday, 22-Apr-79, at 10:37 PM

                    Run Statistics

Transfer Totals:

        Total of 8928 blocks transferred

Error Totals:

        Total of    0 bad compares.

        Total of    0 new bad blocks encountered on source.
        Total of    0 new bad blocks encountered on destination.

Timing Totals:

        Total elapsed time:   0 hrs.,   4 mins.,  55 secs.
        Total wait    time:   0 hrs.,   1 mins.,  31 secs.
        Total process time:   0 hrs.,   3 mins.,  24 secs.


SAV/RES Function:


Option: START

You currently have: JOB MAX = 20, SWAP MAX = 28K.

JOB MAX or SWAP MAX changes? NO

Any memory allocation changes? NO

You currently have crash dump enabled.

Crash dump? YES

22-Apr-79?
11:36 PM?

INIT    V7.0-07 RSTS V7.0-07 Small System

Command File Name?
DETACHING...



^C
HELLO 1/2
Password:
Job 1 is detached under this account
Job number to attach to?
1 other user is logged in under this account
```

```
Ready

RUN $UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Small System
#ADD SWAPFILE 0 : SWAP0
#ADD RT11
#ADD TECO
#EXIT

Ready

BYE/F
```

```
ATTACHING TO JOB 1
DETACHING...
```

```
^C
HELLO 1/2
Password:
Job 1 is detached under this account
Job number to attach to?
1 other user is logged in under this account
```

```
Ready

RUN $TTYSET
TTYSET  V7.0-07 RSTS V7.0-07 Small System
Terminal characteristics program
? EXIT

Ready

BYE/F
```

```
ATTACHING TO JOB 1
DETACHING...
```

```
^C
HELLO 1/2
Password:
Job 1 is detached under this account
Job number to attach to?
1 other user is logged in under this account



Ready

RUN SY:(1,111)OPSER
OPSER   V7.0-07 RSTS V7.0-07 Small System
'OPSER' FILES NOT FOUND - WILL INITIALIZE.
#DETACH
DETACHING . . .


^C
HELLO 1/2
Password:
Jobs 1 2 are detached under this account
Job number to attach to?
2 other users are logged in under this account



Ready

RUN SY:(1,111)QUEMAN
QUEMAN  V7.0-07 RSTS V7.0-07 Small System
'QUEUE.WRK' NOT FOUND - WILL INITIALIZE
NO QUEUE FILE FOUND -- WILL INITIALIZE
STARTED AT: 11:36 PM ON 22-Apr-79
INITIALIZED
#
JOB #3 'QUEMAN' PUT ONLINE
DETACH/PRIORITY:0
DETACHING . . .



^C
HELLO 1/2
Password:
Jobs 1 2 3 are detached under this account
Job number to attach to?
3 other users are logged in under this account



Ready

RUN SY:(1,111)SPOOL
SPOOL   V7.0-07 RSTS V7.0-07 Small System
#LP0:/HEAD:2/PHY:KB14:
Detaching...
```

```
^C
HELLO 1/2
Password:
Jobs 1 2 3 4 are detached under this account
Job number to attach to?
4 other users are logged in under this account



Ready

RUN SY:(1,111)BATCH
BATCH   V7.0-07 RSTS V7.0-07 Small System

JOB #4 'LPOSPL' PUT ONLINE

MESSAGE             1 : 22-Apr-79 11:37 PM  JOB:3  DET    QUMRUN[1,2]
        LPOSPL (4) PUT ONLINE
#BAO:/ERROR:FATAL/NOQUEUE/NODELETE
DETACHING...



ATTACHING TO JOB 1
DETACHING...



^C
HELLO 1/2
Password:
Jobs 1 2 3 4 5 are detached under this account
Job number to attach to?
5 other users are logged in under this account



Ready


JOB #5 'BAOSPL' PUT ONLINE

MESSAGE             2 : 22-Apr-79 11:37 PM  JOB:3  DET    QUMRUN[1,2]
        BAOSPL (5) PUT ONLINE
RUN (1,2)UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Small System
#CCL ATT-ACH=(1,2)LOGIN.*;PRIV 30000
#CCL ATP-K=(1,2)ATPK.*;PRIV 30000
#CCL BCK-=(1,2)RMSBCK.TSK;0
#CCL BFC-REF=(1,2)BFCREF.*;30000
#CCL BYE-=(1,2)LOGOUT.*;PRIV 0
#CCL CNV-=(1,2)RMSCNV.TSK;0
#CCL CRE-ATE=(1,2)EDIT.*;30000
#CCL DEF-=(1,2)RMSDEF.TSK;0
#CCL DFN-=(1,2)RMSDFN.TSK;0
#CCL DES-=(1,2)RMSDES.TSK;0
#CCL DIS-MOUNT=(1,2)UMOUNT.*;PRIV 30000
#CCL DI-RECTORY=(1,2)DIRECT.*;PRIV 30000
#CCL DSP-=(1,2)RMSDSP.TSK;0
#CCL EDT-=(1,2)EDT.TSK;0
#CCL ED-IT=(1,2)EDIT.*;30000
```

```
#CCL FIT-=(1,2)FIT.*;PRIV 30000
#CCL HELLO-=(1,2)LOGIN.*;PRIV 0
#CCL IFL-=(1,2)RMSIFL.TSK;0
#CCL LBR-=(1,2)LBR.TSK;0
#CCL LIB-R=(1,2)LIBR.SAV;8208
#CCL LIN-K=(1,2)LINK.SAV;8208
#CCL LOG-IN=(1,2)LOGIN.*;PRIV 0
#CCL MACR-O=(1,2)MACRO.SAV;8216
#CCL MAC-=(1,2)MAC.TSK;0
#CCL MAK-E=(1,2)TECO.TEC;0
#CCL MOU-NT=(1,2)UMOUNT.*;PRIV 30000
#CCL MU-NG=(1,2)TECO.TEC;0
#CCL PAT-=(1,2)PAT.TSK;0
#CCL PIP-=(1,2)PIP.SAV;8208
#CCL PL-EASE=(1,2)PLEASE.*;PRIV 30000
#CCL QU-EUE=(1,2)QUE.*;PRIV 30000
#CCL RST-=(1,2)RMSRST.TSK;PRIV 0
#CCL SE-T=(1,2)TTYSET.*;PRIV 30000
#CCL SRT-=(1,2)SORT.TSK;0
#CCL SU-BMIT=(1,2)QUE.*;PRIV 30000
#CCL SW-ITCH=(1,2)SWITCH.*;PRIV 30000
#CCL SY-STAT=(1,2)SYSTAT.*;PRIV 30000
#CCL TE-CO=(1,2)TECO.TEC;0
#CCL TKB-=(1,2)TKB.TSK;0
#CCL TY-PE=(1,2)TECO.TEC;8
#CCL UT-ILTY=(1,2)UTILTY.*;30000
#EXIT

Ready

BYE/F



ATTACHING TO JOB 1
DETACHING...



^C
HELLO 1/2
Password:
Jobs 1 2 3 4 5 are detached under this account
Job number to attach to?
5 other users are logged in under this account



Ready

RUN SY:(1,2)UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Small System
#REMOVE LOGICAL LB
#ADD LOGICAL SY:(1,208)LB
#EXIT
```

```
Ready

BYE/F




ATTACHING TO JOB 1
RUN SY:(1,27)ERRINT
100
NO

Ready

ERRINT  V7.0-07 RSTS V7.0-07 Small System
ERRLOG File is 2% Full
Change Size to < 100 >?
Utilize Crash File Output (Yes/No) <No>?
Detaching . . .



HELLO

RSTS V7.0-07 Small System  Job 6  KB0  22-Apr-79  11:39 PM
#1,2
Password:
Jobs 1 2 3 4 5 are detached under this account
Job number to attach to?
5 other users are logged in under this account


WHAT A WAY TO START YOUR DAY RSTS/E V7.0!!!




Ready

RUN $SHUTUP
SHUTUP   V7.0-07   RSTS V7.0-07 Small System

11:39 PM 22-Apr-79  ********  Set-up   Dialogue   Phase  ********

Type 'ESC'('ALT') to any query to backup one (1) step

Use 'OPSER' for utilities shutdown (YES/NO) <YES>  YES
Allow utilities to reach logical end point (YES/NO) <YES>?  YES
Minutes until system shutdown (0-99) <5>?  0

11:40 PM 22-Apr-79  ********  Warning   Message   Phase  ********
Further LOGINs are now disabled

11:40 PM 22-Apr-79  ********  Initial Job Killing Phase  ********

11:40 PM 22-Apr-79  ********  ' OPSER ' Shutdown  Phase  ********
Detaching...
```

```
'OPSER' ATTACHING
*
JOB #5 'BAOSPL' TAKEN OFFLINE
*
MESSAGE                3 : 22-Apr-79 11:40 PM  JOB:3  DET     QUMRUN[1,2]
        BAOSPL (5) REQUESTED OFF-LINE -- TAKEN OFF-LINE
*
JOB #4 'LPOSPL' TAKEN OFFLINE
*
MESSAGE                4 : 22-Apr-79 11:40 PM  JOB:3  DET     QUMRUN[1,2]
        LPOSPL (4) REQUESTED OFF-LINE -- TAKEN OFF-LINE
*
JOB #3 'QUEMAN' TAKEN OFFLINE
*'OPSER' TERMINATING



Re-attaching...

11:40 PM 22-Apr-79  ********  ' ERRCPY ' Shutdown Phase  ********

11:40 PM 22-Apr-79  ********  Remove RTS/RES LIB  Phase  ********

11:40 PM 22-Apr-79  ********  SWAP File  Removal  Phase  ********

11:40 PM 22-Apr-79  ********  Disk     DISMOUNT     Phase  ********

11:40 PM 22-Apr-79  ********  Final    Shutdown     Phase  ********

Please wait for system to re-boot itself




RSTS V7.0-07 Small System (DB0)

Option:
```

```
Enabling only console, disks, and tapes.

Warning ** DB2: is dual ported, proceed with caution!

Warning ** DB1: is dual ported, proceed with caution!


RSTS V7.0 (DM1)


Option:
Please enter one of the valid RSTS/E system initialization
options, or type 'HELP' for a help message: HELP

The valid RSTS initialization options are:
        DSKINT  Initialize disk to RSTS file structure
        COPY    Copy minimal system to disk
        PATCH   Patch a file
        HARDWR  Set controller characteristics
        INSTALL Install a monitor SIL
        REFRESH Manipulate files in [0,1]
        DEFAULT Set monitor defaults
        SET     Set device characteristics
        START   Start timesharing
        <LF>    Start timesharing (fast)
        BOOT    Bootstrap a device
        LOAD    Load a stand-alone program
        UNISYS  Disable all but console terminal
        FILL    Set console fill for INIT
        SAVRES  SAVE or RESTORE a RSTS/E disk
        HELP    Type this HELP message
Only the first two characters need be typed.


Option: DSKINT

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
04:39 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 4:39 PM

Disk?
Disk type (DC,DF,DS,DK,DL,DM,DP,DB,DR)? DR
Unit?
Physical unit number (0-7)? 0
Pack ID?
Up to 6 alphanumeric characters? BIGV70
Pack cluster size?
4, 8, or 16? 8
SATT.SYS base?
Type a block number to locate the file SATT.SYS at a specific
place on the disk, or type <LF> to let RSTS find a location.
SATT.SYS base? 20000
MFD password?
Up to 6 alphanumeric characters? SECRET
MFD cluster size?
```

```
8 or 16? 8
Pre-extend directories <no>?
Type YES to force the MFD and accounts [0,1] and [1,2]
be pre-extended to their maximum size when created.
Pre-extend directories <no>? YES
PUB, PRI, or SYS?
Public (PUB), private (PRI), or system (SYS) disk? SYS
Library password?
Up to 6 alphanumeric characters? HIDDEN
Library UFD cluster size?
8 or 16? 16
Library account base?
Type a block number to locate the the library account at a specific
place on the disk, or type <LF> to let RSTS find a location.
Library account base? 20000
Date last modified <yes>?
Type 'YES' to maintain date of last modification in the
directory on this disk.
Type 'NO' to maintain the date of last access.
Should this disk retain last-modified information? YES
New files first <no>?
Type 'YES' to force new directory entries to be
added to the front of the directory.
Type 'NO' to force new entries to be added to
the end.
Should directory entries be added to the front? NO
Format <no>?
Should the pack be formatted (Y or N)? NO
Patterns? 8
Proceed (Y or N)?
Type 'Y' to proceed with DSKINT, 'N' to abort it? Y

Disk pack serial # 13414


Pattern # 8
Pattern # 7
Pattern # 6
Pattern # 5
Pattern # 4
Pattern # 3
Pattern # 2
Pattern # 1

Option: COPY

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
05:37 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 05:37PM

To which disk?
Type the name of the disk which is to receive the RSTS/E system.
The disk must already be initialized.
Valid disk names are DF, DS, DK, DL, DM, DP, DB, and DR.

To which disk? DR
Unit?
Physical unit number (0-7)? 0

Enabling only console, disks, and tapes.

Warning ** DB2: is dual ported, proceed with caution!

Warning ** DB1: is dual ported, proceed with caution!
```

```
RSTS V7.0 (DRO)

Option: HARDWR

  HARDWR suboption?

  Valid HARDWR suboptions are:

        LIST    List hardware configuration
        DISABLE Disable a controller
        ENABLE  Enable a disabled controller
        CSR     Enter non-standard controller address
        VECTOR  Enter non-standard vector address
        UNITS   Associate a disk type with a controller
        DM      Set DM11BB/DH11 associations
        TU58    Set TU58/DL11 associations
        HERTZ   Set AC line hertz
        SWITCH  Set console switch register characteristics
        RESET   Reset all user CSR's & vectors, enable all devices
        EXIT    (or <LF>) Exit from HARDWR option

  Only the first two characters need be typed

  HARDWR suboption? LIST

  Name   Address Vector  Comments
  TT:     177560   060
  RS:     172040   204   BAE=+030, Units: 0(RS04) 1(RS04 IL)
  RK:     177400   220   RK05F units: none
  RM:     177440   210   Units: 0(RK06) 1(RK06)
  RB:     176700   254   BAE=+050, Units: 1(RP06 DP) 2(RP06 DP)
  RR:     176300   150   BAE=+050, Units: 0(RM03) 1(RM03)
  TC:     177340   214
  TU:     172440   224   BAE=+034, Units: 0(TE16 @TM02 #0)
                                    1(TE16 @TM02 #0) 2(TU77 @TM03 #1)

  KW11L   177546   100
  KW11P   172540   104
  SR      177570
  DR      177570

  Hertz = 60.

  Other: FPU, SL, 22-Bit Addressing, Cache w/address, System ID = -1

  HARDWR suboption? EXIT

Option: INSTALL

Sil?

Type the filename of the monitor save image library.

Directory of all .SIL files in [0,1]:

SYSGEN.SIL

Sil? SYSGEN
  Rebooting . . .


Warning ** DB2: is dual ported, proceed with caution!
```

```
Warning ** DB1: is dual ported, proceed with caution!


RSTS V7.0 (DRO)


Option: REFRESH

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
05:40 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 05:40PM

Disk?
Type the name of the disk to refresh (DC,DF,DS,DK,DM,DF, or DB).
Type <LF> to refresh the system disk.

Disk? DR
Unit?
Physical unit number (0-7)? 0

Clean?
Type 'YES' if you want the disk cleaned before REFRESHing.
Type 'NO' to skip the clean operation.

Clean? YES

Disk is being cleaned - wait ...


  REFRESH subOption?

  Valid REFRESH subOptions are:

  LIST    List the file status table
  CHANGE  Change the system file allocation
  FILE    Change the characteristics of a file in [0,1]
  BADS    Examine or change the bad block file
  EXIT    (or <LF>) to exit from REFRESH

  Only the first two characters need be typed

  REFRESH subOption? LIST

  File                    File          Current  Minimum     Start
  Name       Required?  Class Status     Size     Size       LBN

System files:

  SWAP   .SYS    YES             CRE                 64
  SWAP0  .SYS    NO               OK
  SWAP1  .SYS    NO               OK
  SWAP3  .SYS    NO               OK
  OVR    .SYS    NO               OK
  ERR    .SYS    NO               OK                  16
  BUFF   .SYS    NO               OK
  CRASH  .SYS    NO               OK

Others:

  BADB   .SYS             NOD              0
  SATT   .SYS         NOD CTG              5              20004
  INIT   .SYS         NOD CTG            418
  ERR    .ERR             CTG             16                604
  SYSGEN.SIL              CTG            204
  RT11   .RTS             CTG             20                828
```

```
REFRESH suboption? CHANGE

SWAP.SYS changes?
SWAP.SYS is required on the system disk to  bring  up  timesharing.
It must be big enough to hold at least two jobs at the system  swap
max.  When the system is brought up,  SWAP.SYS will be in the third
swap file position.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

SWAP.SYS changes? YES

  Size?
  Type 'OLD' or <LF> to default to the minimum size of 64 blocks.
  Otherwise, enter the file size in 256 word blocks.

  Size? 10*31K

  Base?
  Type 'OLD', '0', or <LF> to let RSTS find a location.
  Enter a logical block number to locate the file at a specific
  place on the disk.

  Base? 20000

SWAP0.SYS changes?
This file may be used as an additional swapping file if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

SWAP0.SYS changes? NO

SWAP1.SYS changes?
This file may be used as an additional swapping file if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

SWAP1.SYS changes? NO

SWAP3.SYS changes?
This file may be used as an additional swapping file if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

SWAP3.SYS changes? NO

OVR.SYS changes?
OVR.SYS may be used to hold the non-resident system code if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

OVR.SYS changes? NO

ERR.SYS changes?
ERR.SYS may be used to hold the system error message text if it is
installed as such during system start-up.
Type 'NO', 'OLD', or <LF> for no change in status.
Type 'YES' to enter file data.

ERR.SYS changes? NO

BUFF.SYS changes?
BUFF.SYS is used for DECtape operations.
```

```
  It must contain at least 3 blocks per supported DECtape.
  BUFF.SYS is required on the system disk if DECtape is to be used.
  Type 'NO', 'OLD', or <LF> for no change in status.
  Type 'YES' to enter file data.

  BUFF.SYS changes? YES

    Size?
    Enter the file size in 256 word blocks.

    Size? 6

    Base?
    Type 'OLD', '0', or <LF> to let RSTS find a location.
    Enter a logical block number to locate the file at a specific
    place on the disk.

    Base? 0

  CRASH.SYS changes?
  CRASH.SYS is used to hold a dump of the monitor's tables
  if the system crashes and the crash dump option is enabled.
  Type 'NO', 'OLD', or <LF> for no change in status.
  Type 'YES' to enter file data.

  CRASH.SYS changes? YES

    Size?
    Enter the file size in 256 word blocks.

    Size? 80

    Base?
    Type 'OLD', '0', or <LF> to let RSTS find a location.
    Enter a logical block number to locate the file at a specific
    place on the disk.

    Base? 0

  Other files?
  Type the NAME.EXT of a file to be created or deleted during
  this CHANGE operation.  Type <LF> if there are no more files.

  Other files? NO

  REFRESH suboption? EXIT

Option: DEFAULT

No defaults are currently set in SYSGEN.SIL

You currently have: JOB MAX = 2, SWAP MAX = 16K.

JOB MAX or SWAP MAX changes?

JOB MAX or SWAP MAX may be changed as follows:


 1) JOB MAX may never be greater than 2, which is the Job maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory (1K=1024 words), may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N Jobs, where
       N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
    truncated to an integer.  The sum of the N's for the four swap
```

```
    files  determines the number of Jobs which may log on.  This number
    may be increased on line by adding swap files (up to a  maximum  of
    4,  including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP  MAX  *  8]
    blocks long, so that it can hold two Jobs.

Type 'YES' to change JOB MAX or SWAP MAX.  Type 'NO' to leave the
maxima as they stand.  Any changes? YES

  New JOB MAX?

  Type 'NO' if you don't want to change the current JOB MAX.
  To enter a new JOB MAX, type a number between 1 and 2.

  New JOB MAX? 2

  New SWAP MAX?

  Type 'NO' if you don't want to change the current  SWAP MAX.
  To enter a new SWAP MAX, type a number between 8 and 31 (K).

  New SWAP MAX? 31

You currently have: JOB MAX = 2, SWAP MAX = 31K.

JOB MAX or SWAP MAX changes? NO

Run Time System?

Specify the name of the Run Time System to be used as the  system
default.  The named Run Time System must exist on the system disk
in account [0,1] with extension '.RTS'.

Directory of all valid run time systems:

RT11.RTS

Name of default Run Time System? RT11

Error message file?

Specify the name of a file in [0,1] with extension '.ERR'
which contains the RSTS/E error message text.

Directory of valid error message files:

ERR.ERR

Name of error message file? ERR

Installation name?

Enter the installation name as a string of up to 15 characters.

New installation name? RSTS/E SYSGEN

  Memory allocation table:

     0K: 00000000 - 00127777 (  22K) : EXEC
    22K: 00130000 - 00147777 (   4K) : RTS (RT11)
    26K: 00150000 - 03777777 ( 486K) : USER
   512K: 04000000 - End              : NXM


  Table suboption? EXIT
```

```
You currently have crash dump disabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.

Enable crash dump? YES

Magtape labelling default <none>?

Type 'ANSI' to select ANSI standard magtape labelling for system default.
Type 'DOS' to select DOS format magtape labelling for system default.

Magtape labelling default <none>? DOS

Preferred clock <P 100>?

Choose the clock which, if available, should be used during timesharing.
Type 'L' to use the KW11-L line frequency clock.
Type 'P' to use the KW11-P programmable clock.
Type <LF> for no change.

Preferred clock <P 100>? P

  Interrupt frequency?
  Type 'LINE' to use the KW11-P at AC line frequency.
  Type a multiple of 50 between 50 and 1000 to use the
  KW11-P crystal clock at the specified interrupt frequency.

  Interrupt frequency? 100

Date format <ALPHABETIC>?

Type 'A' or 'N' to choose the format for the system date.
Type 'ALPHABETIC' for alphabetic date (e.g. 31-Dec-76).
Type 'NUMERIC' for numeric date (e.g. 76.12.31).
Type <LF> for no change.

Date format <ALPHABETIC>? A

Time format <AM/PM>?

Type 'AM' or '24' to choose the format for the system time.
Type 'AM/PM' for AM/PM format time (e.g. 01:30 PM).
Type '24-HOUR' for numeric time (e.g. 13:30).
Type <LF> for no change.

Time format <AM/PM>? AM/PM

Power fail delay <1>?
When power is restored after a power failure, RSTS/E will
delay the recovery for 1 to 300 seconds to allow all
devices to become ready.  Specify the number of seconds
you want to delay.

Power fail delay <1>? 300


Option: SET

  SET suboption?

  Valid SET suboptions are:
        LIST     List the status of a device
        MODEM    Enable modem control for keyboards
        LOCAL    Disable modem control for keyboards
```

```
        LP      Set line printer characteristics
        DISABLE Disable a device unit
        ENABLE  Enable a device unit
        PRIV    Make device ownership privileged
        UNPRIV  Make device ownership non-privileged
        EXIT    (or <LF>) exit from SET option

  Only the first two characters need be typed

  SET suboption? LIST
  Device?
  Type the name of the device to be listed.
  To list selected units, type a unit number or range.
  Type <LF> to list all devices.
  Device? LP

  Name  Control Comments

  LPO   LPO:    NOOMITCR,CR,NOEOT,FILL,NOCONTROL,NOVTAB,BSEMULATE, width 80

  SET suboption? LP
  Type (NOOMITCR,CR,NOEOT,FILL,NOCONTROL,NOVTAB,BSEMULATE)?
  Specify the line printer type (LP, LS, LV, or LA180).
  If the line printer is none of these, type individual
  characteristic names, separated by commas.
  The characteristics are:
    OMITCR     Omit sending <CR> if next character is <LF>
    NOOMITCR   Always send <CR> to the printer
    CR         Insert <CR> before <LF>, <VT>, and <FF>
    NOCR       Printer performs implied <CR> before <LF>, <VT>, <FF>
    FILL       Insert fill after form feeds
    NOFILL     Fill is not required after form feeds
    CONTROL    Send non-printing characters to the printer
    NOCONTROL  Discard non-printing characters or use uparrow mode
    EOT        Send EOT (^D) to the printer
    NOEOT      Treat EOT like other non-printing characters
    VTAB       Send vertical tabs to the printer
    NOVTAB     Treat vertical tabs like other non-printing characters
    BSEMULATE  Emulate the action of 'backspace' on the printer
    BSREAL     Printer has real backspace (carriage moves left)
    BSCONTROL  Treat backspace like other non-printing characters
  Unspecified characteristics take the following defaults:
        NOOMITCR, CR, NOEOT, FILL, NOCONTROL, NOVTAB, BSEMULATE
  Type <LF> to leave the characteristics alone.
  The defined printer types are:
  LP = OMITCR, NOCR, NOEOT, FILL, NOCONTROL, NOVTAB, BSEMULATE
  LV = NOOMITCR, NOCR, EOT, NOFILL, NOCONTROL, NOVTAB, BSEMULATE
  LS = NOOMITCR, CR, NOEOT, NOFILL, CONTROL, VTAB, BSEMULATE
  LA180 = OMITCR, NOCR, NOEOT, FILL, NOCONTROL, NOVTAB, BSREAL

  What is the type of this line printer? LP
  Width (80)?
  Specify the width of the printer line as a number between
  1 and 254.
  Type <LF> to leave the width unchanged.

  What is the width of the line printer? 132
  Lower case (no)?
  Type 'YES' if the line printer has lower case capability.
  Type 'NO' if it does not.  Type <LF> for no change.

  Does this printer have lower case? YES

  SET suboption? EXIT

Option: START
```

```
You currently have: JOB MAX = 2, SWAP MAX = 31K.

JOB MAX or SWAP MAX changes?

JOB MAX or SWAP MAX may be changed as follows:


 1) JOB MAX may never be greater than 2, which is the Job maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory (1K=1024 words), may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N Jobs, where
       N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
    truncated to an integer. The sum of the N's for the four swap
    files determines the number of Jobs which may log on. This number
    may be increased on line by adding swap files (up to a maximum of
    4, including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP MAX * 8]
    blocks long, so that it can hold two Jobs.

Type 'YES' to change JOB MAX or SWAP MAX.  Type 'NO' to leave the
maxima as they stand.  Any changes? NO

Any memory allocation changes?

If you wish to specify a certain portion of memory as unavailable to
RSTS or as dedicated buffer space, or if you wish to locate the Run Time
System at some special address (e.g. in MOS memory), answer 'YES'.  To
leave the memory allocation unchanged from the last specified table,
answer 'NO'.

Any memory allocation changes? NO

You currently have crash dump enabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.

Enable crash dump? YES

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
06:22 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 06:22PM
DF0: disabled - no RF: controller
DL0: disabled - no RL: controller
DL1: disabled - no RL: controller
DP0: disabled - no RP: controller
DP1: disabled - no RP: controller
DB0: disabled - unit not present
MT0: disabled - no TM: controller
MT1: disabled - no TM: controller
MS0: disabled - no MS0: controller
MS1: disabled - no MS1: controller

10 devices disabled

?Can't find file or account
.MOUNT DM1:SYSGNG/RO
```

```
. R DM1:CREATE.SAV



  ^C
  HELLO 1/2
  Password:
  1 other user is logged in under this account

  .
  .ASSIGN DM1: IN

  .R IN:PIP.SAV
  *SY:$$.*<232>=IN:$LOGIN.SAV,$LOGOUT.SAV,$PIP.SAV
  *SY:$$.*<104>=IN:$UTILTY.SAV
  *SY:$$.*<104>=IN:$MACRO.SAV,$CREF.SAV,$LINK.SAV
  *SY:$$.*<104>=IN:$SILUS.SAV,$HOOK.SAV,$SYSGEN.SAV
  *SY:$$.*<124>=IN:$SYSBAT.SAV
  *SY:$$.*<104>=IN:$ONLPAT.SAV
  *DK:$$.*< 40>=IN:$ERR.STB,$PIPSAV.TXT
  *SY:[0,1]*.*<40>=IN:$TECO.RTS
  *SY:[0,1]*.*/MO:16=SY:[0,1]TECO.RTS
  *SY:$$.*<104>/RTS:TECO=IN:$TECO.TEC
  *^C

  .DEASSIGN IN

  .DISMOUNT DM1:

  .R LOGOUT
  Confirm: Y
  Saved all disk files; 576 blocks in use
  Job 2 User 1,2 logged off KB1 at 22-Apr-79 06:28 PM
  1 other user still logged in under this account
  System RSTS V7.0-07 RSTS/E SYSGEN
  Run time was 1.7 seconds
  Elapsed time was 1 minute
  Good evening

**22-Apr-79**


Beginning of RSTS/E  system  generation.


Questions come in long and short  forms.
If  you  are  familiar with them, answer
"S" for short; otherwise, answer "L" for
long form.

Form ?                              $S $

Questions come in long and short  forms.
If  you  are  familiar with them, answer
"S" for short; otherwise, answer "L" for
long form.
```

```
Form ?                                  #S #     L

The system will automatically supply
answers to all of its prompts.  You have
the option of accepting the answer,
supplying a different answer, or
requesting the full printed message.  The
hardware answers will be meaningful only
if you are generating a system for the
computer that you are currently running
on.  If you are generating a system for
this computer, type "YES"; otherwise,
type "NO".

Same system ?                           #Y #     YES

The RSTS/E system is distributed on
magtape; RK05 (DK), RL01 (DL), and RK06
and RK07 (DM) cartridge disks; or may
already have been transferred to the
system disk (SY).  For magtape, a dis-
tinction must be made between the TU10,
TE10, and TS03 drives, which use the
device name "MT"; the TU16, TE16, TU45,
and TU77 drives, which use the device
name "MM"; and the TS04 drive, which
uses the device name "MS".  Enter the
type of distribution medium for this
system generation (MT, MM, MS, DK, DL,
DM, or SY).

Distribution medium ?                   #DM#     DM

The generated system can be written onto
the current system disk (SY); another
disk drive (DF, DK, DL, DM, DP, DR, or
DB); TU10, TE10, or TS03 magtape (MT);
TU16, TE16, TU45, or TU77 magtape (MM);
TS04 magtape (MS); or DECtape (DT).
Using the current system disk (SY) as
the output medium is recommended only if
the system type is DM, DF, DR, or DB.

Output medium ?                         #SY#     SY

RF disk drives have limited storage cap-
acity.  If an RF drive is being used as
the system disk during the SYSGEN pro-
cedure, files will have to be deleted
from that disk after they are used.  When
the system disk is an RK05 or RL01 and
output to SY has been chosen, files will
also have to be deleted after they are
used to leave enough room for the system
library.  Should files be deleted after
they are used (YES or NO)?

Delete files ?                          #NO#     NO

If there is a line printer available for
use during SYSGEN it may be used to
print the system load maps and,
optionally, to print assembly listings
of the system tables and terminal
service modules.  If you have a printer
and want the assembly listings and/or
load maps printed during SYSGEN, answer
```

```
"YES".  Otherwise answer "NO".

LP for SYSGEN ?                    *Y *     NO

This program can be used  to generate a
monitor  and/or  a  BASIC-PLUS Run-Time
System.  Do  you  wish  to  generate  a
monitor (YES or NO)?

Generate monitor ?                 #Y #     YES

The  monitor  Save  Image  Library (SIL)
will have  a name  of from 1 to 6 alpha-
numeric characters  and  an extension of
"SIL". Please specify the name you want.

Monitor name ?                     #RSTS#   RSTSV7

The system generation process can  auto-
matically  patch  the generated monitor.
You must have a monitor  patch  file  on
any RSTS/E file structured medium. Would
you  like  to  automatically  patch  the
generated monitor (YES or NO)?

Monitor patching ?                 #??#     NO

You have  the  option of generating  the
BASIC-PLUS  Run-Time System  in addition
to generating  the monitor.  Do you want
to  generate  BASIC-PLUS  at  this  time
(YES or NO)?

Generate BASIC-PLUS ?              #Y #     YES

The  BASIC-PLUS Save Image Library (SIL)
will have  a name  of from 1 to 6 alpha-
numeric characters  and  an extension of
"RTS". Please specify the name you want.

BASIC-PLUS RTS name ?              #BASIC#  BASIC

The system generation process can  auto-
matically  patch  the  generated  BASIC-
PLUS.  You must have a BASIC-PLUS  patch
file  on  some  RSTS/E  file structured
medium.  Would you like to automatically
patch  the  generated  BASIC-PLUS  (YES
or NO)?

BASIC-PLUS patching ?              #??#     NO

You have  the  option of installing  RSX
or  BASIC-PLUS-2  as  the system default
run-time system.  Will you want  RSX  as
the   system   default   run-time  system
(YES or NO)?

RSX as default RTS ?               #NO#     NO


Now you must specify the  hardware  con-
figuration  on  which this RSTS/E system
will run.


The next few  questions  deal  with  the
```

```
numbers and types of terminal interfaces
on the system.

Serial ASCII terminals connected direct-
ly to the computer and those connected
through leased private telephone lines
(not dial-up) may use either of two
classes of single line interfaces (or
several multiplexers, discussed later).
The first class includes the KL11, LC11,
DL11A, and DL11B interfaces. Specify the
total number of these single line inter-
faces (1 to 16 - include the console
terminal).

KL11,LC11,DL11A,DL11B's ?          *01*    1

The second class of single line inter-
faces used to connect terminals locally
or through leased telephone lines (not
dial-up) includes the DL11C and DL11D
interfaces. How many DL11C's and DL11D's
are on this system (0 to 31)?

DL11C, DL11D's ?                   *00*    0

There are two kinds of individual inter-
faces for automatic answer datasets used
on the dial-up telephone network. The
first of these is the DC11. How many
DC11-DA lines do you have (0 to 32)?

DC11's ?                           *00*    0

The second kind of individual line
dial-up interface is the DL11E. How many
DL11E's are on this system (0 to 31)?

DL11E's ?                          *00*    0

Each DJ11 multiplexer can connect up to
16 terminals to the system. Please enter
the total number of DJ11's attached to
this system (0 to 16).

DJ11's ?                           *00*    0

Each DH11 multiplexer can connect up to
16 terminals to the system. Please enter
the total number of DH11's attached to
this system (0 to 16).

DH11's ?                           *03*    3

For this DH11 unit, enter the number of
lines which will be used now or in the
forseeable future. A response of 16 will
permit all lines to be used. If the num-
ber of lines enabled (n) is less than 16
RSTS/E will not be configured for and
will not recognize lines n thru 15 on
this DH11 unit. Enter the number of
lines enabled (0 to 16).

DH11 unit 00 lines enabled ?       *16*    16
```

```
DH11 unit 01 lines enabled ?     #16#    16

DH11 unit 02 lines enabled ?     #16#    16

Dial-up telephone lines can be connected
through an automatic answer dataset to
a DH11 multiplexer with a DM11-BB modem
controller. Note: all DH11-AD's include
a DM11-BB as an integral part of the
DH11. If you wish to include support for
datasets on DH11's answer YES. Otherwise
answer NO.

Dataset support for DH11's ?     *NO*    NO

Each DZ11 multiplexer can connect up to
8 terminals to the system. Please enter
the total number of DZ11's attached to
this system (0 to 16).

DZ11's ?                         *00*    0

Pseudo keyboards permit interactive jobs
to be run without tying up a real termi-
nal. They are primarily intended for use
by a batch control program which feeds
commands to one or more pseudo keyboards
dedicated to running background tasks.
How many pseudo keyboards would you like
to have (1 to 127)?

Pseudo keyboards ?               #04#    12

RSTS/E is capable of supporting IBM 2741
compatible terminals on DL11D, DL11E,
and DC11 single line interfaces, or on
DH11 or DZ11 multiplexers. If you do not
want any 2741 support then answer "NO".
Otherwise answer "YES".

2741 support ?                   #NO#    NO

An optional feature of the RSTS/E termi-
nal service allows one job to interact
with several terminals through special
forms of the Record I/O GET and PUT
statements. This feature is useful in
applications where the same basic func-
tion is performed on several terminals
and a separate job for each is undesir-
able or at least inefficient. Would you
like to include this feature(YES or NO)?

Multi-terminal service ?         #Y #    YES

Echo control is an optional feature of
the RSTS/E terminal service which allows
any full duplex terminal to function
like a block mode terminal. This feature
enables a program to define fixed length
input fields and to defer echoing of all
typed characters until they are actually
requested. It is useful in data entry
applications or wherever the appearance
of terminal output must be precisely
controlled. Would you like to include
this feature in your system (YES or NO)?
```

```
Echo control ?                          *Y *     YES

The RSTS/E terminal service can be built
to respond to CTRL/T by printing a one-
line status report describing the Job's
status. This report includes the Job
name, RTS name, run state, Job and RTS
sizes, and total and incremental CPU
times. The Job is not disturbed when the
report is printed. Would you like to
have this feature in your monitor (YES
or NO)?

One-line status report ?                *Y *     YES


The next questions deal with the numbers
and kinds of disk units on this system.

The RF11 controller is used to control
up to 8 of the RS11 256K word fixed-head
disks. If this system has none of these
disks, answer NO; otherwise, answer YES.

RF/RS11's ?                             *NO*     NO

The RS04/RS03 disk system consists of an
RH11 device controller and from one to
eight RS03 (256K) or RS04 (512K word)
fixed-head disk drives. Please enter the
total number of RS03 and RS04 drives on
this system (0 to 8).

RS03/RS04's ?                           *02*     2

The RK11 controller is used to control
up to 8 of the RK05 1.2 million word
moving-head cartridge disk drives. Note
that an RK05F is equivalent to 2 RK05's.
How many RK05 drives are there (0 to 8)?

RK05's ?                                *08*     2

By using the overlapped seek driver, you
can increase the efficiency of disk I/O
at the expense of some memory. Type
YES to use the overlapped seek driver.
Type NO to use the non-overlapped seek
driver.

Overlapped seek ?                       *Y *     YES

The RL11 controller is used to control
any combination of up to four RL01 (2.6
million word) or RL02 (5.2 million word)
top loading cartridge disk drives. Enter
the total number of RL01 and RL02 drives
on this system (0 to 4).

RL01/RL02's ?                           *00*     0

The RK611 controller is used to control
any combination of up to eight RK06 (6
million word) or RK07 (12 million word)
top loading cartridge disk drives. Enter
the total number of RK06 and RK07 drives
on this system (0 to 8).
```

```
RK06/RK07's ?                          *02*    2

Overlapped seek ?                      *Y *    YES

The RP11  controller is  used to control
any combination of  up to eisht RP02 (10
million word)  or RP03 (20 million word)
movins-head disk pack drives.  Enter the
total number  of RP02 and RP03 drives on
this system (0 to 8).

RP02/RP03's ?                          *00*    0

The RM02/3 disk  system  consists  of an
RH11 controller and  up  to  eisht  RM02
or  RM03  movins-head  disk pack drives.
Type the total number of  RM02  or  RM03
drives in this confisuration (0 to 8).

RM02/RM03's ?                          *02*    2

Overlapped seek ?                      *Y *    YES

The RP04/5/6 disk system  consists of an
RH11  controller and  any combination of
up to eisht RP04 (44 million word), RP05
(44 million word), or  RP06 (88  million
word) movins-head disk pack drives. Type
the total number of RP04, RP05, and RP06
drives  in  this confisuration (0 to 8).

RP04/RP05/RP06's ?                     *02*    2

Overlapped seek ?                      *Y *    YES


The next few  questions  deal  with  the
peripheral   devices  attached  to  this
RSTS/E system.

The TU16/TE16 mastape system consists of
an  RH11  massbus  interface,  TM02/TM03
controller  and from one to  eisht TU16,
TE16, TU45,  or  TU77  drives.  If  this
system  has no TU16, TE16, TU45, or TU77
mastape drives answer 0; otherwise,  how
many  TU16, TE16, TU45, and TU77  drives
exist on this system (1 to 8)?

TU16/TE16/TU45/TU77's ?                #08#    3

The  TM11/TMA11/TMB11 mastape controller
can support up to eisht  TU10,  TE10, or
TS03 mastape drives.  Please  enter  the
number of TU10, TE10, and TS03 drives on
this system (0 to 8).

TU10/TE10/TS03's ?                     *00*    0

The  TS04  mastape  system consists of a
TS11 controller and a TS04 drive. RSTS/E
supports up to 8 TS04  systems.  If this
system has no TS04 mastape drives answer
0;  otherwise,  how many TS04's exist on
this system (1 TO 8)?

TS04's ?                               *00*    0
```

```
The TC11 DECtape controller can control
up to 8 single drives.  If this system
has no DECtape at all, answer 0; other-
wise, how many single DECtape drives,
not TU56's, are there (1 to 8 - note
that each TU56 dual drive has 2).

DECtapes ?                          *08*     2

The TU58 DECtape-II system consists of
two drives and a controller, connected
through a DL11 interface.  RSTS/E sup-
ports up to four TU58 systems for a
maximum of eight drives.  Please enter
the number of TU58 drives attached to
this system (0 to 8).

TU58's ?                            *00*     0

The RSTS/E system can have up to eight
line printers of the LP11, LS11, or LV11
type.  These printers are referred to by
the device names LP0: through LP7:.  If
there is no line printer, answer 0;
otherwise, enter the number of printers
(1 to 8).

Printers ?                          *01*     1

The RX11 or RX211 floppy disk system
consists of a UNIBUS interface and an
RX01 (single density) or RX02 (double
density) floppy disk subsystem.  The RX01
and RX02 each include a disk controller
and two floppy disk drives.  RSTS/E
supports up to four RX11 or RX211
systems for a maximum of eight drives.
Please enter the number of floppy disk
drives attached to this system (0 to 8).

RX01/RX02's ?                       *08*     2

Does this system have a CR11 punched
card reader or a CM11 marked card reader
(YES or NO)?

CR11/CM11 card reader ?             *NO*     NO

Does this system have a CD11 high-speed
punched card reader (YES or NO)?

CD11 card reader ?                  *NO*     NO

Is there a high-speed paper tape reader
(YES or NO)?

P.T. reader ?                       *NO*     NO

Is there a high-speed paper tape punch
(YES or NO)?

P.T. punch ?                        *NO*     NO

The DMC11 network link is a synchronous
communication line interface which imp-
lements the DDCMP line protocol in hard-
ware.  At least one unit is required for
```

```
DECnet communications.  How many DMC11's
are attached to this system (0 to 16)?

DMC11's ?                              *06*    6

DECnet/E is a set of  modules which im-
lement  the  network  services  protocol
and user interfaces  required for DECnet
communication.  The DECnet/E software is
sold and distributed as a separate pack-
age.  It is not included in the standard
RSTS/E kit.  Do you have  a DECnet/E kit
and wish  to include  DECnet  support in
this system (YES or NO)?

DECnet network support ?               *Y *    YES

The  DECnet/E  package is distributed on
magtape;  RK05 (DK), RL01 (DL), and RK06
and RK07 (DM)  cartridge disks;  or  may
already  have  been  transferred  to the
system  disk (SY).  For magtape,  a dis-
tinction  must be made between the TU10,
TE10,  and  TS03 drives,  which use  the
device name "MT"; the TU16, TE16,  TU45,
and  TU77  drives,  which use the device
name "MM"; and  the  TS04  drive,  which
uses  the  device  name "MS".  Enter the
type  of  distribution  medium  for  this
DECnet/E generation (MT, MM, MS, DK, DL,
DM, or SY).

DECnet/E distribution medium ?  *DM*    DK/A

The system generation process can  auto-
matically  patch  the generated DECnet/E
support.  You must have a DECnet/E patch
file  on  any  RSTS/E  file  structured
medium.  Would you like to automatically
patch the DECnet/E support (YES or NO)?

DECnet/E patching ?                    *??*    NO

The   KMC11   is   an   intelligent micro-
processor  controller which, when loaded
with  appropriate  micro-codes,  can  be
used  to  control various types of peri-
pherals.  How many KMC11  units  do  you
have on this system (0 to 16)?

KMC11's ?                              *00*    0

The LP driver can be made to take advan-
tage  of the extended buffer pool rather
than always buffering  character  output
from  the  small buffer pool.  This will
particularly benefit those systems which
have  an increased contention for system
small buffers.  Do you want the extended
buffering for LP (YES or NO)?

Extended buffering for LP ?       *Y *    YES

The  RSTS/E 2780  package  emulates  the
operation  of  the IBM 2780 Model 1 data
transmission terminal.  The package per-
mits  the RSTS/E  system  to communicate
```

```
with any IBM system which supports the
device, or another RSTS/E 2780 system.
The 2780 package is sold and distributed
as a separate package.It is not included
in the standard RSTS/E kit.  Do you have
the  2780 package and wish to include it
in this system (YES or NO)?

2780 support ?                    *NO*     NO


The remaining questions deal with the
capacity and features of this RSTS/E
system provided at the system manager's
option.

An optional feature of RSTS/E is the
ability to read and write files which
are longer than 65535 blocks.  Including
large file support also reduces file
creation and access times and makes
disk update mode significantly faster.
Including large file support will make
your monitor 2K larger, and will use
more small buffers for each open file.
Do you want your system to handle large
files (YES or NO)?

Large files ?                     *Y *     YES

With sufficient hardware RSTS/E can han-
dle up to 63 simultaneous Jobs.  What is
the maximum number of Jobs (JOBMAX) to
be used at this installation (1 to 63)?

Maximum Jobs ?                    *10*     50

Small buffers are 16 word blocks in mon-
itor storage that are dynamically allo-
cated as input and output buffers, file
parameter blocks, etc.  Storage may be
allocated for  30 to 999 small  buffers.
The recommended  minimum  is at least 10
for each possible Job.  How many small
buffers would  this installation like to
have (30 to 999)?

Small buffers ?                   *500*    500

Logical names can be assigned to devices
on a system wide  basis.  The assignment
table  consists  of five  words for each
assignment.  Please  enter  the  maximum
number  of  system  wide logical assign-
ments that will be in  use  at  any  one
time (5-50).

System wide logicals ?            *10*     10

You can add special statistics gathering
code  to the monitor. This code includes
tables that record Job and disk transfer
statistics.  Would  you  like to include
the  statistics  gathering  code (YES or
NO)?

Monitor statistics ?              *NO*     NO
```

```
An optional feature of the RSTS/E system
allows the file processor (FIP) to use
free buffers, or dedicated sections of
memory (called the extended buffer pool)
to store directory information. This
improves the speed of directory process-
ing by not rereading frequently accessed
directory information. If you want FIP
buffering type YES, otherwise type NO.

FIP buffering ?                    #Y #     YES

An extended version of FIP buffering is
available under RSTS/E which allows jobs
to specify, on a file by file basis,
that user data files are to be cached in
the extended buffer pool.  This caching
is in addition to the FIP directory
buffering. Extended data buffering can
also cache clusters of data, and do read
ahead of user data.  It requires you to
allocate at least 2K words to the
extended buffer pool. Do you want to
include extended data buffering in your
system (YES or NO)?

Extended data buffering ?          #NO#     YES

At the cost of a physically larger
monitor, the disk drivers and their
subroutines can be built into a separate
monitor "phase". If you want to maximize
the size of your small buffer pool, you
should answer "YES". Build monitor with
a separate disk driver phase(YES or NO)?

Disk driver phase ?                #Y #     YES

An optional feature of RSTS/E allows
programs to reduce I/O for overlaying by
attaching to shareable memory-resident
code. If you have at least 124K words of
memory, and intend to use the RMS-11K
Resident Library, answer 'YES'.

Resident libraries ?               #Y #     YES

The RSTS/E monitor can be made to take
over some of the function of the RSX Run
Time System. Programs which normally run
under the RSX Run-Time System don't need
any run time system, so they can grow to
31K, or use the address space for a
resident library. This option makes the
monitor about 1K larger. Do you want to
include RSX directives in your monitor
(YES or NO)?

RSX directives ?                   #Y #     YES

If there is sufficient memory available
on this system, the most frequently used
non-resident disk handling code can be
made resident in order to provide better
system performance. Should this disk
processing be done by resident code (YES
or NO)?
```

```
Resident disk handling ?          *Y *      YES

The routines to implement the simple SYS
calls are normally non-resident. Overall
system performance can be improved by
making this code resident. Do you want
the simple SYS call code resident (YES
or NO)?

Resident simple SYS calls ?       *NO*      YES

Non-resident code is used to delete or
rename a file. If you want the file
delete/rename code to be resident type
"YES"; otherwise type "NO".

Resident file delete/rename ?     *NO*      NO

Non-resident code is used to do logins,
attaches, and assign attributes. If you
want the login, attach, and attribute
code resident, type "YES", else answer
"NO".

Res. login/attach/attribute ?     *NO*      YES

Non-resident code is used to list disk
directories (CATALOG command) and do
file lookups. If you want the directory
lister and file lookup code resident,
type "YES", otherwise answer "NO".

Resident catalog/lookup ?         *NO*      YES


The following questions deal with the
BASIC-PLUS run-time system

Will this software run on a computer
with a floating point processor (YES
or NO)?

FPP ?                             *Y *      YES

Floating point numbers are represented
internally as two 16-bit words, giving
seven significant digits. It is possible
to maintain 17 significant digits by us-
ing 4 words per number. The four word
math packages also include the scaled
arithmetic feature. Would this instal-
lation prefer to use 2 or 4 word math?

Math precision ?                  *02*      4

It is possible to save space in the
BASIC-PLUS system by omitting the loga-
rithmic functions SQR,EXP,LOG,and LOG10,
if they are not needed.Does this instal-
lation need to compute these functions
(YES or NO)?

Log functions ?                   *Y *      YES

It is possible to save space in the
BASIC-PLUS system by omitting the triso-
nometric functions SIN,COS,TAN, and ATN,
```

```
if they are not needed.Does this instal-
lation need to compute  these  functions
(YES or NO)?

Trig functions ?                    #Y #     YES

Special output formatting  can  be  done
using   the   "PRINT  USING"  statement.
Would this  installation  like  to  have
this optional feature (YES or NO)?

Print using ?                       #Y #     YES

BASIC-PLUS permits the user  to  operate
on  an entire matrix using just a single
statement.   These  statements  are  the
"MAT"  statements.  Would this installa-
tion like to have this optional  feature
(YES or NO)?

Matrices ?                          #NO#     NO

An optional feature of BASIC-PLUS allows
arithmetic operations to be performed on
numbers  represented  by  strings.  This
feature  can be used  to obtain  greater
accuracy  in arithmetic  operations.  Do
you want string arithmetic (YES or NO)?

String arithmetic ?                 #NO#     YES


The system generation  dialog is finish-
ed. If you have any special requirements
which require editing the generated file
CONFIG.MAC(system configuration file) or
SYSGEN.CTL(batch control file)  you  may
do it now.  When  ready type "R SYSBAT".




.R SYSBAT


SYSGEN  batch  processing  has  started.
If any problems develop during the batch
process  it  may  be  aborted  by  typing
"Control/C". To restart type "R SYSBAT".



  ^C
  HELLO 1/2
  Password:
  1 other user is logged in under this account

  .
  .SIZE 20

MOUNT AN-C887A-BC (DECNET PACKAGE) ON A DISK DRIVE
```

```
READY AND WRITE PROTECT THE DRIVE

Mount DK:"DECNTA"-write locked
Unit ? 0
   .ASSIGN  DK0: DECNTA

   .R PIP.SAV
   **.*=DECNTA:$NSPSUB.OBJ,$NSP.OBJ,$NET.OBJ
   *^C


Dismount DK0:
   .DEASSIGN  DECNTA


MOUNT AM-2774G-BC (RK06) OR AY-D526G-BC (RK07) ON A DISK DRIVE

READY AND WRITE PROTECT THE DRIVE

Mount DM:"SYSGNG"-write locked
Unit ? 1
   .ASSIGN  DM1: SYSGNG

   .ASSIGN SYSGNG: IN

   .R PIP.SAV
   **.*=IN:$COMMON.MAC
   *SY:$*.*/PR:NOWARN=IN:$SYSLIB.OBJ
   **.*=IN:$OVLHD.OBJ
   **.*=IN:$LIBR.SAV,$PATCH.SAV,$PAT.SAV
   **.*=IN:$MINCOP.BAS
   *^C

   .R PIP.SAV
   *TBL.OBJ,TTDINT.OBJ,TTDVR.OBJ/DE:NOWARN
   *TBL.LST,TTDINT.LST,TTDVR.LST/DE:NOWARN
   *RSTS.SAV,TER.SAV,DSK.SAV/DE:NOWARN
   *EMT.SAV,FIP.SAV,RSX.SAV,OVR.SAV/DE:NOWARN
   *RSTS.MAP,TER.MAP,DSK.MAP/DE:NOWARN
   *EMT.MAP,FIP.MAP,RSX.MAP,OVR.MAP/DE:NOWARN
   *RSTS.STB,TER.STB,DSK.STB/DE:NOWARN
   *EMT.STB,FIP.STB,RSX.STB,OVR.STB/DE:NOWARN
   *NSP.SAV,TRN.SAV,XMDVR.SAV,RJ2780.SAV/DE:NOWARN
   *NSP.MAP,TRN.MAP,XMDVR.MAP,RJ2780.MAP/DE:NOWARN
   *NSP.STB,TRN.STB,XMDVR.STB,RJ2780.STB/DE:NOWARN
   *^C

   .R MACRO.SAV
   *TTDVR,TTDVR/C=IN:$COMMON,$KERNEL,DK:CONFIG,IN:$CHECK,$KBDEF,$TTDVR
   ERRORS DETECTED:  0
   *^C

   .R MACRO.SAV
   *TTDINT,TTDINT/C=IN:$COMMON,$KERNEL,DK:CONFIG,IN:$CHECK,$KBDEF,$TTDINT
   ERRORS DETECTED:  0
   *^C

   .R MACRO.SAV
   *TBL,TBL/C=IN:$COMMON,$KERNEL,DK:CONFIG,IN:$CHECK,$TBL
   ERRORS DETECTED:  0
   *^C

   .R LINK.SAV
   *RSTS/Z,RSTS/A/W,RSTS=TBL,$ERR.STB/X/B:0/E:#37200/U:#1000/I/C
   *NSPSUB/C
   *TTDINT/C
   *IN:$RSTS
```

```
Extend section? MORBUF
Round section? MORBUF
Library search? SYDLRG
Library search? BUFEXT
Library search? LPDVRX
Library search?
*^C

.R LINK.SAV
*DSK/Z,DSK/A/W,DSK=IN:$DSK,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*IN:$RSTS
Round section? DSKPAT
Library search? DKSEEK
Library search? DMSEEK
Library search? DRSEEK
Library search? DBSEEK
Library search?
*^C

.R LINK.SAV
*TER/Z,TER/A/W,TER=IN:$TER,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*TTDVR/C
*IN:$RSTS
Round section? TERPAT
Library search? TTSYST
Library search?
*^C

.R LINK.SAV
*XMDVR/Z,XMDVR/A/W,XMDVR=IN:XMP,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*IN:$RSTS
Round section? XMDPAT
Library search? XMDVRM
Library search?
*^C

.R LINK.SAV
*EMT/Z,EMT/A/W,EMT=IN:$EMT,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*IN:$RSTS
Round section? EMTPAT
Library search? LIB
Library search?
*^C

.R LINK.SAV
*FIP/Z,FIP/A/W,FIP=IN:$FIPLRG,DK:RSTS.STB/X/B:#117000/U:#1000/I/C
*IN:$RSTS
Round section? FIPPAT
Library search? OPL
Library search? UUO
Library search? SND
Library search? LIN
Library search? DIR
Library search?
*^C

.R LINK.SAV
*RSX/Z,RSX/A/W,RSX=IN:$RSX,DK:EMT.STB/X/B:#117000/U:#1000/C
*IN:$RSTS
Round section? RSXPAT
*^C

.R LINK.SAV
*NSP/Z,NSP/A/W,NSP=NSP,FIP.STB/X/B:#117000/U:#1000
Round section? NSPPAT
*^C
```

```
.R LINK.SAV
*OVR/Z,OVR/A/W,OVR=IN:$OVRLRG,DK:NSP.STB/X/B:$1000/C
*NET/C
*IN:$RSTS
*^C

.R SILUS.SAV
*SY0:[0,1]RSTSV7.SIL,TT:=RSTS,TER/M,DSK/M,EMT/M,FIP/M/C
*RSX/M/C
*XMDVR/M/C
*NSP/M/C
*OVR/M/C
*IN:$ODT,$DEFALT
Directory of SIL RSTSV7.SIL on 22-Apr-79 at 07:15 PM

 Name    Ident     Load     Size   Transfer Total

RSTS     07.007   000000   130000   000001    22K
TER      07.007   120000   016000   000001    26K
DSK      07.007   120000   010000   000001    28K
EMT      07.007   120000   020000   000001    32K
FIP      07.007   120000   031000   000001    38K
RSX      07.007   120000   007000   000001    40K
XMP      07.007   120000   005000   000001    41K
NSP      06C.00   120000   020000   000001    45K
OVR      07.007   002000   100000   000001    61K
ODT      07.007   140000   012520   142522    64K
DEFALT   07.007   001000   002000   000001    64K

Resident monitor size is 45K (with 501 small buffers)
128 small buffers can be added to this system (629 total)
16 small buffers can be added without a size change (517 total)



*^C

.RUN LIBR.SAV
*SY:$SYSLIB=SY:$SYSLIB,DK:OVLHD/U
*^C

.R PIP.SAV
*BASIC.SAV,BASIC.STB/DE:NOWARN
*^C

.R LINK.SAV
*BASIC/Z,BASIC/A/W,BASIC=IN:$RTS,DK:$ERR.STB/X/H:$177776/U:$4000/C
*IN:$MA4F/C
*IN:$XL4F/C
*IN:$XT4F/C
*IN:$SF/C
*IN:$IO/C
*IN:$PU/C
*IN:$SN/C
*IN:$VE
Round section? PA
*^C

.R SILUS.SAV
*BASIC.RTS,TT:=BASIC
Directory of SIL BASIC .RTS on 22-Apr-79 at 07:15 PM

 Name    Ident     Load     Size   Transfer Total

BASIC    07.007   100000   077776   000001    16K
```

```
  *^C

  .DEASSIGN IN


Dismount DM1:
  .DEASSIGN  SYSGNG

  .R PIP.SAV
  *SY0:[0,1]*.*/MODE:16.=BASIC.RTS
  *BASIC.RTS/DE
  *^C

  .R LOGOUT
  Confirm: Y
  Saved all disk files; 3928 blocks in use
  Job 2 User 1,2 logged off KB1 at 22-Apr-79 07:15 PM
  1 other user still logged in under this account
  System RSTS V7.0-07 RSTS/E SYSGEN
  Run time was 6 minutes, 11.2 seconds
  Elapsed time was 11 minutes
  Good evening




Batch Job completed.

.R UTILTY
*NO LOGINS
*SHUTUP

Warning ** DB2: is dual ported, proceed with caution!

Warning ** DB1: is dual ported, proceed with caution!


RSTS V7.0-07 RSTS/E SYSGEN (DRO)


Option: INSTALL

Sil <SYSGEN>?

Type the filename of the monitor save image library.

Directory of all .SIL files in [0,1]:

SYSGEN.SIL
RSTSV7.SIL

Sil <SYSGEN>? RSTSV7


Option: DEFAULT

No defaults are currently set in RSTSV7.SIL

You currently have: JOB MAX = 50, SWAP MAX = 16K.

JOB MAX or SWAP MAX changes?
```

```
JOB MAX or SWAP MAX may be changed as follows:

 1) JOB MAX may never be greater than 50, which is the Job maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory (1K=1024 words), may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N Jobs, where
       N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
    truncated to an integer. The sum of the N's for the four swap
    files determines the number of Jobs which may log on. This number
    may be increased on line by adding swap files (up to a maximum of
    4, including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP MAX * 8]
    blocks long, so that it can hold two Jobs.

Type 'YES' to change JOB MAX or SWAP MAX. Type 'NO' to leave the
maxima as they stand. Any changes? YES

  New JOB MAX?

  Type 'NO' if you don't want to change the current JOB MAX.
  To enter a new JOB MAX, type a number between 1 and 50.

  New JOB MAX? 50

  New SWAP MAX?

  Type 'NO' if you don't want to change the current SWAP MAX.
  To enter a new SWAP MAX, type a number between 8 and 31 (K).

  New SWAP MAX? 31

You currently have: JOB MAX = 50, SWAP MAX = 31K.

JOB MAX or SWAP MAX changes? NO

Run Time System?

Specify the name of the Run Time System to be used as the system
default. The named Run Time System must exist on the system disk
in account [0,1] with extension '.RTS'.

Directory of all valid run time systems:

RT11.RTS
BASIC.RTS

Name of default Run Time System? BASIC

Error message file?

Specify the name of a file in [0,1] with extension '.ERR'
which contains the RSTS/E error message text.

Directory of valid error message files:

ERR.ERR

Name of error message file? ERR

Installation name?

Enter the installation name as a string of up to 15 characters.
```

```
New installation name? Large System

  Memory allocation table:

     0K: 00000000 - 00263777 (  45K) : EXEC
    45K: 00264000 - 00363777 (  16K) : RTS (BASIC)
    61K: 00364000 - 03777777 ( 451K) : USER
   512K: 04000000 - End              : NXM


You currently have selected data caching,
be sure to allocate at least 2K of XBUF


  Table subortion?

  Valid table suborions are:

  LIST    List the current memory allocation table
  PARITY  List the parity memory configuration
  RESET   Let RSTS reset the default memory configuration
  LOCK    Lock out some memory
  UNLOCK  Unlock some locked memory
  RTS     Move the Run Time System to a special location
  MAP     Specify a portion of XBUF to be mapped with UMR's
  XBUF    Allocate extended buffer space for disk/message caching
  EXIT    (or <LF>) when you are satisfied with the table

  Only the first two characters need be typed

  Table subortion? XBUF

    Extended buffer address range is?

    Enter the addresses of the first and last 1K memory sections
    to be used for disk block caching and large message send/receive.

    Extended buffer address range is? 61K+80

  Table subortion? LIST

  Memory allocation table:

     0K: 00000000 - 00263777 (  45K) : EXEC
    45K: 00264000 - 00363777 (  16K) : RTS (BASIC)
    61K: 00364000 - 01063777 (  80K) : XBUF
   141K: 01064000 - 03777777 ( 371K) : USER
   512K: 04000000 - End              : NXM


  Table subortion? EXIT

Cache cluster size <4>?

Choose the number of 512 byte blocks to be treated
as a unit for purposes of disk data caching. Legal
values are 1, 2, 4, and 8.

Cache cluster size <4>? 8

You currently have crash dump disabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.

Enable crash dump? YES
```

```
Magtape labelling default <none>?

Type 'ANSI' to select ANSI standard magtape labelling for system default.
Type 'DOS' to select DOS format magtape labelling for system default.

Magtape labelling default <none>? DOS

Preferred clock <P 100>?

Choose the clock which, if available, should be used during timesharing.
Type 'L' to use the KW11-L line frequency clock.
Type 'P' to use the KW11-P programmable clock.
Type <LF> for no change.

Preferred clock <P 100>? P

  Interrupt frequency?
  Type 'LINE' to use the KW11-P at AC line frequency.
  Type a multiple of 50 between 50 and 1000 to use the
  KW11-P crystal clock at the specified interrupt frequency.

  Interrupt frequency? 100

Date format <ALPHABETIC>?

Type 'A' or 'N' to choose the format for the system date.
Type 'ALPHABETIC' for alphabetic date (e.g. 31-Dec-76).
Type 'NUMERIC' for numeric date (e.g. 76.12.31).
Type <LF> for no change.

Date format <ALPHABETIC>? A

Time format <AM/PM>?

Type 'AM' or '24' to choose the format for the system time.
Type 'AM/PM' for AM/PM format time (e.g. 01:30 PM).
Type '24-HOUR' for numeric time (e.g. 13:30).
Type <LF> for no change.

Time format <AM/PM>? AM

Power fail delay <1>?
When power is restored after a power failure, RSTS/E will
delay the recovery for 1 to 300 seconds to allow all
devices to become ready.  Specify the number of seconds
you want to delay.

Power fail delay <1>? 300


Option: START

You currently have: JOB MAX = 50, SWAP MAX = 31K.

JOB MAX or SWAP MAX changes?

JOB MAX or SWAP MAX may be changed as follows:


 1) JOB MAX may never be greater than 50,  which  is  the  job  maximum
    specified at system generation time.

 2) SWAP MAX, which is expressed in K of memory  (1K=1024  words),  may
    never be greater than 31 (K) or less than 8 (K).

 3) Each of the four possible swap files can hold N jobs, where
      N = [Size of swap file (in blocks)] / [SWAP MAX (K) * 4]
```

```
    truncated to an integer.  The sum of the  N's  for  the  four  swap
    files  determines the number of Jobs which may log on.  This number
    may be increased on line by adding swap files (up to a  maximum  of
    4,  including SWAP.SYS), but may never exceed the JOB MAX specified
    at start-up time.

 4) The one required file, SWAP.SYS, must be at least [SWAP  MAX  *  8]
    blocks long, so that it can hold two Jobs.

Type 'YES' to change JOB MAX or SWAP MAX.  Type 'NO' to leave the
maxima as they stand.  Any changes? NO

Any memory allocation changes?

If you wish to specify a certain portion of  memory  as  unavailable  to
RSTS or as dedicated buffer space, or if you wish to locate the Run Time
System at some special address (e.g.  in MOS memory), answer 'YES'.   To
leave  the  memory  allocation  unchanged from the last specified table,
answer 'NO'.

Any memory allocation changes? NO

You currently have crash dump enabled.

Crash dump?

Type 'YES' to enable crash dump at startup time.
Type 'NO' to disable crash dump.

Enable crash dump? YES

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
07:36 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 7:36 PM
DB0: disabled - unit not present

1 device disabled

?Can't find file or account
?Program lost-Sorry

Ready

MOUNT DM0:SYSL1G/RO

Ready

RUN DM0:$BUILD
BUILD   V7.0-07 RSTS V7.0-07 Large System
System Build <No> ? YES
Source Input Device <DM0:> ? DM0:
Library Output Device <SY:> ? SY:
Target System Device <SY0:> ? SY0:
Library Account <[1,2]> ? [1,2]

*** Copying file DM0:[1,2]BUILD.CTL to BLD01.TMP ***

Locate logical 'LB:' on <SY:[1,1]> ? SY:[1,11]

%Can't find file or account - SY:[1,11]
Attempt to create account SY:[1,11] <No>? YES
Account SY:[1,11] created with your password
Function (Build/Patch, Patch, Build) <Build/Patch> ? BUILD
Run-Time System <BASIC > ? BASIC
```

```
Locate ERROR Package on <SY:[1,2]> ? SY:[1,8]

%Can't find file or account - SY:[1,8]
Attempt to create account SY:[1,8] <No>? YES
Account SY:[1,8] created with your password
Additional Control File is <None> ? SPLER

*** Copying file DMO:[1,2]SPLER.CTL to BLDO1.TMP ***

Locate SPOOLING Package on <SY:[1,2]> ? SY:[1,250]

%Can't find file or account - SY:[1,250]
Attempt to create account SY:[1,250] <No>? YES
Account SY:[1,250] created with your password
Additional Control File is <None> ? BIGPRG

*** Copying file DMO:[1,2]BIGPRG.CTL to BLDO1.TMP ***

Additional Control File is <None> ? BACKUP

*** Copying file DMO:[1,2]BACKUP.CTL to BLDO1.TMP ***

Locate BACKUP Package on <SY:[1,2]> ? SY:[1,99]

%Can't find file or account - SY:[1,99]
Attempt to create account SY:[1,99] <No>? YES
Account SY:[1,99] created with your password
Additional Control File is <None> ? DEVTST

*** Copying file DMO:[1,2]DEVTST.CTL to BLDO1.TMP ***

Locate DEVTST Package on <SY:[1,2]> ? SY:[1,44]

%Can't find file or account - SY:[1,44]
Attempt to create account SY:[1,44] <No>? YES
Account SY:[1,44] created with your password
Additional Control File is <None> ?
COMPILE SY:[1,2]BUILD
OLD DMO:[1,2]LOGIN.BAS
COMPILE SYO:[1,2]LOGIN<232>
OLD DMO:[1,2]ATPK.BAS
COMPILE SY:[1,2]ATPK
RUN SY:[1,2]ATPK
BLDO1.TMP/RTS:[0,1]BASIC.RTS/LOG/DEL

Ready


Ready


Ready


Ready


Ready


Ready


Ready

ATPK     V7.0-07 RSTS V7.0-07 Large System
*
Ready

ASSIGN SYO:SYSDSK
```

```
Ready

ASSIGN SY:SYSTEM

Ready

ASSIGN [1,2]

Ready

ASSIGN DMO:INPUT

Ready

!********** BUILD.CTL - STANDARD LIBRARY PROGRAMS
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.



SCALE 0

Ready

OLD DMO:[1,2]CPATCH.BAS

Ready

COMPILE SY:[1,2]CPATCH

Ready

SCALE 0

Ready

OLD DMO:[1,2]AUTOED.BAS

Ready

COMPILE SY:[1,2]AUTOED

Ready


SCALE 0

Ready

OLD DMO:[1,2]BUILD .BAS

Ready

COMPILE SY:[1,2]BUILD

Ready

SCALE 0

Ready

OLD DMO:[1,2]ATPK.BAS
```

```
Ready
COMPILE SY:[1,2]ATPK
Ready

SCALE 0
Ready
OLD DMO:[1,2]LOGIN.BAS
Ready
COMPILE SY0:[1,2]LOGIN<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]LOGOUT.BAS
Ready
COMPILE SY0:[1,2]LOGOUT<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]PATCPY.BAS
Ready
COMPILE SY:[1,2]PATCPY
Ready

SCALE 0
Ready
OLD DMO:[1,2]PBUILD.BAS
Ready
COMPILE SY:[1,2]PBUILD
Ready

SCALE 0
Ready
OLD DMO:[1,2]UTILTY.BAS
Ready
COMPILE SY0:[1,2]UTILTY
```

```
Ready

SCALE 0

Ready

OLD DMO:[1,2]INIT  .BAS

Ready

COMPILE SY0:[1,2]INIT

Ready

SCALE 0

Ready

OLD DMO:[1,2]SHUTUP.BAS

Ready

COMPILE SY0:[1,2]SHUTUP

Ready

SCALE 0

Ready

OLD DMO:[1,2]ERRBLD.BAS

Ready

COMPILE SY:[1,8]ERRBLD

Ready

RUN SY:[1,8]ERRBLD
ERRBLD  V7.0-07 RSTS V7.0-07 Large System

Ready

SCALE 0

Ready

OLD DMO:[1,2]ERRINT.BAS

Ready

COMPILE SY:[1,8]ERRINT

Ready

SCALE 0

Ready

OLD DMO:[1,2]ERRCPY.BAS

Ready
```

```
COMPILE SY:[1,8]ERRCPY
Ready

SCALE 0
Ready
OLD DMO:[1,2]DIRECT.BAS
Ready
COMPILE SY:[1,2]DIRECT<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]TTYSET.BAS
Ready
COMPILE SY:[1,2]TTYSET<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]SYSTAT.BAS
Ready
COMPILE SY:[1,2]SYSTAT<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]EDIT   .BAS
Ready
COMPILE SY:[1,2]EDIT<40>
Ready

SCALE 0
Ready
OLD DMO:[1,2]EDITCH.BAS
Ready
COMPILE SY:[1,2]EDITCH<40>
Ready
```

```
SCALE 0

Ready

OLD DMO:[1,2]ERRDIS.BAS

Ready

COMPILE SY:[1,8]ERRDIS

Ready

SCALE 0

Ready

OLD DMO:[1,2]ERRDET.BAS

Ready

COMPILE SY:[1,8]ERRDET

Ready

SCALE 0

Ready

OLD DMO:[1,2]ANALYS.BAS

Ready

COMPILE SY:[1,8]ANALYS

Ready

SCALE 0

Ready

OLD DMO:[1,2]ANALY1.BAS

Ready

COMPILE SY:[1,8]ANALY1

Ready

SCALE 0

Ready

OLD DMO:[1,2]ODT    .BAS

Ready

COMPILE SY:[1,2]ODT

Ready

SCALE 0

Ready
```

```
OLD DMO:[1,2]REACT .BAS
Ready
COMPILE SY:[1,2]REACT
Ready

SCALE 0
Ready
OLD DMO:[1,2]REORDR.BAS
Ready
COMPILE SY:[1,2]REORDR
Ready

SCALE 0
Ready
OLD DMO:[1,2]DSKINT.BAS
Ready
COMPILE SY:[1,2]DSKINT
Ready

SCALE 0
Ready
OLD DMO:[1,2]UMOUNT.BAS
Ready
COMPILE SY:[1,2]UMOUNT<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]COPY  .BAS
Ready
COMPILE SY:[1,2]COPY<40>
Ready

SCALE 0
Ready
OLD DMO:[1,2]FILCOM.BAS
Ready
```

```
COMPILE SY:[1,2]FILCOM<40>
Ready

SCALE 0
Ready
OLD DMO:[1,2]QUOLST.BAS
Ready
COMPILE SY:[1,2]QUOLST<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]MONEY .BAS
Ready
COMPILE SY:[1,2]MONEY<40>
Ready

SCALE 0
Ready
OLD DMO:[1,2]GRIPE .BAS
Ready
COMPILE SY:[1,2]GRIPE<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]TALK  .BAS
Ready
COMPILE SY:[1,2]TALK<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]PLEASE.BAS
Ready
COMPILE SY:[1,2]PLEASE<232>
Ready
```

```
SCALE 0

Ready

OLD DMO:[1,2]INUSE .BAS

Ready

COMPILE SY:[1,2]INUSE<40>

Ready


SCALE 0

Ready

OLD DMO:[1,2]SWITCH.BAS

Ready

COMPILE SY:[1,2]SWITCH<232>

Ready


RUN SY:[1,2]PIP.SAV
*SY:[1,2]ONLCLN.SAV/RTS:RT11=DMO:[1,2]ONLCLN.SAV
*^Z

Ready


RUN SY:[1,2]PIP.SAV
*SY:[1,2]NOTICE.TXT<40> /PR:NOWARN=DMO:[1,2]NOTICE.TXT/AS/NO
*SY:[1,2]HELP   .TXT<40> /PR:NOWARN=DMO:[1,2]HELP   .TXT/AS/NO
*SY:[1,2]START.TMP=KB:
@SYO:[1,2]RTS.CMD
@SYO:[1,2]TTY.CMD
$@SPOOL.CMD[1,2]
@SYO:[1,2]CCL.CMD
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,11]LB
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,8]ERRINT
FORCE KB0: 100
FORCE KB0: NO
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
^Z
*SYO:[1,2]START .CTL     /PR:NOWARN=SY:[1,2]START.TMP/AS
*SY:[1,2]START .TMP      /DE:NOWARN
*SYO:[1,2]TTY    .CMD    /PR:NOWARN=DMO:[1,2]TTY    .CMD/AS/NO
*SYO:[1,2]RTS    .CMD    /PR:NOWARN=DMO:[1,2]RTS    .CMD/AS/NO
*SYO:[1,2]CCL    .CMD    /PR:NOWARN=DMO:[1,2]CCL    .CMD/AS/NO
*SY:[1,2]CRASH .TMP                 =KB:
@SYO:[1,2]RTS.CMD
@SYO:[1,2]ANALYS.CMD
@SYO:[1,2]CLEAN.CMD
@SYO:[1,2]TTY.CMD
$@SPOOL.CMD[1,2]
@SYO:[1,2]CCL.CMD
```

```
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,11]LB
FORCE KB0: EXIT
FORCE KB0: RUN SY:[1,2]QUE
FORCE KB0: Q SY:[1,8]ANALYS.DMP/DE
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,8]ERRINT
FORCE KB0: 100
FORCE KB0: YES
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
^Z
*SY0:[1,2]CRASH .CTL     /PR:NOWARN=SY:[1,2]CRASH .TMP/AS
*SY:[1,2]CRASH .TMP      /DE:NOWARN
*SY:[1,2]ANALYS.TMP                =KB:
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,8]ANALYS
FORCE KB0: [0,1]CRASH.SYS
FORCE KB0: SY:[1,8]ANALYS.DMP/WIDE
FORCE KB0: SY:[1,8]ERRCRS.FIL
FORCE KB0: BYE/F
ATTACH
^Z
*SY0:[1,2]ANALYS.CMD     /PR:NOWARN=SY:[1,2]ANALYS.TMP/AS/NO
*SY:[1,2]ANALYS.TMP      /DE:NOWARN
*SY0:[1,2]CLEAN .CMD     /PR:NOWARN=DM0:[1,2]CLEAN .CMD/AS/NO
*SY:[1,2]UTILTY.HLP                =DM0:[1,2]UTILTY.HLP/AS/NO
*SY:[1,2]DIRECT.HLP<40>            =DM0:[1,2]DIRECT.HLP/AS/NO
*SY:[1,8]ERRDIS.HLP                =DM0:[1,2]ERRDIS.HLP/AS/NO
*SY:[1,2]ACCT   .SYS<188>         /PR:NOWARN=DM0:[1,2]ACCT   .SYS/AS/NO
*SY:[1,2]COPY   .HLP<40>           =DM0:[1,2]COPY   .HLP/AS/NO
*^Z

Ready

RUN SY:[1,2]UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Large System
#LOGINS
#EXIT

Ready


!********** SPLER.CTL - SPOOLING PROGRAM BUILD
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.



SCALE 0

Ready

OLD DM0:[1,2]QUE.BAS

Ready

COMPILE SY:[1,2]QUE    <232>

Ready
```

```
SCALE 0

Ready

OLD DMO:[1,2]QUEMAN.BAS

Ready

COMPILE SY:[1,250]QUEMAN

Ready

SCALE 0

Ready

OLD DMO:[1,2]QUMRUN.BAS

Ready

COMPILE SY:[1,250]QUMRUN

Ready

SCALE 0

Ready

OLD DMO:[1,2]OPSER.BAS

Ready

COMPILE SY:[1,250]OPSER

Ready

SCALE 0

Ready

OLD DMO:[1,2]OPSRUN.BAS

Ready

COMPILE SY:[1,250]OPSRUN

Ready

SCALE 0

Ready

OLD DMO:[1,2]CHARS .BAS

Ready

COMPILE SY:[1,250]CHARS

Ready

RUN SY:[1,250]CHARS
CHARS   V7.0-07 RSTS V7.0-07 Large System

Ready
```

```
SCALE 0

Ready

OLD DMO:[1,2]SPOOL .BAS

Ready

COMPILE SY:[1,250]SPOOL

Ready

SCALE 0

Ready

OLD DMO:[1,2]SPLIDL.BAS

Ready

COMPILE SY:[1,250]SPLIDL

Ready

SCALE 0

Ready

OLD DMO:[1,2]SPLRUN.BAS

Ready

COMPILE SY:[1,250]SPLRUN

Ready

SCALE 0

Ready

OLD DMO:[1,2]BATDCD.BAS

Ready

COMPILE SY:[1,250]BATDCD

Ready

RUN SY:[1,250]BATDCD
BATDCD  V7.0-07 RSTS V7.0-07 Large System

Ready

SCALE 0

Ready

OLD DMO:[1,2]BATCH .BAS

Ready

COMPILE SY:[1,250]BATCH
```

```
Ready

SCALE 0

Ready

OLD DMO:[1,2]BATIDL.BAS

Ready

COMPILE SY:[1,250]BATIDL

Ready

SCALE 0

Ready

OLD DMO:[1,2]BATDEC.BAS

Ready

COMPILE SY:[1,250]BATDEC

Ready

SCALE 0

Ready

OLD DMO:[1,2]BATRUN.BAS

Ready

COMPILE SY:[1,250]BATRUN

Ready

RUN SY:[1,2]PIP.SAV
*SY:[1,2]SPOOL .TMP=KB:
DETACH
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,250]OPSER
FORCE KB: DETACH
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,250]QUEMAN
FORCE KB: DETACH/PRIORITY:0
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,250]SPOOL
FORCE KB: LP0:/HEAD:2
LOGIN KB: [1,2]
FORCE KB: RUN SY:[1,250]BATCH
FORCE KB: BA0:/ERROR:FATAL/NOQUEUE/NODELETE
ATTACH
^Z
*SY0:[1,2]SPOOL.CMD/PR:NOWARN=SY:[1,2]SPOOL.TMP/AS
*SY:[1,2]SPOOL.TMP/DE:NOWARN
*^Z

Ready

RUN SY:[1,2]CPATCH
CPATCH  V7.0-07 RSTS V7.0-07 Large System
```

```
File to patch - SY0:[1,2]START.CTL
#KB:
*:G/$/@SPOOL.CMD/-11C/@SPOOL.CMD/EX
Patch from _KB:[1,2].CMD complete.
#^Z
File to patch - ^Z

Ready

RUN SY:[1,2]CPATCH
CPATCH  V7.0-07 RSTS V7.0-07 Large System
File to patch - SY0:[1,2]CRASH.CTL
#KB:
*:G/$/@SPOOL.CMD/-11C/@SPOOL.CMD/EX
Patch from _KB:[1,2].CMD complete.
#^Z
File to patch - ^Z

Ready


!********** BIGPRG.CTL - LARGE PROGRAM BUILD
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.


SCALE 0

Ready

OLD DM0:[1,2]DISPLY.BAS

Ready

APPEND DM0:[1,2]VT05  .DPY

Ready

COMPILE SY:[1,2]VT5DPY<232>

Ready


SCALE 0

Ready

OLD DM0:[1,2]DISPLY.BAS

Ready

APPEND DM0:[1,2]VT50  .DPY

Ready

COMPILE SY:[1,2]VT50PY<232>

Ready


SCALE 0

Ready

OLD DM0:[1,2]FIT.BAS

Ready
```

```
COMPILE SY:[1,2]FIT<232>
Ready

SCALE 0
Ready
OLD DM0:[1,2]FLINT.BAS
Ready
COMPILE SY:[1,2]FLINT<40>
Ready

SCALE 0
Ready
OLD DM0:[1,2]PMDUMP.BAS
Ready
COMPILE SY:[1,2]PMDUMP<40>
Ready

SCALE 0
Ready
OLD DM0:[1,2]BPCREF.BAS
Ready
COMPILE SY:[1,2]BPCREF<40>
Ready

SCALE 0
Ready
OLD DM0:[1,2]BPCRF1.BAS
Ready
COMPILE SY:[1,2]BPCRF1<40>
Ready

SCALE 0
Ready
OLD DM0:[1,2]RUNOFF.BAS
Ready
COMPILE SY:[1,2]RUNOFF<40>
Ready
```

```
SCALE 0

Ready

OLD DM0:[1,2]MAKSIL.BAS

Ready

COMPILE SY:[1,2]MAKSIL

Ready


RUN SY:[1,2]PIP.SAV
*SY:[1,2]SAVRES.SAV<124>/RTS:RT11=DM0:[1,2]SAVRES.SAV
*^Z

Ready


RUN SY:[1,2]PIP.SAV
*SY:[1,2]BPCREF.HLP<40>=DM0:[1,2]BPCREF.HLP/AS/NO
*SY:[1,2]FIT.HLP<40>=DM0:[1,2]FIT.HLP/AS/NO
*SY:[1,2]RUNOFF.RNO<40>=DM0:[1,2]RUNOFF.RNO/AS/NO
*^Z

Ready


!********** BACKUP.CTL - BACKUP PROGRAM BUILD
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.



SCALE 0

Ready

OLD DM0:[1,2]BACKUP.BAS

Ready

COMPILE SY:[1,99]BACKUP<232>

Ready

SCALE 0

Ready

OLD DM0:[1,2]BACLST.BAS

Ready

COMPILE SY:[1,99]BACLST<232>

Ready

SCALE 0

Ready

OLD DM0:[1,2]BACCON.BAS

Ready
```

```
COMPILE SY:[1,99]BACCON<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]BACDIR.BAS
Ready
COMPILE SY:[1,99]BACDIR<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]BACMNT.BAS
Ready
COMPILE SY:[1,99]BACMNT<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]BACLAB.BAS
Ready
COMPILE SY:[1,99]BACLAB<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]BACDSK.BAS
Ready
COMPILE SY:[1,99]BACDSK<232>
Ready

SCALE 0
Ready
OLD DMO:[1,2]BACKTO.BAS
Ready
COMPILE SY:[1,99]BACKTO<232>
Ready
```

```
SCALE 0

Ready

OLD DM0:[1,2]BACCOM.BAS

Ready

COMPILE SY:[1,99]BACCOM<232>

Ready

SCALE 0

Ready

OLD DM0:[1,2]BACDMP.BAS

Ready

COMPILE SY:[1,99]BACDMP<232>

Ready

SCALE 0

Ready

OLD DM0:[1,2]BACDEL.BAS

Ready

COMPILE SY:[1,99]BACDEL<232>

Ready

SCALE 0

Ready

OLD DM0:[1,2]BACLOD.BAS

Ready

COMPILE SY:[1,99]BACLOD<232>

Ready

SCALE 0

Ready

OLD DM0:[1,2]BACENT.BAS

Ready

COMPILE SY:[1,99]BACENT

Ready

SCALE 0
```

```
Ready

OLD DMO:[1,2]BACFRM.BAS

Ready

COMPILE SY:[1,99]BACFRM<232>

Ready

SCALE 0

Ready

OLD DMO:[1,2]BACPRM.BAS

Ready

COMPILE SY:[1,99]BACPRM

Ready

RUN SY:[1,99]BACPRM
BACPRM  V7.0-07 RSTS V7.0-07 Large System

Ready

!********** DEVTST.CTL - DEVICE EXERCISER PROGRAMS
! Copyright (C) 1979 by Digital Equipment Corporation, Maynard, Mass.


SCALE 0

Ready

OLD DMO:[1,2]DSKSEK.BAS

Ready

COMPILE SY:[1,44]DSKSEK

Ready

SCALE 0

Ready

OLD DMO:[1,2]DSKEXR.BAS

Ready

COMPILE SY:[1,44]DSKEXR

Ready

SCALE 0

Ready

OLD DMO:[1,2]LPEXER.BAS

Ready
```

```
COMPILE SY:[1,44]LPEXER

Ready

SCALE 0

Ready

OLD DMO:[1,2]PPEXER.BAS

Ready

COMPILE SY:[1,44]PPEXER

Ready

SCALE 0

Ready

OLD DMO:[1,2]PREXER.BAS

Ready

COMPILE SY:[1,44]PREXER

Ready

SCALE 0

Ready

OLD DMO:[1,2]DXEXER.BAS

Ready

COMPILE SY:[1,44]DXEXER

Ready

SCALE 0

Ready

OLD DMO:[1,2]DTEXER.BAS

Ready

COMPILE SY:[1,44]DTEXER

Ready

! ERRORS WILL RESULT WHEN THE CPEXER PROGRAM IS BUILT
! USING CSPCOM OR BASIC PLUS IF THE NECESSARY MATH OPTIONS
! WERE NOT SELECTED.
SCALE 0

Ready

OLD DMO:[1,2]CPEXER.BAS

Ready
```

```
COMPILE SY:[1,44]CPEXER

Ready

SCALE 0

Ready

OLD DM0:[1,2]CPUTST.BAS

Ready

COMPILE SY:[1,44]CPUTST

Ready

SCALE 0

Ready

OLD DM0:[1,2]KBEXER.BAS

Ready

COMPILE SY:[1,44]KBEXER

Ready

SCALE 0

Ready

OLD DM0:[1,2]MTEXER.BAS

Ready

COMPILE SY:[1,44]MTEXER

Ready



 *** BUILD Complete ***

Ready

RUN $PIP
*$NOTICE.TXT

WELCOME TO RSTS/E V7.0 TIME SHARING



*SY:$NOTICE.TXT=KB:

RSTS/E V7.0 IS ON THE AIR, WITH

                                LARGE FILES

              AND

DATA CACHING!!!
```

```
^Z
*$HELP.TXT

TO GET ON-LINE AND USE RSTS/E, FOLLOW THE
INSTRUCTIONS FOUND IN THE
RSTS/E SYSTEM USER'S GUIDE.

*$HELP.TXT=KB:

SEE DAVE AT EXT. 350 FOR INFORMATION ON USING
THIS RSTS/E TIME-SHARING SYSTEM.

^Z
*$START.CTL
@SY0:[1,2]RTS.CMD
@SY0:[1,2]TTY.CMD
@SPOOL.CMD[1,2]
@SY0:[1,2]CCL.CMD
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,11]LB
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,8]ERRINT
FORCE KB0: 100
FORCE KB0: NO
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
*$CRASH.CTL
@SY0:[1,2]RTS.CMD
@SY0:[1,2]ANALYS.CMD
@SY0:[1,2]CLEAN.CMD
@SY0:[1,2]TTY.CMD
@SPOOL.CMD[1,2]
@SY0:[1,2]CCL.CMD
DETACH
LOGIN KB0: [1,2]
FORCE KB0: RUN SY:[1,2]UTILTY
FORCE KB0: REMOVE LOGICAL LB
FORCE KB0: ADD LOGICAL SY:[1,11]LB
FORCE KB0: EXIT
FORCE KB0: RUN SY:[1,2]QUE
FORCE KB0: Q SY:[1,8]ANALYS.DMP/DE
FORCE KB0: EXIT
FORCE KB0: BYE/F
ATTACH
FORCE KB0: RUN SY:[1,8]ERRINT
FORCE KB0: 100
FORCE KB0: YES
LOGINS
SEND RSTS/E IS NOW ON THE AIR...
END
*$ACCT.SYS
*SY:$ACCT.SYS=KB:
3,3,ACCT,0,0,ACCOUNTING OFFICE
9,1,43912,0,0,SECURITY OFFICE
99,99,GAMES,0,0,GAMES ACCOUNT
100,100,DEMO,0,0,SYSTEM DEMO ACCOUNT
^Z
*^Z

Ready

RUN $REACT
```

```
REACT   V7.0-07 RSTS V7.0-07 Large System
System Account Manager
Function? STANDARD
?Name or account now exists - Failure to ENTER Account: [100,100] DEMO
0  0 SYSTEM DEMO ACCOUNT
All Accounts in Account File are now Entered
Function? ^Z

Ready

RUN $SHUTUP
SHUTUP   V7.0-07   RSTS V7.0-07 Large System

08:41 PM 22-Apr-79  ******** Set-up   Dialogue   Phase  ********

Type 'ESC'('ALT') to any query to backup one (1) step

'OPSER' not running

Minutes until system shutdown (0-99) <5>? 0

08:41 PM 22-Apr-79  ******** Warning   Message   Phase  ********
Further LOGINs are now disabled

08:41 PM 22-Apr-79  ******** Initial Job Killing Phase  ********

08:41 PM 22-Apr-79  ******** Remove RTS/RES LIB  Phase  ********

08:41 PM 22-Apr-79  ******** SWAP File  Removal  Phase  ********

08:41 PM 22-Apr-79  ******** Disk     DISMOUNT    Phase  ********

08:41 PM 22-Apr-79  ******** Final    Shutdown    Phase  ********

Please wait for system to re-boot itself




Warning ** DB2: is dual ported, proceed with caution!

Warning ** DB1: is dual ported, proceed with caution!


RSTS V7.0-07 Large System (DR0)


Option: SAVRES

22-Apr-79?
Enter date as 'DAY-MONTH-YEAR' (e.g., 31-DEC-76)
or as 'YEAR.MONTH.DAY' (e.g., 76.12.31) ? 22-APR-79
08:42 PM?
Enter time as 'HOUR:MINUTES AM' or 'HOUR:MINUTES PM' (e.g. 1:15 PM)
or in 24-hour format as 'HOUR:MINUTES' (e.g. 13:15) ? 8:42 PM
```

```
SAV/RES Function:

Please enter one of the valid SAV/RES functions,
or type 'HELP' for a help message: HELP

The valid SAV/RES functions are:
    SAVE        Make a safe copy of a RSTS/E file-structured disk.
    RESTORE     Restore a RSTS/E file-structured disk from a SAVE Set.
    IMAGE       Copy a volume image from a RSTS/E file-structured disk
                to a LIKE disk.
    IDENTIFY    List the characteristics of a SAVE Set or RSTS/E disk.
    HELP        Print this list of acceptable responses.
Only the first two characters need be typed.


SAV/RES Function: IDENTIFY

From Device?

Type 2 characters to specify the input device type,
followed by a single digit (0-7) to specify the unit
number.
Include a Save Set name or Pack ID if you want SAVRES
to ensure it matches the one on the volume.  This drive
should be WRITE-LOCKED.

From Device? DM1

          Device:       DM1:
         Pack ID:       SAMPLE
Pack Clustersize:       4
   Creation date:       Sunday, 22-Apr-79


SAV/RES Function: SAVE

From RSTS disk?

Type 2 characters to specify the input device type,
followed by a single digit (0-7) to specify the unit
number.
Include a  Pack  Id  if you want SAVRES to ensure it
matches the one on the volume.  This drive should be
WRITE-LOCKED.

From RSTS disk? DR0:

*** Pack ID/default Save Set Name is BIGV70

To Device? DM1:RECOVR

*** The volume on DM1: is a RSTS disk
*** Pack ID is SAMPLE

*** Pack will be reinitialized
Mount it anyway <NO>?
*** This is your last chance to prevent the
*** loss of any data on the output volume
Mount it anyway <NO>? YES

*** Save Set Name is RECOVR

Expiration Date <21-Apr-80>?

Type the desired expiration date or press the LINE FEED
key to accept the date printed.

Expiration Date <21-Apr-80>? 21-APR-82
```

```
Verify (Yes or No) <NO>? YES

Proceed (Yes or No)?

Type 'Yes' to proceed with the operation.
Type 'No' to abort and return to the SAV/RES Function: prompt.

Proceed (Yes or No)? YES

*** Initializing first SAVE volume

*** Begin SAVE from DR0: to DM1: at 09:00 PM

*** Begin VERIFY pass from DR0: to DM1: at 09:01 PM

*** 0 differences found

 Dismount Device:        DM1:
        Set Name:        RECOVR
          Seq #:         1
   Creation date:        Sunday, 22-Apr-79
 Expiration date:        Wednesday, 21-Apr-82

        Please label this volume!

--- SAVE operation completed at 09:02 PM

                Summary Report

SAVE of DR0:BIGV70 to Save Set RECOVR

    Input Device:        DR0:
         Pack ID:        BIGV70
Pack Clustersize:        8
   Creation date:        Sunday, 22-Apr-79

   Output Device:        Disk
        Set Name:        RECOVR
    # of volumes:        1
   Creation date:        Sunday, 22-Apr-79
 Expiration date:        Wednesday, 21-Apr-82

SAVE started on Sunday, 22-Apr-79, at 09:00 PM

                Run Statistics

Transfer Totals:

        Total of 10920 blocks transferred

Error Totals:

        Total of    0 bad compares.

        Total of    0 new bad blocks encountered on source.
        Total of    0 new bad blocks encountered on destination.

Timing Totals:

        Total elapsed time:   0 hrs.,   2 mins.,   7 secs.
        Total wait    time:   0 hrs.,   0 mins.,   0 secs.
        Total process time:   0 hrs.,   2 mins.,   7 secs.


SAV/RES Function:


Option: START
```

```
You currently have: JOB MAX = 50, SWAP MAX = 31K.

JOB MAX or SWAP MAX changes? NO

Any memory allocation changes? NO

You currently have crash dump enabled.

Crash dump? YES

22-Apr-79?
09:06 PM?
DB0: disabled - unit not present

1 device disabled

INIT    V7.0-07 RSTS V7.0-07 Large System

Command File Name?
DETACHING...



^C
HELLO 1/2
Password:
Job 1 is detached under this account
Job number to attach to?
1 other user is logged in under this account



Ready

RUN $UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Large System
#ADD RT11
#ADD RSX
?Can't find file or account - in ADD
#ADD RMS11
?Can't find file or account - in ADD
#ADD BP2COM
?Can't find file or account - in ADD
#ADD BP2IC2
?Can't find file or account - in ADD
#ADD BASIC
?Name or account now exists - in ADD
#ADD BAS4F
?Can't find file or account - in ADD
#ADD TECO
#EXIT

Ready

BYE/F
```

```
ATTACHING TO JOB 1
DETACHING...



^C
HELLO 1/2
Password:
Job 1 is detached under this account
Job number to attach to?
1 other user is logged in under this account



Ready

RUN $TTYSET
TTYSET  V7.0-07 RSTS V7.0-07 Large System
Terminal characteristics program
? EXIT

Ready

BYE/F









ATTACHING TO JOB 1
DETACHING...



^C
HELLO 1/2
Password:
Job 1 is detached under this account
Job number to attach to?
1 other user is logged in under this account



Ready

RUN SY:(1,250)OPSER
OPSER   V7.0-07 RSTS V7.0-07 Large System
'OPSER' FILES NOT FOUND - WILL INITIALIZE.
#DETACH
DETACHING . . .
```

```
^C
HELLO 1/2
Password:
Jobs 1 2 are detached under this account
Job number to attach to?
2 other users are logged in under this account



Ready

RUN SY:(1,250)QUEMAN
QUEMAN  V7.0-07 RSTS V7.0-07 Large System
'QUEUE.WRK' NOT FOUND - WILL INITIALIZE
NO QUEUE FILE FOUND -- WILL INITIALIZE
STARTED AT: 09:07 PM ON 22-Apr-79
INITIALIZED
#
JOB #3 'QUEMAN' PUT ONLINE
DETACH/PRIORITY:0
DETACHING . . .



^C
HELLO 1/2
Password:
Jobs 1 2 3 are detached under this account
Job number to attach to?
3 other users are logged in under this account



Ready

RUN SY:(1,250)SPOOL
SPOOL   V7.0-07 RSTS V7.0-07 Large System
#LP0:/HEAD:2
Detaching...



^C
HELLO 1/2
Password:
Jobs 1 2 3 4 are detached under this account
Job number to attach to?
4 other users are logged in under this account



Ready


JOB #4 'LPOSPL' PUT ONLINE

MESSAGE             1 : 22-Apr-79 09:07 PM  JOB:3  DET    QUMRUNE1,2]
        LPOSPL (4) PUT ONLINE
```

```
RUN SY:(1,250)BATCH
BATCH   V7.0-07 RSTS V7.0-07 Large System
#BAO:/ERROR:FATAL/NOQUEUE/NODELETE
DETACHING...



ATTACHING TO JOB 1
DETACHING...



^C
HELLO 1/2
Password:
Jobs 1 2 3 4 5 are detached under this account
Job number to attach to?
5 other users are logged in under this account



Ready


JOB #5 'BAOSPL' PUT ONLINE

MESSAGE              2 : 22-Apr-79 09:08 PM  JOB:3  DET    QUMRUNE1,2]
        BAOSPL (5) PUT ONLINE
RUN (1,2)UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Large System
#CCL ATT-ACH=(1,2)LOGIN.*/PRIV 30000
#CCL ATP-K=(1,2)ATPK.*/PRIV 30000
#CCL BCK-=(1,2)RMSBCK.TSK/0
#CCL BPC-REF=(1,2)BPCREF.*/30000
#CCL BYE-=(1,2)LOGOUT.*/PRIV 0
#CCL CNV-=(1,2)RMSCNV.TSK/0
#CCL CRE-ATE=(1,2)EDIT.*/30000
#CCL DEF-=(1,2)RMSDEF.TSK/0
#CCL DFN-=(1,2)RMSDFN.TSK/0
#CCL DES-=(1,2)RMSDES.TSK/0
#CCL DIS-MOUNT=(1,2)UMOUNT.*/PRIV 30000
#CCL DI-RECTORY=(1,2)DIRECT.*/PRIV 30000
#CCL DSP-=(1,2)RMSDSP.TSK/0
#CCL EDT-=(1,2)EDT.TSK/0
#CCL ED-IT=(1,2)EDIT.*/30000
#CCL FIT-=(1,2)FIT.*/PRIV 30000
#CCL HELLO-=(1,2)LOGIN.*/PRIV 0
#CCL IFL-=(1,2)RMSIFL.TSK/0
#CCL LBR-=(1,2)LBR.TSK/0
#CCL LIB-R=(1,2)LIBR.SAV/8208
#CCL LIN-K=(1,2)LINK.SAV/8208
#CCL LOG-IN=(1,2)LOGIN.*/PRIV 0
#CCL MACR-O=(1,2)MACRO.SAV/8216
#CCL MAC-=(1,2)MAC.TSK/0
#CCL MAK-E=(1,2)TECO.TEC/0
#CCL MOU-NT=(1,2)UMOUNT.*/PRIV 30000
#CCL MU-NG=(1,2)TECO.TEC/0
#CCL PAT-=(1,2)PAT.TSK/0
#CCL PIP-=(1,2)PIP.SAV/8208
#CCL PL-EASE=(1,2)PLEASE.*/PRIV 30000
#CCL QU-EUE=(1,2)QUE.*/PRIV 30000
#CCL RST-=(1,2)RMSRST.TSK/PRIV 0
```

```
#CCL SE-T=(1,2)TTYSET.*$PRIV 30000
#CCL SRT-=(1,2)SORT.TSK$0
#CCL SU-BMIT=(1,2)QUE.*$PRIV 30000
#CCL SW-ITCH=(1,2)SWITCH.*$PRIV 30000
#CCL SY-STAT=(1,2)SYSTAT.*$PRIV 30000
#CCL TE-CO=(1,2)TECO.TEC$0
#CCL TKB-=(1,2)TKB.TSK$0
#CCL TY-PE=(1,2)TECO.TEC$8
#CCL UT-ILTY=(1,2)UTILTY.*$30000
#EXIT

Ready

BYE/F



ATTACHING TO JOB 1
DETACHING...



^C
HELLO 1/2
Password:
Jobs 1 2 3 4 5 are detached under this account
Job number to attach to?
5 other users are logged in under this account



Ready

RUN SY:(1,2)UTILTY
UTILTY  V7.0-07 RSTS V7.0-07 Large System
#REMOVE LOGICAL LB
#ADD LOGICAL SY:(1,11)LB
#EXIT

Ready

BYE/F
```

```
ATTACHING TO JOB 1
RUN SY:(1,8)ERRINT
100
NO

Ready

ERRINT  V7.0-07 RSTS V7.0-07 Large System
ERRLOG File is 2% Full
Change Size to < 100 >?
Utilize Crash File Output (Yes/No) <No>?
Detaching . . .
```

Index

C

D

E

F

G

H

J

K

L

M

S

T

U

V

RSTS/E V7.0
System Generation Manual
AA-2669E-TC

READER'S COMMENTS

NOTE: This form is for document comments only. DIGITAL will use comments submitted on this form at the company's discretion. If you require a written reply and are eligible to receive one under Software Performance Report (SPR) service, submit your comments on an SPR form.

Did you find this manual understandable, usable, and well-organized? Please make suggestions for improvement.

Did you find errors in this manual? If so, specify the error and the page number.

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
- ☐ Other (please specify)_____

Name_____ Date_____

Organization_____

Street_____

City_____ State_____ Zip Code_____
or
Country

Do Not Tear - Fold Here and Tape

digital

No Postage Necessary if Mailed in the United States

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO.33 MAYNARD MASS.

POSTAGE WILL BE PAID BY ADDRESSEE

ATTN: Commercial Engineering Publications MK1-2/H3
DIGITAL EQUIPMENT CORPORATION
CONTINENTAL BOULEVARD
MERRIMACK N.H. 03054

Do Not Tear - Fold Here and Tape

Cut Along Dotted Line