

RSTS/E

System Installation and Update Guide

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This guide describes how to install and update a RSTS/E V9.1 system.

OPERATING SYSTEM AND VERSION: RSTS/E V9.1

SOFTWARE VERSION: RSTS/E V9.1

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Preface

Objective

This guide provides a task-oriented procedure for RSTS/E system installation and update.

Audience

The audience for this guide includes:

- Anyone installing RSTS/E for the first time.
- Anyone upgrading to RSTS/E V9.0 from a pre-V9.0 version of RSTS/E.
- Anyone updating an existing RSTS/E V9.0 system.
- Anyone performing an online or partial system installation.

In addition, the Offline Options section of this guide provides reference material on all the INIT.SYS options and suboptions. System managers will find this section useful for system tuning.

Document Structure

The guide is divided into six parts:

- | | |
|----------|--|
| Part I | Tells how to build a new RSTS/E system. It is divided into seven phases plus one optional phase, each consisting of one or more tasks. A summary of the installation procedure is printed on beige paper at the end of Part I. |
| Part II | Explains how to perform a system installation to upgrade an existing pre-V9.0 RSTS/E system to V9.0. |
| Part III | Explains how to perform an online system installation to create a new monitor, install system programs, or perform a full installation. |
| Part IV | Explains how to update an existing V9.0 system to a new release. It is divided into five phases plus one optional phase, each consisting of one or more tasks. |

Part V Is a reference section that describes the INIT.SYS offline options.

Appendixes A through F contain supplemental information that you may need for your particular installation.

Related Documents

You may find the following documents useful while performing a system installation:

- *RSTS/E V9.0 Release Notes*
- *RSTS/E System Manager's Guide*
- *RSTS/E Software Dispatch*

Conventions

This guide uses the following symbols and conventions:

	Represents a carriage-return/line-feed combination. Press the RETURN key on your keyboard to produce this combination.
	Indicates the circumflex key.
<i>Italics</i>	Indicates that a definition follows the italicized technical term.
	Represents the CTRL key and some other keyboard character. For example, to enter <CTRL/U>, hold down the CTRL key and press the key labeled "U". RSTS/E echoes or displays the character at your terminal as ^U.
<code>dot matrix</code>	Information in this typeface indicates text displayed on the console terminal.
<code>color</code>	Red dot matrix indicates the response made in the example installation. Your response may differ from the response given in the example installation.
	Tells what task or phase you should perform next.

Summary of Technical Changes for RSTS/E V9.0

The system installation and update process for RSTS/E V9.0 is quicker and easier than in previous releases. The guide is renamed and reorganized to reflect these changes, while still retaining the basic approach of the V8.0 manual.

The following is a summary of changes to this guide for RSTS/E V9.0:

- V9.0 supports the following hardware: DHU11/DHV11 multiplexer, RD52 disk, VT220/240 and LA200 terminals, RC25 disk, PDP-11/73 and PDP-11/84 systems, TK25 streaming tape, LN03 laser printer, and LQP03 printer.
- V9.0 no longer supports the following hardware: RF11 disks, RS03/RS04 disks, RK05 as a system disk, VT05 and VT50 terminals, and TU58 DECTape-II. See the *RSTS/E V9.0 Release Notes* for a complete list of unsupported hardware.

V9.0 no longer supports the following devices as distribution devices: RL01, RK05, and RK06 disks; 800 bpi, 600 foot magnetic tape used on TS03 magnetic tape drives.

- The following disk format restrictions apply to V9.0:
 - RDS0.0 disks (pre V8.0) can only be mounted read-only. They cannot be mounted as system or public disks.
 - RDS1.1 disks (V8.0) can be mounted read/write as private disks. They cannot be mounted as system or public disks.
 - RDS1.2 disks (V9.0) can be mounted read/write as system, public, or private disks.
- The RSX emulator is now a permanent feature of the monitor. The RSX run-time system is no longer necessary, because the monitor can now perform all functions. The default keyboard monitor is DCL.
- The V9.0 system installation process makes system start-up quicker and easier. The major changes are:
 - You no longer need to configure the SYSGEN monitor.
 - Indirect command files do much of the work for you.
 - Many features are now automatically enabled, including directory caching, some monitor feature patches, allocation of memory to XBUF, and creation of SWAP.SYS and CRASH.SYS system files.
 - The distribution kit contains two sets of media that you need for the installation:
 - V9.0 Installation Media
 - V9 Library Media

You begin the system installation by mounting the Installation media.

- You press RETURN rather than LINE FEED to accept the default choice in the system installation dialogue. You type a question mark (?) to obtain online assistance.
- After you install you V9.0 monitor, you can use some or all of the information from that monitor to configure future monitors during updates.
- The process to update an existing V9.0 system is now standardized. This guide describes how to update your system when you receive new releases of RSTS/E from DIGITAL.
- The following changes have been made to INIT.SYS:
 - The SET option is replaced by DCL commands. See the *RSTS/E System Manager's Guide* for details.
 - The CHANGE suboption of REFRESH is replaced by the DCL INSTALL FILE/SYSTEM command. See the *RSTS/E System Manager's Guide* for details.
 - A new VIRTUAL suboption of DEFAULT lets you allocate memory to a virtual disk. See the Offline Options section of this guide for details.
 - A streamlined DEFAULT option selects more defaults automatically. You can now set others online. See the Offline Options section of this guide for details.
 - A new DATES option eliminates the need for INIT.SYS to unnecessarily prompt you for the date and time. See the Offline Options section of this guide for details.
 - The HARDWR UNITS suboption has been removed (except for RK05F disks).
 - The INSTALL option is now obsolete. Use the START option instead.
- The configuration questions in Phase 3 of Part I have been updated. In addition, the LOAD/OVERLAY command replaces the four questions that pertain to making certain sections of code permanently resident. See the *RSTS/E System Manager's Guide* for details.

Summary of Technical Changes for RSTS/E V9.1

The following is a summary of the changes to this guide for RSTS/E V9.1:

Note

The RSTS/E V9.0 version of this manual contains many references to V9.0, which have not been changed for this update. You should consider all references to V9.0 to be V9.x.

- V9.1 supports the following hardware: PDP-11/83, PDP-11/84A (with MSV11), PDP-11/84P (without MSV11) systems, TK50 cartridge streaming tape drive, RQDX3 Q-bus disk controller, and RD53 disk.
- V9.1 can use the TK50 as a distribution device.
- The V9.1 installation process includes the following changes:
 - When you use a template monitor, SYSGEN always asks for any new devices, even if you respond “yes” to the “Accept defaults” question.
 - The MSCP controllers question now asks for the number of MSCP disks.
 - A new question asks for the number of TMSCP tape drives.
 - The Data Caching question has been deleted. Data caching is now used on all systems.
- The following changes have been made to INIT.SYS:
 - The DEFAULT dialogue question asking you to select a primary run-time system has been deleted. RSTS/E V9.0 provided a permanent run-time system that provided a keyboard monitor in the event the run-time system you were using suffered a catastrophic failure. The RSTS/E V9.1 monitor has a built-in keyboard monitor, eliminating the need for a primary run-time system. The advantage of this is that you no longer need to permanently allocate memory, thus freeing 1K (for RSX) or 28K (for DCL) of memory for other uses.
 - The RTS suboption of the DEFAULT option has been deleted because you no longer need to select and position a primary run-time system.
 - When using the XBUF suboption of DEFAULT, you now must consider the amount of XBUF memory required for file I/O window turns and the optional loading of disk Storage Allocation Tables (SAT).
- V9.1 supports a new MU: device name for use with the TK50 tape drive.
- The V9.1 distribution kit contains two sets of media that you need for the installation:

V9.1 Installation Media

V9 Library Media

- PBUILD is no longer included as a part of RSTS/E. For a corrected version of Appendix E, refer to the *RSTS/E V9.1 Release Notes*.

Introduction to System Installation

This section explains some basic concepts about system installation. It also explains how to use this guide.

What Is System Installation?

System installation is the process by which you build:

- A RSTS/E monitor
- One or more run-time systems
- System programs
- Layered products

The following sections briefly explain each of these items.

RSTS/E Monitor

The *RSTS/E monitor* is a set of routines that controls:

- System scheduling — RSTS/E stands for Resource Sharing Time Sharing/Extended. This means the monitor makes sure that all users can work simultaneously without interruption or interference; for example: running programs, creating programs, accessing data files, or working with a text editor.
- Memory management — The monitor makes sure that computer memory is used efficiently.
- Input/output (I/O) services — The monitor handles requests to and from I/O devices.
- Device management — Your installation probably has a variety of hardware, such as tape drives, line printers, and disk drives. The monitor controls the software that transfers data between these hardware devices and computer memory.

- System program management — A *system program* is software that provides you with a set of tools for performing common tasks, such as copying or deleting files. PIP and SYSTAT are examples of system programs. The monitor keeps track of who is using these system programs.

DIGITAL sells RSTS/E to a diverse audience; therefore, each installation requires a monitor suited to individual needs. During system installation, you build a RSTS/E monitor that reflects the hardware you have (number and types of tape drives, disk drives, and other peripheral devices), and the software you choose (number of jobs, number of small buffers, resident libraries, and so forth).

To get you started, DIGITAL supplies a temporary RSTS/E monitor (called the SYSGEN monitor) on the installation tape or disk. This monitor is prebuilt and requires no tailoring during system installation. You use it to build your RSTS/E monitor. After you build your RSTS/E monitor, you do not need the SYSGEN monitor anymore. You will be instructed when to “shut it down.”

Run-Time Systems

A *run-time system* is software that provides an environment for people to work in.

The run-time systems that DIGITAL supplies with RSTS/E are:

- DCL
- RSX
- BASIC-PLUS
- RT11

DCL is always the default keyboard monitor.

The RSTS/E V9.0 monitor has RSX emulation. Because the monitor can now perform all tasks previously associated with the RSX run-time system, you are no longer required to use the RSX run-time system. For example, you can choose DCL as the run-time system and not even have RSX on your system.

System Programs

System programs provide you with tools for performing common tasks. For example, system programs allow you to efficiently develop programs, manage files, and perform special system management-related tasks. These system programs run under the control of a run-time system. DIGITAL distributes RSTS/E system programs on container files, located on the V9 Library tapes or disks. You restore these container files during system installation to obtain the system programs you need.

Layered Products

A *layered product*, also called optional software, is software that you must purchase from DIGITAL. You can build layered products after you complete the system installation by processing the appropriate command file. Examples of optional software are BASIC-PLUS-2, COBOL-81, and DIBOL.

Types of System Installation

This guide describes four types of system installations:

- **New** — In this type of system installation you build a RSTS/E monitor, one or more run-time systems, the required system programs, and any other optional system programs.
- **Upgrade** — In this type of system installation you upgrade a V8.0 or earlier version of the monitor to a V9.0 monitor. This system installation is almost identical to the previous one, except for some additional tasks.
- **Online** — In this type of system installation you build a RSTS/E monitor during timesharing on a previously installed V9.0 system. Note that you cannot perform an online system installation to install a V9.0 system from a V8.0 or earlier system. For example, you cannot perform an online installation for a V9.1 system on a V9.0 system.
- **Update** — In this type of system installation, you update an existing V9.0 system to a new release. When you receive new V9.x Installation Kits from DIGITAL (x = 1, 2, 3, and so on), use these procedures to update your present V9.0 system to a later V9.x system.

Another type of system installation is:

- **System installation for another PDP-11** — In this type of installation you build a RSTS/E monitor on one PDP-11 for use on another PDP-11. This means you must know the hardware characteristics of the PDP-11 for which you are building the RSTS/E monitor.

How to Use This Guide

The *RSTS/E System Installation and Update Guide* focuses on the tasks you must perform to install or update your monitor, rather than the option or program used to complete the task. The guide is divided into six parts:

- **Part I** tells how to build a new RSTS/E system. It is divided into seven phases plus one optional phase, each consisting of one or more tasks. This logical division of phases makes it easier to understand the complex process of system installation. A summary of the installation procedure is printed on beige paper at the end of Part I.
- **Part II** explains how to perform a system installation to upgrade an existing RSTS/E system to V9.0.

- Part III explains how to perform an online system installation to create a new monitor or perform a partial installation.
- Part IV explains how to update an existing V9.0 system to a new release. It is divided into five phases plus one optional phase, each consisting of one or more tasks.
- Part V is a reference section that describes the INIT.SYS offline options.
- Appendixes A through F contain supplemental information that you may need for your particular installation.

Installing RSTS/E V9.0 on a New System

Part I describes the tasks you must perform to install a new RSTS/E V9.0 system. This part of the guide is for users who are less experienced and knowledgeable about performing a system installation. It also provides an example installation for use as an aid in explaining the tasks.

Some tasks require you to load and unload tapes or disks, depending on the RSTS/E installation kit you received. Other tasks require you to answer questions and to make decisions about some of the questions you need to answer.

The method of explanation depends on the type of task you perform. In tasks requiring you to load a tape or disk, the guide gives you general load instructions.

In tasks requiring you to answer questions and make decisions about the answers to those questions, this guide first gives you any necessary background information, followed by a *terminal session*. Each terminal session explains the question and gives some possible responses. The question appears in dot matrix type. The response in red next to the question is from an *example installation*. Use the example installation as a guide when you are building your RSTS/E monitor. The example installation has the following characteristics:

- CPU: PDP-11/44
- Memory: 512K words
- System Disk: RA80
- RSTS/E Distribution Kit: 1600 bpi magnetic tape
- Installation Kit: V9.0

Your responses may differ from the ones you see in the example installation. The following example question is from a terminal session:

```
Disk? DU
```

Explanation — This question asks for the device designator of your system disk.

Response — Acceptable responses for the system disks are: DL, DM, DP, DR, DB, or DU. In the example installation, the response is DU because the system disk is an RA80.

In addition to the explanation in the guide, you also have access to online explanations. To print the online explanation of a question on your console terminal, type a question mark (?).

Structure of Part I

Part I of this guide divides system installation into seven phases plus one optional phase, where each phase consists of one or more tasks. For convenience, all the tasks in a phase appear at the start of that section.

The contents of each phase follow:

Phase 1: Getting Started

Provides instructions on collecting the required installation kits and documentation, checking the kit order numbers, and physically mounting and bootstrapping the Installation tape or disk.

Bootstrap instructions are in Appendix D. However, Phase 1 contains an example of bootstrapping.

Phase 2: Prepare System

Describes how to mount, initialize, and copy files to your system disk. It also explains how to start the SYSGEN monitor.

Phase 3: Configure RSTS/E Monitor

Explains how to answer the configuration questions that determine the hardware and software your RSTS/E monitor will support.

Phase 4: Select RSTS/E System Programs

Describes how to select system programs. It also explains how to select layered product updates that will be transferred later.

Phase 5: Generate RSTS/E System

Explains how to generate the RSTS/E monitor. It also describes how to install system programs and transfer layered product updates. Finally, it describes the dialogue to install BASIC-PLUS and SORT/MERGE.

Phase 6: Create Accounts and Edit System Start-Up File

Describes how to tailor the START.COM file and create user accounts.

Phase 7: Start RSTS/E Monitor

Explains how to shut down the SYSGEN monitor and start the new RSTS/E monitor.

Phase 8: Optional Tasks

An optional phase that explains how to relocate system program packages or apply a mandatory patch.

System Installation Flowchart

Figure 1, the System Installation Flowchart, summarizes the installation phases and tasks. You may want to use this flowchart while you perform the system installation.

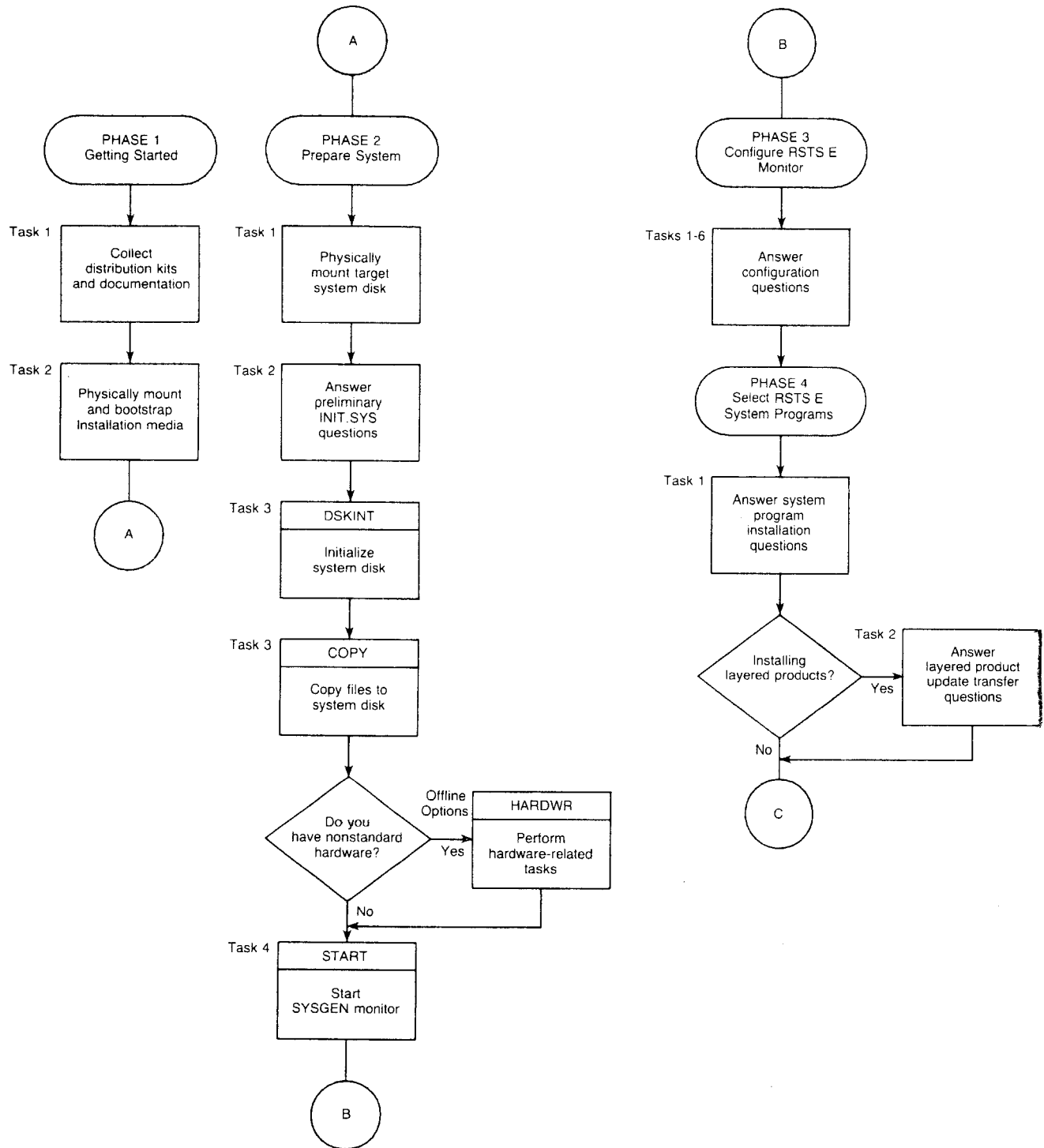
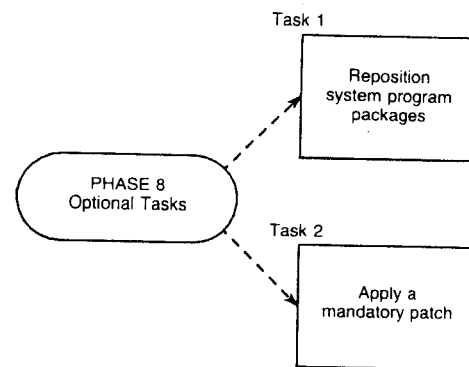
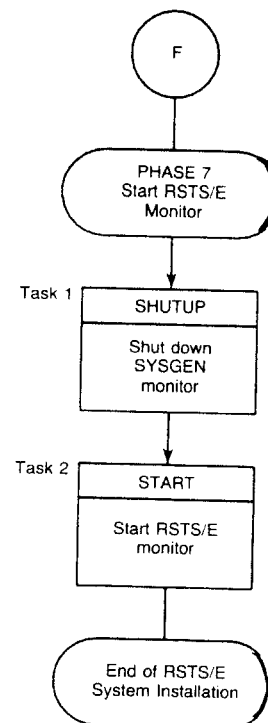
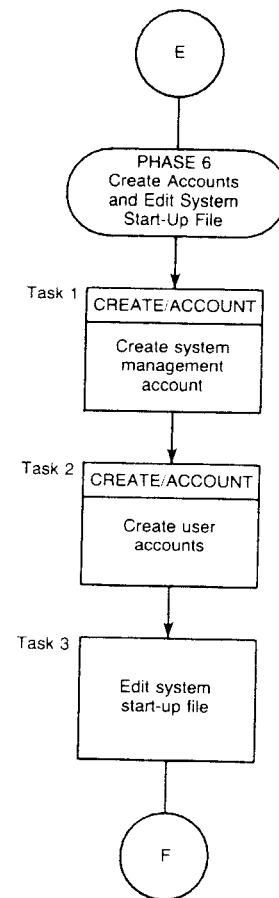
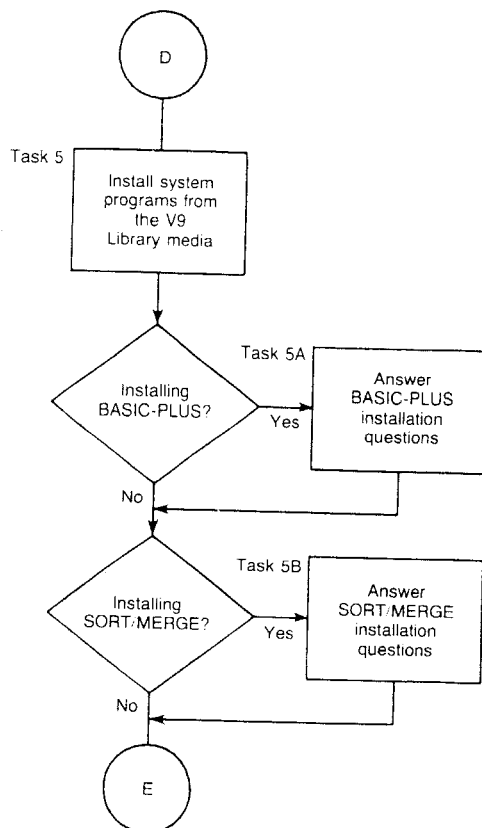
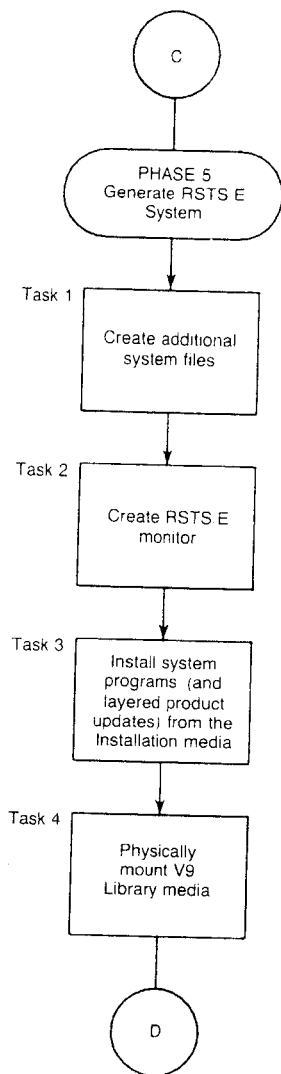


Figure 1: System Installation Flowchart



MK-01605-00

Phase 1 Getting Started

This phase describes the tasks you must perform to prepare for a RSTS/E system installation.

The tasks in this phase are:

- Task 1: Collect Distribution Kits and Documentation
- Task 2: Physically Mount and Bootstrap Installation Media

Task 1: Collect Distribution Kits and Documentation

DIGITAL sends you one of the following distribution kits:

- *A Kit* — for new RSTS/E customers. Contains complete RSTS/E documentation, RSTS/E V9 Library Kit, RSTS/E V9.0 Installation Kit, and all purchased optional software kits.
- *H Kit* — for those whose service contract or warranty has expired or for those who have purchased additional CPUs. Contains complete RSTS/E documentation, RSTS/E V9 Library Kit, RSTS/E V9.0 Installation Kit, and all purchased optional software kits.
- *W Kit* — for those under warranty or software product service contract. Contains complete RSTS/E documentation, RSTS/E V9 Library Kit, RSTS/E V9.0 Installation Kit, and all purchased optional software kits (only if the original version has changed).

To perform a system installation, collect the following items from the A, H, or W kit:

- *RSTS/E V9 Library Kit* — Consists of the tape or disk that contains most of the programs and files you need to perform a system installation.
- *RSTS/E V9.0 Installation Kit* — Consists of the tape or disk that contains feature and mandatory patches and replacement modules. It also contains some of the programs and files you need to perform a system installation and all the programs and files you need to perform a system update. You receive this kit for every new release of RSTS/E. The kits are labeled V9.1, V9.2, V9.3, and so forth. Because each kit is cumulative, use the most current one. For example, the V9.3 Installation Kit would contain all the patches and replacement modules that were on Kits V9.1 and V9.2, plus some new patches and replacement modules.
- *Optional Software Kit(s)* — Optional software, also called layered products, is purchased separately from the RSTS/E Distribution Kit. Examples of optional software are COBOL-81, BASIC-PLUS-2, and DIBOL. You purchase optional software from an original equipment manufacturer or directly from DIGITAL. Each optional software kit consists of the disk or tape that contains the programs and files you need to install the optional software, along with the appropriate documentation and installation guide.
- *RSTS/E V9.0 Release Notes* — Explains the differences between the most current and previous version of RSTS/E. You refer to this document during system installation.

You may want to keep the following items nearby for use as reference material:

- *RSTS/E System Manager's Guide* — Describes how to operate and manage a RSTS/E system. You refer to this manual during system installation for more

information about creating accounts and editing the system start-up file. You also use this manual to help manage your system on a day-to-day basis.

- *RSTS/E Software Dispatch* — Contains new and revised software product descriptions (SPD), programming notes, patches and replacement modules for system programs and optional software, and documentation corrections.

If one or more of these items is missing, contact your local DIGITAL software support specialist.

Check the order numbers that appear on the tapes or disks that make up your RSTS/E V9 Library Kit and RSTS/E V9.0 Installation Kit to be sure they match the order numbers that appear in the *RSTS/E Release Notes*. The *RSTS/E Release Notes* also contains the order numbers for the DECnet/E Software Kit and the RJ2780 Software Kit. To check the order numbers of any other optional software kits, refer to the bill of materials.



Go to Task 2.

Task 2: Physically Mount and Bootstrap Installation Media

This task requires you to mount and bootstrap the appropriate tape or disk from your RSTS/E Distribution Kit. First, the task provides instructions for mounting the tape on a tape drive, or mounting a disk on a disk drive. Choose the appropriate section for your type of installation media. Second, the task provides an example of bootstrapping the tape or disk.

In the example installation, the kit is a RSTS/E V9.0 Installation Kit, consisting of a 9-track, 1600 bits per inch (bpi) tape.

Tape Mount Session

Mount the 800 or 1600 bpi 9-track tape from your RSTS/E Distribution Kit that has the label V9.0 Installation. This tape contains the system installation files and programs. Note that there may be other programs and files on this tape. The chart in the *RSTS/E Release Notes* shows the contents of each tape.

To load the tape on the drive:

1. Physically mount the tape on drive unit 0 or 1 with the write-enable ring removed. If you have a combination of TU10, TE10, TU16, TE16, TU45, and TU77 tape drives, load the 800 bpi distribution tape onto unit 0 or 1 of the TU10 or TE10 tape drive. If you have a combination of TU16, TE16, TU45, TU77, TS11, TSV05, and TU80 tape drives, load the 1600 bpi distribution tape on unit 0 or 1 of the TS11 drive.
2. Press the LOAD indicator.
3. The drive automatically winds the tape until the beginning of tape (BOT) indicator light comes on. This indicates the tape is at its load point.
4. Make sure that the write-lock (WR) indicator light is on. (If not, dismount the tape, remove the write-enable ring, and then remount the tape.)
5. Press the ONLINE indicator. The indicator light comes on.
6. Make sure the *console terminal* is on line. The console terminal is usually a hard-copy terminal that you use during system installation.

Note

The previous instructions may not apply to your tape drive. If so, see the hardware manual supplied with your tape drive for the load instructions.

Disk Mount Session

Mount the disk from your RSTS/E Distribution Kit that has the label V9.0 Installation. This disk contains the system installation programs and files. Note that this disk may also contain other files and programs. The chart in the *RSTS/E Release Notes* shows the contents of each disk.

To load the disk onto the disk drive:

1. Physically mount the disk in drive unit 0 or 1. If you have an RL02 disk, you can mount the disk in any drive unit.
2. Make sure that the READY light is on.
3. Make sure that the write-protect (WR PROT) light is on.
4. Make sure that the *console terminal* is on line. The console terminal is usually a hard-copy terminal that you use during system installation.

Note

The previous load instructions may not apply to your disk drive. If so, see the hardware manual supplied with your disk drive for the load instructions.

Bootstrap V9.0 Installation Media

Now you must *bootstrap* the tape or disk, which means using the PDP-11 Central Processing Unit (CPU) switches to activate a hardware bootstrap loader. There are different types of hardware bootstrap loaders; the type you have on your PDP-11 determines which CPU switches you should use.

The *hardware bootstrap loader* is a device inside your PDP-11 that reads a *bootstrap record* from the tape or disk into memory. This bootstrap record contains a program that loads and executes additional program code from the tape or disk.

Your DIGITAL field service representative or software support specialist should already have identified the type of hardware bootstrap loader on your PDP-11. The representative should also have given instructions for bootstrapping your tape or disk.

If you do not know how to bootstrap the V9.0 Installation media, see Appendix D, which contains bootstrap instructions for the different types of hardware bootstrap loaders.

The example installation shows how to bootstrap the 1600 bpi tape from a TU80 tape drive, by activating switches on a PDP-11/44. These bootstrap instructions are:

1. Move the control switch (CONT) to the HALT position.
2. Move the control switch to the BOOT position.

The CPU prints some octal numbers on the console terminal, followed by three angle brackets:

```
>>>B MS0
```

The >>> prompts for a command. Type B to indicate a BOOT operation, followed by the *device designator* or *device specification* of the drive on which your tape or disk is mounted. A device designator consists of two letters that identify the device type, followed by the decimal unit number of the drive and a colon. (However, do not specify a colon here.) The example installation uses a TU80 tape drive: thus, the tape device designator is MS0.

Table 1 lists the tape device designators. Table 2 lists the bootable disk device designators. Enter the appropriate device designator for your installation.

About 30 seconds after you type the device designator, the following prints on the console terminal:

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

```
RSTS V9.0 (MS0) INIT V9.0-14
```

```
Current date <DD-MMM-YY>?
```

The Current date prompt means that INIT.SYS is loaded into memory. You have successfully bootstrapped your installation media. Note that the device designator of the tape or disk drive you bootstrapped appears within parentheses. In the example installation, the device designator is MS0.

Table 1: Tape Device Designators

Designator	Device
MM0: to MM7:	TE16/TU16/TU45/TU77 magnetic tape units 0 to 7
MS0: to MS3:	TS11/TSV05/TU80/TK25 magnetic tape units 0 to 3
MT0: to MT7:	TE10/TU10/TS03 magnetic tape units 0 to 7 *
MU0: to MU7:	TK50 magnetic tape units 0 to 7
*Note: You cannot use a TS03 drive for system installation.	

Table 2 lists the bootable disk device designators.

Table 2: Bootable Disk Device Designators

Designator	Device
DB0: to DB7:	RP04/RP05/RP06 disk drive units 0 to 7 *
DK0: to DK7:	RK05/RK05F disk drive units 0 to 7
DL0: to DL3:	RL01/RL02 disk drive units 0 to 3
DM0: to DM7:	RK06/RK07 disk drive units 0 to 7
DP0: to DP7:	RP02/RP03 disk drive units 0 to 7
DR0: to DR7:	RM02/RM03/RM05/RM80 disk drive units 0 to 7 *
DU0: to DU15:	RA60/RA80/RA81/RCF25/RC25/RD51/RD52/RD53/RX50 disk drive units 0 to 15
*Note: See Appendix F for more information on multiple RH controller configurations.	



Go to Phase 2.

Phase 2 Prepare System

After you bootstrap the V9.0 Installation tape or disk, you are ready to prepare your system for the installation. First you prepare your *system disk*. The system disk is the disk on which your RSTS/E monitor will reside. *Nonsystem disks* store other files and programs that might not fit on the system disk. Next you start the SYSGEN monitor, a prebuilt monitor supplied by DIGITAL. You use the SYSGEN monitor to generate your new monitor.

The tasks in this phase are:

- Task 1: Physically Mount Target System Disk
- Task 2: Answer Preliminary INIT.SYS Questions
- Task 3: Initialize System Disk (DSKINT)
- Task 4: Start SYSGEN Monitor (START)

Task 1: Physically Mount Target System Disk

Mount your system disk on a free drive, either 0 or 1. If you are performing an installation for another system, mount the target system disk instead.

Note

Unless your system disk is a DU or DL class device, you must mount your system disk (as well as your V9.0 Installation tape or disk) on drive 0 or 1 because the SYSGEN monitor recognizes only units 0 and 1 of each device type. For example, if you mount your system disk on drive 2 at this stage, the SYSGEN monitor fails during start-up.

If your disk is a DU or DL class device, you can mount it on disk drive 0, 1, 2, or 3. See Table 2 for a list of disk device designators.

Follow either the disk mount instructions in Task 2 of Phase 1 or the disk mount instructions in the appropriate hardware manual. Do not remove the V9.0 Installation tape or disk that contains the system installation programs and files.

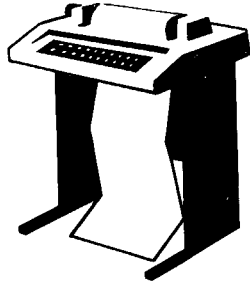


Go to Task 2.

Task 2: Answer Preliminary INIT.SYS Questions

Your next task is to answer the Date and Time questions, and then to answer the preliminary INIT.SYS questions.

Terminal Session



You have now successfully bootstrapped your V9.0 Installation media, and the INIT.SYS program is loaded into memory. INIT.SYS prints its banner, and prompts you for the date and time.

```
RSTS V9.0 (MS0) INIT V9.0-14  
Current date <DD-MMM-YY>? 31-May-85  
Current time <HH:MM AM/PM>? 05:00 AM
```

Explanation — INIT.SYS prompts you for a valid date and time. You see the date and time prompts when you bootstrap a disk from the console boot/restart switch.

If you specified the date and time at some earlier point and you used the BOOT option of INIT.SYS to bootstrap the disk, then INIT.SYS simply displays the current date and time before proceeding to the next prompt.

Response — Type the current date and time in the alphabetic format.

```
Installing RSTS on a new system disk? <Yes> (RET)
```

Explanation — INIT.SYS asks this question whenever you bootstrap a tape or disk read-only. (RSTS/E Distribution Kits are always read-only). If you answer YES, INIT.SYS assumes you are performing a new V9.0 system installation and want to use the DSKINT option to initialize your system disk. INIT.SYS then prompts you for the location of the system disk.

If you answer NO, INIT.SYS asks if you are updating an existing RSTS system disk before proceeding with a COPY operation.

Note

In V9.0, any system or public disk must be a RDS1.2 format disk. Answer YES to this question if you are performing a new installation. If you are upgrading to V9.0 from a previous release of RSTS/E, see Part II of this guide for instructions.

Response — Type YES or press RETURN to proceed with the disk initialization. Because the example installation is a new RSTS/E V9.0 installation, the response is RETURN to accept the default of YES.



If you answered YES to the previous question, go to Task 3.



If you answered NO to the previous question, go to Task 4.

Task 3: Initialize System Disk (DSKINT)

Your next task is to initialize the system disk with DSKINT, an INIT.SYS program option. DSKINT:

- Optionally formats the disk. DSKINT writes timing and sense marks on the disk and destroys any previously stored information.
- Optionally checks the disk for bad blocks. DSKINT locates bad blocks on the disk and allocates them to the *bad block file (BADB.SYS)*.
- Writes a minimum RSTS/E file structure on the disk. The minimum *RSTS/E file structure* contains a pack label and three directories:
 - The Master File Directory (MFD)
 - The Group File Directory (GFD)
 - The User File Directory (UFD) for account [0,1].
- Prepares the disk to accept RSTS/E system and other files.

Terminal Session



To initialize your system disk, you must answer the DSKINT questions. This terminal session lists the questions, explains them, and gives you some possible responses. After you understand the question, type the response at your console terminal. In some cases, your response will differ from the response shown in red in the example installation.

These responses have special meaning:

Response	Description
(RET)	Accept the default response
?	Obtain an online explanation of the question
^	Return to the previous question
(CTRL/Z)	Restart DSKINT dialogue
(CTRL/C)	Abort DSKINT and return to the Option: prompt

The common DSKINT dialogue error messages appear in Table 5, at the end of this task. If you receive an error message that does not appear there, see Appendix A.

31-May-85 - 05:02 AM

Disk? DU

Explanation — After you answer YES to the Installing RSTS on a new system disk? question, INIT.SYS automatically begins the DSKINT dialogue. DSKINT prints the current date and time, and then asks for the device designator of your system disk.

Response — Type one of the acceptable responses for system disks: DL, DM, DP, DR, DB, or DU. In the example installation, the response is DU because the system disk is an RA80.

Unit? 0

Explanation — DSKINT asks for the unit number of the disk drive on which your system disk is mounted.

Response — Type one of the acceptable responses at this stage of system installation: 0 or 1. (If your system disk is a DL or DU class device, acceptable responses are 0, 1, 2, or 3.) The response is 0 in the example installation.

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

Pack ID:	NATHAN
Pack Cluster Size:	8
Pack is currently:	Private, Update access date on writes, Level: 1.1

Pack ID? SYSDSK

Explanation — After you type the unit number, DSKINT prints the disk's pack label information, if the disk has been initialized before. If the disk has not been initialized before, DSKINT does not print the identifying information. The *pack label information* lists:

- Pack ID
- Pack cluster size
- Pack status (public or private)
- Whether files are catalogued with the date they were last modified (written to) or accessed (read, opened, closed, and so forth)
- New files first information
- Whether the disk is read-only
- Format level.

This private disk could be a system disk; DSKINT cannot determine whether a private disk is also a system disk. In the example installation, the pack ID is NATHAN, the pack cluster size is 8, the pack status is private, the files are catalogued with the date they were last written to, and the format level is RDS1.1.

This information lets you decide whether to initialize the disk. When you initialize a disk, you destroy any information stored on it. Because this disk is a format level RDS1.1 disk and contains no vital information, it will be initialized and used as the

new system disk. If your disk contains vital information, see Part II, Installing RSTS/E on a Pre-V9.0 System, for information on how to preserve the information.

After printing the pack label information, DSKINT asks for a pack ID. The *pack ID* is a system-wide logical name. You must specify this pack ID when you logically mount the disk.

Response — Type a one- to six-character alphanumeric pack ID. The pack ID in the example installation is SYSDSK.

```
Pack cluster size <4>? (RET)
```

Note

Some questions show a response within brackets, like the one in this question (<4>?). This is the default response. To accept any default response, press RETURN. The RETURN response does not print on your console terminal. The (RET) symbol appears in the example installation to show you that the RETURN key was chosen as a response.)

Explanation — A *cluster* is a fixed number of 512-byte blocks of storage area allocated contiguously on a disk. The *pack cluster size* is the minimum number of blocks that your RSTS/E monitor can allocate to a file on the disk.

Your answer to this question depends on the type of processing and the disk requirements of your installation. The pack cluster size affects disk space and speed of file creation and access. A large pack cluster size improves access time to programs and user files because the monitor allocates space for data in cluster units. For example, if the pack cluster size is 16, the monitor allocates 16 blocks at a time. However, if the pack cluster size is two, the monitor allocates only two blocks at a time. Thus, more disk accesses are needed to allocate the same amount of space.

On the other hand, a large pack cluster size may waste disk space. For example, if you assign a pack cluster size of 16, the monitor allocates one cluster of 16 contiguous blocks (8,192 bytes) to a file that contains only one block (512 bytes) of information. Fifteen blocks (7,680 bytes) are wasted. Likewise, the monitor allocates one cluster of 16 contiguous blocks to a 15-block (7,680 bytes) file. In this case, only one block (512 bytes) is wasted.

Response — Type the disk pack cluster size. For system disks, DIGITAL recommends a pack cluster size of 4 or greater. In the example installation, the response is RETURN to accept the default cluster size of 4.

Table 3 lists the disk cluster sizes.

Table 3: Disk Pack Cluster Sizes

Disk Type	Pack Cluster Size
RX50*	1, 2, 4, 8, 16
RC25	1, 2, 4, 8, 16
RD51	1, 2, 4, 8, 16
RD52	1, 2, 4, 8, 16
RD53	4, 8, 16
RK05*	1, 2, 4, 8, 16
RK05F*	1, 2, 4, 8, 16
RL01	1, 2, 4, 8, 16
RL02	1, 2, 4, 8, 16
RK06	1, 2, 4, 8, 16
RK07	1, 2, 4, 8, 16
RP02	2, 4, 8, 16
RP03	2, 4, 8, 16
RM02	4, 8, 16
RM03	4, 8, 16
RP04	4, 8, 16
RP05	4, 8, 16
RA80	4, 8, 16
RM80	4, 8, 16
RP06	8, 16
RA60	8, 16
RM05	8, 16
RA81	16
*You cannot use these disks as system disks.	

MFD cluster size <16>? (RET)

Explanation — The *master file directory (MFD)* stores information about all accounts on a disk. The monitor accesses the MFD each time you add or delete accounts and files from the disk.

This question asks for the *MFD cluster size*, which is the maximum number of 512-byte blocks that each cluster allocated to the MFD can contain. The MFD can have a maximum of seven clusters (if you answer YES to the Pre-extend directories? question later in this task), and each directory is the size that you specify here.

The MFD cluster size must be greater than or equal to the pack cluster size and must not be greater than 16. Legal values for the MFD cluster size are 4, 8, or 16.

Response — Type 4, 8, or 16. Or, press RETURN to accept the default response of 16, as in the example installation.

SATT.SYS base <118595>? (RET)

Explanation — The SATT.SYS file controls the use of storage space on a disk through a storage allocation table (SAT). The monitor accesses this file each time you extend or delete files. You are asked where you want to position this file on the disk. It is advantageous to position the SATT.SYS file near the center of the disk to reduce average seek times for the disk heads. On the other hand, if you use only the first half of a disk or need to create large contiguous files, you may want to locate SATT.SYS in a place other than the center. This reduces fragmentation of the disk.

The position of the SATT.SYS file is also important because its position determines the default placement of the monitor and the default keyboard monitor, as well as the SWAP.SYS system file.

The number that appears within brackets is the center of the disk as calculated by DSKINT. (DSKINT may calculate a different number for your disk.) The device cluster number can range from 1 to the total device size divided by the device cluster size. See Table 4 for a list of disk device cluster sizes and total device sizes.

Response — Press RETURN to have DSKINT position the file near the center of the disk. In the example installation, the response is RETURN.

Or, type the device cluster number where you want the file placed.

Table 4 lists the disk device cluster sizes and total device sizes. Note that the table shows the total blocks that are available for use, not the total size of the disk. In addition, the number of available blocks may vary if your system has a different device cluster size.

Table 4: Device Cluster Sizes and Total Device Sizes

Disk Type	Device Cluster Size	Total Available Blocks **
RX50*	1	799
RC25	1	50901 per unit; 2 units per spindle
RD51	1	21599
RD52	1	60479
RK05*	1	4800
RK05F*	1	4800 per unit; 2 units per drive
RL01	1	10220

(continued on next page)

Table 4: Device Cluster Sizes and Total Device Sizes (Cont.)

Disk Type	Device Cluster Size	Total Available Blocks **
RL02	1	20460
RK06	1	27104
RK07	1	53768
RC25	1	50901
RP02	2	39998
RD51	1	21599
RP03	2	79998
RD52	1	60479
RM02	4	131648
RD53	4	138668
RM03	4	131648
RP04	4	171796
RP05	4	171796
RA80	4	237208
RM80	4	242572
RP06	8	340664
RA60	8	400168
RM05	8	500352
RA81	16	891056
*You cannot use these disks as system disks. **Total available blocks represent the number of blocks when the disk is initialized at the device cluster size.		

Pre-extend directories <NO>? (RET)

Explanation — This question asks if you want DSKINT to allocate automatically a maximum of seven clusters to the system account [0,1], the LB: library account [1,1], the system library account [1,2], and the MFD and GFDs for groups 0 and 1. The number of blocks each of these seven clusters contain depends on how you answered the cluster size questions for each of these accounts. For example, if you specify 16 as the cluster size for account [1,2] and answer YES to this question, DSKINT allocates the maximum of seven clusters to this account. Each cluster is 8,192 bytes (16 times 512 bytes).

Response — Type YES to have DSKINT automatically allocate a maximum of seven adjacent clusters to these accounts. In the example installation, the response is RETURN.

Or, type NO or press RETURN if you want DSKINT to allocate only the minimum of 0 or 1 clusters.

PUB, PRI, or SYS <SYS>? (RET)

Explanation — This question asks you to designate the disk you are initializing as either public, private, or system. The system disk is the disk on which the RSTS/E monitor resides. It always contains account [1,2].

Response — Type SYS or press RETURN, because you are initializing a system disk in this task. In the example installation, the response is RETURN.

```
[1,1] cluster size <16>? (RET)
```

Explanation — This question asks for the cluster size of the *User File Directory (UFD)* for account [1,1]. The UFD is an area on the disk that stores information about the files created under a particular user account number. The cluster size for account [1,1] is the maximum number of 512-byte blocks that each cluster allocated to this account can contain.

Response — Press RETURN to accept the default response of 16. In the example installation, the response is RETURN.

Or, type the cluster size for account [1,1]: 1, 2, 4, 8, or 16. It must be greater than or equal to the pack cluster size and must not be greater than 16. Specifying a large cluster size improves disk access time.

Because the example installation's answer to the Pre-extend directories? question was NO, DSKINT allocates one cluster containing 8,192 bytes (16 times 512 bytes) to this account.

```
[1,2] cluster size <16>? (RET)
```

Explanation — This question asks for the cluster size of the UFD for account [1,2]. The cluster size for account [1,2] is the maximum number of 512-byte blocks that each cluster allocated to this account can contain.

Response — Type the cluster size for account [1,2]: 1, 2, 4, 8, or 16. It must be greater than or equal to the pack cluster size and must not be greater than 16. DIGITAL recommends that the cluster size for account [1,2] be 16, to improve disk access time. Press RETURN to accept the default response of 16, as in the example installation.

Because the example installation's answer to the Pre-extend directories? question was NO, DSKINT allocates one cluster containing 8192 bytes (16 times 512 bytes) to this account.

```
[1,1] and [1,2] account base <118595>? (RET)
```

Explanation — This question asks whether you want to place accounts [1,1] and [1,2] near the center of the disk or in some other place. The number that appears within brackets is the position of SATT.SYS, that is, the number you specified to the SATT.SYS base? question, or the middle of the disk as calculated by DSKINT if you specified RETURN to that question. DSKINT may show a different number for your disk.

Response — Press RETURN to place these accounts near the center of the disk. In the example installation, the response is RETURN.

Or, type the device cluster number where you want these files placed. The device cluster number can range from 1 to the total device size divided by the device cluster size. See Table 4 for a list of device cluster sizes and total device sizes.

Date last modified <YES>? (RET)

Explanation — This question asks whether you want to retain the date on which files were last modified (written to) or last accessed (written to, opened, read from, closed, and so forth).

Response — Type YES or press RETURN to retain the date on which files were last modified. This response is useful if you plan to use the BACKUP system program to back up files that have changed since the last backup. This response also decreases disk activity because the RSTS/E monitor updates the date only if the files are written to. In the example installation, the response is RETURN, which means the monitor updates the date each time the files are modified.

Or, type NO to retain the date on which files were last accessed. This response is useful for reordering the files, so the most frequently accessed files can be placed at the beginning of the directory. This response increases disk activity because the RSTS/E monitor updates the date no matter how the file is accessed for reads or writes.

New files first <NO>? (RET)

Explanation — This question asks if you want newly created files placed at the beginning or end of the directory of the account in which they are created.

Response — DIGITAL recommends that you type NO or press RETURN to place newly created files at the end of the directory, giving you overall faster access time. In the example installation, the response is RETURN.

Or, type YES to place newly created files at the beginning of the directory. This response is useful when you have a private disk on which the files you most frequently access are new files.

Read-only <NO>? (RET)

Explanation — This question asks if you want this disk to be, by default, a read-only or a read/write device when it is logically mounted. You can write to a read-only disk when you logically mount it with the /WRITE qualifier.

Response — Press RETURN to make your system disk read/write. In the example installation, the response is RETURN.

Use previous bad block info <YES>? (RET)

Explanation — This question does not appear if you are initializing a new disk. The question asks if you want DSKINT to create a new bad block file (BADB.SYS) in system account [0,1] by using information from the existing bad block file. DSKINT checks each block on the disk (if you answer 1, 2, or 3 to the Patterns? question that comes later). If DSKINT finds unreliable blocks, it allocates the pack cluster in which the block resides to the BADB.SYS file.

Response — DIGITAL recommends that you type YES or press RETURN to create the new bad block file, using information from the existing bad block file. In the example installation, the response is RETURN.

Or, type NO to have DSKINT ignore the current bad block file when creating the new one. You may want to answer NO, for example, if you are reinitializing a disk to decrease the pack cluster size. In this case, you want to obtain new bad block information.

Format <NO>?

Explanation — This question asks if you need to format your disk. Formatting a disk means that DSKINT writes timing and sense marks onto the disk and destroys any information that previously existed on the disk. You must format the following disks if you are initializing them for the first time: RK05, RK05F, RP02, RP03, RP04, RP05, RP06.

You can optionally reformat these disks: RK06, RK07, RM02, RM03, RM05.

You cannot format or reformat (in which case this question would not appear) these disks: RL01, RL02, RA60, RA80, RA81, RC25, RM80, RD51, RD52, RX50.

Note

If you are formatting a disk, DIGITAL recommends that you mount the disk on the drive and leave it spinning for 20-30 minutes before initializing it. This ensures that the disk temperature is stable and uniform during the formatting. Failure to do this may cause unreliable data storage on the disk.

Response — Type YES to format the disk; type NO or press RETURN if you do not need to format the disk. This question does not appear in the example installation.

Patterns <3>? (RET)

Explanation — This question asks for the number of patterns DSKINT should use in checking for bad blocks. You can select a number from 0 to 3. If you select 0 patterns, DSKINT also prints the Erase disk? prompt.

DSKINT writes a pattern to the disk, and then reads it to check that the data was written correctly. The time DSKINT takes to run these pattern checks for bad blocks depends on the disk you are initializing. Type a question mark (?) to have DSKINT print the time (in minutes) required for the different disks to complete one format check for bad blocks.

For DU class disks, with the exception of RX50, bad blocks are handled transparently by the hardware. No blocks are ever added to the BADB.SYS file, since the hardware simply replaces the bad block with a new one. DIGITAL still recommends that you run 3 patterns the first time you initialize a DU class disk.

Response — Type the number of patterns (0 to 3). DIGITAL recommends you run 3. Any bad blocks discovered during pattern checking are added to the bad block file (BADB.SYS) so that data will not be written to these blocks. If you specify 0, DSKINT then asks the next question. In the example installation, the response is RETURN.

Erase disk <YES>?

Explanation — This question, which appears only if you answered 0 to the Patterns? question, asks if you want to erase the disk. If you answer YES, DSKINT wipes out all data on the disk. This is usually done for security purposes.

If you answer NO, DSKINT writes only the basic RSTS/E file structure on the disk. Use the NO response under the following conditions:

- You are initializing a disk that has been initialized before.
- You answered YES to the Use previous bad block info? question.
- You are confident no additional bad blocks are on the disk.
- You are not concerned about the security of old data that could still be accessed.

Response — The example installation did not see this question, because it did not answer 0 to the Patterns? question.

Proceed (Y or N)? Y

Explanation — This question allows you to check your responses to the dialogue questions and abort the initialization if you have made any errors.

Response — Type Y to proceed with the disk initialization. In the example installation, the response is Y.

Or, type N to abort the initialization and return to the Option: prompt.

DSKINT formats the disk, then begins pattern checking with pattern 3 and ends with pattern 1. If DSKINT prints a block and device cluster number during pattern checking, it adds the device cluster number (not the block number) to the BADB.SYS file. Note that this disk (a DU class disk) did not contain any bad blocks.

Note

When you are formatting RP02 or RP03 disks, DSKINT prints two requests after the Starting and Ending format pass messages:

SET FORMAT ENABLE SWITCH, THEN TYPE <RET>:

Set the RP11 controller FORMAT ENABLE/NORMAL switch to ENABLE, then press RETURN.

SET FORMAT SWITCH TO NORMAL, THEN TYPE <RET>:

Set the RP11 controller FORMAT ENABLE/NORMAL switch to NORMAL, then press RETURN.

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Enabling only console, disks, and tapes.

RSTS V9.0 (DU0) INIT V9.0-14

Start timesharing? <Yes>

Explanation — The disk initialization is complete. INIT.SYS now uses the COPY option to transfer files that are required for the installation to your new system disk.

When the COPY operation is complete, INIT.SYS automatically bootstraps your system disk, prints a message on your console terminal, and prints the Start timesharing? question.

Table 5 lists the DSKINT error messages. If your error message does not appear there, see Appendix A.

Table 5: DSKINT 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 make the drive ready and press RETURN to proceed, or you can press 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. Enter a valid name.
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 system.



Go to Task 4.

Task 4: Start SYSGEN Monitor (START)

DIGITAL supplies a prebuilt RSTS/E monitor, called the *SYSGEN monitor*, on the Installation tape or disk. It resides in account [0,1] with the file name SYSGEN.SIL. The SYSGEN monitor is a temporary monitor; you use it only to build your RSTS/E monitor. (Phase 7 describes how to shut down the SYSGEN monitor when it is no longer needed.)

You must now decide whether you are ready to start the SYSGEN monitor. You may need to perform some hardware-related tasks first.

You must perform a hardware-related task if you have hardware that has nonstandard CSR addresses. If so, go to the Offline Options section, HARDWR CSR – Declare a Nonstandard Controller Address, before you start the SYSGEN monitor.

If your installation does not require you to perform any hardware-related tasks, then you are ready to begin Task 4 and start timesharing under the SYSGEN monitor. The example installation is ready to start the SYSGEN monitor.

Terminal Session



This terminal session lists the INIT.SYS questions, explains them, and gives you some possible responses. After you understand a question, type the response at your console terminal. In some cases, your response will differ from the response printed in red in the example installation.

```
Start timesharing? <Yes> (RET)
```

Explanation — You stopped here in Task 3. INIT.SYS asks if you are ready to start timesharing.

If you answer YES to this question, INIT.SYS starts timesharing under the SYSGEN monitor.

If you answer NO to this question, INIT.SYS prints its Option: prompt. You can then perform any necessary offline options. When you are then ready to start timesharing, type START at the Option: prompt.

Response — The example installation is ready to start the SYSGEN monitor. Therefore, the response is RETURN.

```
Starting SYSGEN.SIL . . .
Rebooting . . .
```

```
RSTS V9.0 (DU0) INIT V9.0-14
```

```
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```

```
Creating SWAP.SYS file with minimum size of 128 blocks
```

```
Memory allocation table:
```

```
0K: 00000000 - 00407777 ( 66K) : EXEC
66K: 00410000 - 03467777 ( 396K) : USER
462K: 03470000 - 03777777 ( 50K) : XBUF
512K: 04000000 - End           : NXM
```

```
Creating CRASH.SYS file with minimum size of 320 blocks
```

```
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```

```
8 devices disabled
```

Explanation — INIT.SYS prints these messages as it starts the SYSGEN monitor. The system then prints the following prompt:

```
Do you want to perform an installation or an update? <installation> (RET)
```

Explanation — The system asks if you are performing a first time V9.0 installation or are updating an existing V9.0 monitor.

Response — Type IN or press RETURN because you are installing V9.0 for the first time. In the example installation, the response is RETURN.

```
Please mount the RSTS/E Installation media and enter the name
and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'
```

```
Installation device:
```



Go to Phase 3.

Phase 3 Configure RSTS/E Monitor

You now have a temporary monitor to use in building your RSTS/E monitor. Unlike the SYSGEN monitor, which comes prebuilt, you must configure your RSTS/E monitor. To *configure a monitor* means to select the hardware and software it will support. You select the hardware and software by answering *configuration questions*. These questions ask you what hardware (controllers, disk drives, tape drives, and so forth) and software features (EMT logging, extended data buffering, and so forth) your RSTS/E monitor will support.

This phase discusses the tasks you must perform to configure your RSTS/E monitor.

The tasks in this phase are:

- Task 1: Answer Preliminary Configuration Questions
- Task 2: Answer Terminal Interface Configuration Questions
- Task 3: Answer Disk Units Configuration Questions
- Task 4: Answer Peripheral Devices Configuration Questions
- Task 5: Calculate Number of Jobs
- Task 6: Answer Software Tuning and Features Configuration Questions

Each question in Phase 3 prints a default answer within brackets. If the system cannot determine a default response, it prints ?? within the brackets. Answer the questions based on the configuration of your system. If you are building a RSTS/E monitor for another PDP-11, answer the questions based on the configuration of the other PDP-11.

Note that you may see different default responses than the ones provided in the example installation.

If you want to start over at any time while answering the configuration questions, enter CTRL/Z. You return to the beginning of the task.

These responses have special meaning:

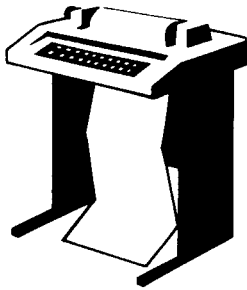
Response	Description
(RET)	Accept the default response
?	Obtain an online explanation of the question
^	Return to the previous question
(CTRL/Z)	Return to the beginning of the dialogue section
(CTRL/C)	Abort the dialogue and return to the DCL \$ prompt

Task 1: Answer Preliminary Configuration Questions

Your next task is to answer the preliminary questions asked by the *INSTAL.COM* command file. The system executes *INSTAL.COM* immediately after it starts the *SYSGEN* monitor.

Before *INSTAL.COM* asks any questions, it opens a log file named *INSTAL.LOG* in the account from which you are running the installation ([1,2] in the example). *INSTAL.COM* closes this log file at the end of the installation. You can then print *INSTAL.LOG* to obtain a record of the installation session.

Terminal Session



This terminal session lists the preliminary configuration questions and provides some possible responses. In some cases, your response will differ from the response shown in red in the example installation.

```
Please mount the RSTS/E Installation media and enter the name
and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'

Installation device: MS0
```

Explanation — You stopped here in Phase 2. This question asks for the location of your Installation media.

Response — Type the device name and unit number of the drive on which your Installation media is mounted. The question lists the valid devices. In the example installation, the response is MS0.

```
Restoring required _SY:[0,1] components

Deleting all global symbols

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Beginning of the RSTS/E Software Installation Procedure

Type '?' for help
Type '^' to go back to the previous question
Type CTRL/Z to return to the beginning of the present section

* Starting dialogue phase *

Are you ready to proceed? <yes> (RET)
```

Explanation — This question asks if you are ready to continue. If you type YES or press RETURN, the dialogue continues. If you type NO, you see the \$ prompt.

Answer NO, for example, if you need to recover a corrupted system disk by issuing the \$RESTORE command. You resume the installation procedure by typing PROCEED.

Response — Type YES or press RETURN to continue with the installation. In the example installation, the response is RETURN.

Please enter the name and unit number of the disk to which you want to install the software. This disk should be physically mounted and write-enabled.

Target disk? <SY:> :

Explanation — This question is for anyone building a RSTS/E system for another PDP-11. Your response to this question determines the disk where the new RSTS/E monitor and system programs will be installed.

If you specify a disk other than the system disk (SY:), physically mount and write-enable the disk before you answer this question. The disk does not need to be initialized at this time, because the next question asks if you want to initialize it.

Response — Type the disk name and unit number of the target disk if you are installing RSTS/E for another PDP-11. You then see the Do you want to initialize the target disk? question.

Type SY or press RETURN to install RSTS/E on your present system disk, the disk you initialized in Phase 2. In the example installation, the response is RETURN.

Restoring required _SY:[1,2] components

Assigning system logicals

**** Starting Monitor Section ****

Do you want to install the RSTS/E monitor? <yes>

Explanation — This question asks if you want to install the monitor. Answer NO to this question if you want to install only system programs and/or layered product updates. You then skip the monitor installation.

If you answer YES or press RETURN to this question, you continue with the dialogue to install a RSTS/E V9.0 monitor.

If you answer NO to this question, go to Phase 4.

Response — Type YES or press RETURN to proceed with the RSTS/E monitor installation. In the example installation, the response is RETURN.

Restoring required SYSGEN components

Explanation — The system now copies files that you need to continue the installation. Then you begin the monitor configuration dialogue.

Use template monitor ? <N> NO

Explanation — This question asks if you want the system to obtain information it needs from a previous monitor. If you do have a previous V9.0 monitor and want to

use information from it, type YES and then follow the steps in Phase 3, Task 2 of Part IV. Type NO if you do not have a previous V9.0 monitor to serve as a template. The default response to this question is NO if the SYSGEN monitor is the previous monitor, and YES if it is not.

Response — Type NO or press RETURN, because you do not have an existing V9.0 monitor to use as a template. In the example installation, the response is NO.

```
New Monitor name ? <RSTS> RSTS90
```

Explanation — This question asks for the name of your new RSTS/E monitor, which will be stored as a save image library (SIL) in account [0,1] on your system disk. The installation procedure performs a lookup to see if the monitor name you specify already exists. If it already exists and it is the currently installed SIL, the procedure returns an error message and then reprompts.

Response — Type a one- to six-character alphanumeric name for your RSTS/E monitor. The default response is RSTS. In the example installation, the response is RSTS90.

```
Supersede existing monitor ? <N>
```

Explanation — You see this question only if the monitor name specified already exists and is not the currently installed SIL. If you type NO or press RETURN to accept the default, the program returns to the New monitor name? prompt. If you type YES, your new monitor supersedes the existing monitor.

Response — In the example installation, this question does not appear because no previous monitor named RSTS90 exists.

```
Accept defaults ? <N> NO
```

Explanation — This question gives you the opportunity to modify the configuration of your new SIL. If you answer NO, the installation procedure gives you the opportunity to make changes at the beginning of each specific configuration section (Tasks 2, 3, 4, 6).

If you answer YES, the installation procedure chooses the default configuration and asks no configuration questions.

If you are using a template monitor, you can type a ? to list the defaults that will be selected if you answer YES to this question.

Response — Type NO to continue with the configuration questions, as in the example installation. DIGITAL recommends that you answer NO if:

- You are performing a first time V9.0 system installation
- You are not using a template monitor.

Type YES if you want to accept the default configuration.

If you are using a template monitor, type a ? to list the defaults that will be selected if you answer YES.

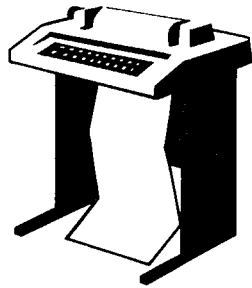


Go to Task 2.

Task 2: Answer Terminal Interface Configuration Questions

Your next task is to answer the *terminal interface configuration questions*. These questions deal with the number and types of hardware that connect your terminals to the PDP-11 and the software features related to these terminals. The RSTS/E monitor supports a maximum of 128 terminals and pseudo keyboards. Therefore, the total number of terminal interfaces and pseudo keyboards cannot exceed 128.

Terminal Session



This terminal session lists the terminal interface configuration questions, explains them, and gives some possible responses (printed in red). After you understand the question, type the response at your console terminal.

If you are generating a monitor for another PDP-11, answer the questions based on the configuration of the target system.

Now you must specify the hardware configuration on which this RSTS/E system will run.

The following questions deal with the numbers and types of terminal interfaces on the system.

Accept Terminal defaults ? <N> (RET)

Explanation — You see this question only if you answered NO to the Accept defaults? question in Task 1.

If you answer YES to this question, you receive the default terminal configuration, and skip to the disk configuration questions (Task 3). If you answer NO or press RETURN, you see these terminal configuration questions:

DL11A compatible lines ?
DL11C, DL11D's ?
DL11E, DLV11E's ?
DJ11's ?
DH11's ?
DZ11/DZV11/DZQ11's ?
DHU11/DHV11's ?
Pseudo keyboards ?
Multi-terminal service ?
Echo control ?
One-line status report ?
FMS-11 support ?
Multiple private delimiters ?

Response — Type NO or press RETURN to begin the terminal configuration questions. In the example installation, the response is RETURN.

Or, type YES to accept the default configuration.

DL11A compatible lines ? <01> (RET)

Explanation — The DL11A single-line interface is a device that allows communication between serial ASCII terminals and your PDP-11. The DL11A single-line interface can connect a terminal either directly to the PDP-11 or indirectly through leased private telephone lines. The RSTS/E monitor can support a maximum of 16 DL11A single-line interfaces.

Response — Type the number (1 to 16) of DL11A single-line interfaces you need to configure. In the example installation, the default number of DL11A compatible lines is 1; thus, the response is RETURN. You may see a different default answer on your console terminal.

DL11C, DL11D's ? <00> (RET)

Explanation — The DL11C and DL11D are another class of single-line interfaces that allow communication between serial ASCII terminals and your PDP-11. The DL11C and DL11D single-line interfaces can connect a terminal either directly to the PDP-11 or indirectly through leased telephone lines. Your RSTS/E monitor can support a maximum of 31 DL11C and DL11D single-line interfaces.

Response — Type the number (0 to 31) of DL11C and DL11D single-line interfaces you want to configure.

In the example installation, the program prints 0 as the number of DL11C and DL11D single-line interfaces to enable; thus, the response is RETURN. You may see a different default answer on your console terminal.

DL11E, DL11E's ? <00> (RET)

Explanation — The DL11E single-line interface connects terminals to the PDP-11. These terminals transfer automatic answer datasets on the dial-up telephone network. The RSTS/E monitor can support a maximum of 31 DL11E single-line interfaces.

Note

You should not use DL11 type interfaces at baud rates over 2400. Exceptions to this are VT102 and VT200-family terminals when operated in "PACE" mode.

Response — Type the number (0 to 31) of DL11E single-line interfaces you need to enable. If you configure more than 31 of any combination of DL11A, DL11C, DL11D, or DL11E single-line interfaces, the program returns to the DL11A compatible lines? question.

In the example installation, the default number of DL11E single-line interfaces is 0; thus, the response is RETURN. You may see a different default answer on your console terminal.

Explanation — The DJ11 multiplexer can connect 1 to 16 terminals to your PDP-11. A RSTS/E monitor can support a maximum of 16 DJ11 multiplexers.

Response — Type the number (0 to 16) of DJ11 multiplexers attached to your PDP-11.

In the example installation, the number of DJ11 multiplexers is 0; thus, the response is RETURN. You may see a different default answer on your console terminal.

If you type 0, you skip the next question and go to the DH11's? question.

DJ11 unit xx lines enabled ?

Explanation — This question appears for each DJ11 multiplexer supported by your RSTS/E monitor. For example, if you type 3 to the previous question, this question appears three times. (The guide shows this question only once.)

Response — Type the number (1 to 16) of lines you need to enable for this DJ11 multiplexer. DIGITAL recommends you configure the maximum number of lines, as long as you have enough memory and you do not exceed the maximum of 128 lines. Because the example installation does not support any DJ11 multiplexers, there is no response to this question.

DH11's ? <00> (RET)

Explanation — The DH11 multiplexer can connect 1 to 16 terminals to your PDP-11. A RSTS/E monitor can support a maximum of 16 DH11 multiplexers.

Response — Type the number (0 to 16) of DH11 multiplexers attached to your PDP-11. In the example installation, the program prints 0 as the number of DH11 multiplexers to enable; thus, the response is RETURN.

If you type 0, you skip the next two questions and go to the DZ11/DZV11/DZQ11's? question.

DH11 unit xx lines enabled ? <16>

Explanation — You see this question for each DH11 multiplexer supported by your RSTS/E monitor. For example, if you typed 4 to the previous question, this question appears four times. (The guide shows this question only once.)

Response — Type the number (1 to 16) of lines you want to enable for this DH11 multiplexer. DIGITAL recommends you configure the maximum number, as long as you have enough memory and you do not exceed the maximum of 128 lines.

Dataset support for DH11's ? <N>

Explanation — A DH11 multiplexer can support automatic answer datasets. A DM11-BB modem controller connects a DH11 multiplexer to an automatic answer dataset.

Response — The installation procedure determines whether your machine has a DM11-BB modem controller. If it does, the default is Y. In this case, type Y for dataset support; type N or press RETURN for no dataset support.

DZ11/DZV11/DZQ11's ? <03> (RET)

Explanation — The DZ11 multiplexer can connect one to eight terminals to a RSTS/E UNIBUS PDP-11; the DZV11 or DZQ11 multiplexer can connect one to four terminals to a RSTS/E Q-BUS PDP-11.

Response — Type the number (0 to 16) of DZ11, DZV11, or DZQ11 multiplexers attached to your PDP-11. A RSTS/E monitor can support a maximum of 16 DZ11/DZV11/DZQ11 multiplexers.

In the example installation, the program shows that there are 3 DZ11/DZV11/DZQ11 multiplexers attached to this PDP-11; thus, the response is RETURN. You may see a different default answer on your console terminal.

If you type 0, you skip the next two questions and go to the DHU11/DHV11's? question.

DZ11/DZV11/DZQ11 unit xx lines enabled ? <08> (RET)

Explanation — This question asks for the number of lines to enable for the DZ11, DZV11, or DZQ11 multiplexer. (Note that this question shows either DZ11, DZV11, or DZQ11, depending on the hardware on your system.) You see this question for each DZ11, DZV11, or DZQ11 multiplexer supported by your RSTS/E monitor. For example, if you type 6 to the DZ11/DZV11/DZQ11's? configuration question, this question appears six times. (The guide shows this question only once.)

Response — Type the number (1 to 8 for DZ11, 1 to 4 for DZV11, or 1 to 4 for DZQ11) of lines you need to enable for this DZ11, DZV11, or DZQ11 multiplexer. DIGITAL recommends you configure the maximum as long as you have enough memory and do not exceed the maximum of 128 lines. In the example installation, the response is 8 to each question.

Dataset support for DZ11/DZV11/DZQ11's ? <N> (RET)

Explanation — This question appears only if you answered the previous two questions. (Note that this question shows either DZ11, DZV11, or DZQ11, depending on the hardware on your system.) It asks if you want to connect dial-up telephone lines to a DZ11, DZV11, or DZQ11 multiplexer. The connection is established through an automatic answer dataset connected to the multiplexer.

There are four models of DZ11s: DZ11-A and DZ11-B, which support partial modem control and, therefore, can support automatic answer datasets; and DZ11-C and DZ11-D, which do not support modem control and, therefore, cannot support automatic answer datasets.

The DZV11 and DZQ11 support partial modem control and, therefore, can support automatic answer datasets.

Response — Type Y if you have a DZ11-A, DZ11-B, DZV11, or DZQ11 and you want automatic answer dataset support; type N if you do not want automatic answer dataset support, or if you have the DZ11-C or DZ11-D models. In the example installation, the response is RETURN.

```
DHU11/DHV11's ? <01>(RET)
```

Explanation — The DHU11 multiplexer can connect 1 to 16 terminals to a RSTS/E UNIBUS PDP-11; the DHV11 multiplexer can connect 1 to 8 terminals to a RSTS/E Q-BUS PDP-11. (Note that this question shows either DHU11 or DHV11, depending on the hardware on your system.)

Response — Type the number (0 to 16) of DHU11 or DHV11 multiplexers attached to your PDP-11. A RSTS/E monitor can support a maximum of 16 DHU11/DHV11 multiplexers.

In the example installation, the program shows that there is 1 DHU11/DHV11 multiplexer attached to this PDP-11; thus, the response is RETURN. You may see a different default answer on your console terminal.

If you type 0, you skip the next two questions and go to the Pseudo keyboards? question.

```
DHU11/DHV11 unit xx lines enabled ? <16>(RET)
```

Explanation — This question asks for the number of lines to enable for the DHU11 or DHV11 multiplexer. (Note that this question shows either DHU11 or DHV11, depending on the hardware on your system.) You see this question for each DHU11 or DHV11 multiplexer supported by your RSTS/E monitor. For example, if you typed 6 to the DHU11/DHV11's? configuration question, this question appears six times. (The guide shows this question only once.)

Response — Type the number (1 to 16 for DHU11 or 1 to 8 for DHV11) of lines you need to enable for this DHU11 or DHV11 multiplexer. DIGITAL recommends you configure the maximum as long as you have enough memory and as long as you do not exceed the maximum of 128 lines. In the example installation, the response is RETURN.

```
Dataset support for DHU11/DHV11's ? <N>(RET)
```

Explanation — This question appears only if you answered the previous two questions. It asks if you want to connect dial-up telephone lines to a DHU11 or DHV11 multiplexer. The connection is established through an automatic answer dataset connected to the multiplexer. (Note that this question shows either DHU11 or DHV11, depending on the hardware on your system.)

Response — Type Y if you have a DHU11 or DHV11 and you want automatic answer dataset support; type N if you do not want automatic answer dataset support. In the example installation, the response is RETURN.

```
Pseudo keyboards ? <04>6
```

Explanation — A *pseudo keyboard* is a logical device that has the characteristics of a terminal, but has no physical terminal associated with it. Pseudo keyboards are useful for batch and network applications. See the *RSTS/E Programming Manual* for more information about pseudo keyboards. This question asks you to type the number of pseudo keyboards supported by your RSTS/E monitor.

Response — Type the number (1 to 127) of pseudo keyboards you want on your system. In the example installation, the response is 6.

Note

A RSTS/E monitor permits a maximum of 128 single-line interfaces, enabled multiplexer lines, and pseudo keyboards. (The console terminal is always enabled.) If you configured more than 128 single-line interfaces, multiplexers, and pseudo keyboards, the program prints an error message and returns to the DL11A compatible lines? question.

Multi-terminal service ? <Y> (RET)

Explanation — The multiterminal service feature allows one program to interact simultaneously with several terminals on one I/O channel instead of opening each terminal for input or output.

This feature is useful with applications such as order entry, inventory control, query-response, or any other application where the same function is performed on several terminals. It eliminates the need to run separate copies of the same program at each terminal when several terminals perform a similar function. The *RSTS/E Programming Manual* explains the procedures for programming multiterminal service.

Response — Type Y or press RETURN to support this feature; type N if you do not want to support it. In the example installation, the response is RETURN.

Echo control ? <Y> (RET)

Explanation — *Echo control* affects the way the terminal screen displays characters. Normally, the terminal screen displays characters just as you type them. In echo control mode, the monitor handles characters differently. The echo control feature lets you use echo control mode in an application program, as described in the *RSTS/E Programming Manual*.

The echo control feature is useful for data entry and other applications where you need to define fixed-length fields for user input, accept input from only one field at a time, define special characters for character deletion sequences within a field, and control the appearance of terminal output.

Response — Type Y or press RETURN to enable echo control; type N if you do not want to enable this feature. In the example installation, the response is RETURN.

One-line status report ? <Y> (RET)

Explanation — This question asks if you want the ability to display a one-line status report at your terminal by pressing CTRL/T. For more information on this feature, see the *RSTS/E System User's Guide*.

Response — Type Y or press RETURN if you want one-line status reports; type N if you do not want these reports.

FMS-11 support ? <N> (RET)

Explanation — The Forms Management System (FMS-11) is a DIGITAL software product that provides tools for developing form applications that run only on VT200 series, VT100, or VT52 terminals. If you want to develop form applications with FMS-11, you must order the FMS-11 Software Kit separately from the RSTS/E Distribution Kit.

This question asks if you plan to use FMS-11. If so, the RSTS/E code needed to support FMS-11 adds approximately 2K words to the size of your resident monitor.

Response — Type Y to add the RSTS/E code required to support FMS-11; type N or press RETURN if you do not plan to support FMS-11. If you type Y, then you can install FMS-11, using the instructions in the *FMS-11 Installation Guide*. In the example installation, the response is RETURN.

Multiple private delimiters ? <N> (RET)

Explanation — A *delimiter* is a character that separates and organizes elements of data. A *private delimiter* is a delimiter used within a program. You can define a letter, a function key such as DELETE, a control character such as CTRL/Z, or even a standard delimiter such as LINE FEED as a private delimiter. A private delimiter is useful on a data entry terminal with a specialized keyboard. You can use a large or conveniently located key as the private delimiter. Private delimiters are also useful in keypad applications.

All RSTS/E monitors support the use of one private delimiter in a program. Answer Y to this question to include support for *multiple private delimiters*. You can declare up to 256 multiple private delimiters in a single program by answering Y to this question and a maximum of 1 by answering NO. Multiple private delimiters allow you to do special character processing without using single character I/O strokes. For example, by combining escape sequences with multiple private delimiters, you can define your own function keys in keypad applications. Note that you cannot declare multiple private delimiters in BASIC-PLUS.

For more information on this feature see the *RSTS/E Programming Manual* and the *RSTS/E System Directives Manual*.

Response — Type Y if you want your RSTS/E monitor to support multiple private delimiters; type N or press RETURN if you do not want your RSTS/E monitor to support them. In the example installation, the response is RETURN.

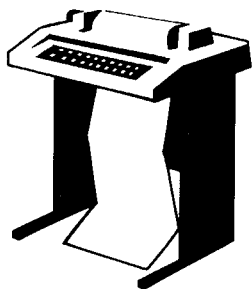


Go to Task 3.

Task 3: Answer Disk Units Configuration Questions

Your next task is to answer the *disk units configuration questions*. These questions deal with the number and types of disk drives supported by your RSTS/E monitor.

Terminal Session



This terminal session lists the disk units configuration questions, explains them, and gives some possible responses (printed in red). After you understand the question, type the response at your console terminal.

If you are generating a monitor for another PDP-11, answer the questions based on the configuration of the target system.

```
The following questions deal with the
numbers and kinds of disk units on this
system.
```

```
Accept Disk defaults ? <N> (RET)
```

Explanation — You see this question only if you answered NO to the Accept defaults ? question in Task 1.

If you answer YES to this question, you receive the default disk configuration, and skip to the peripheral device configuration questions (Task 4). If you answer NO or press RETURN, you see these disk configuration questions:

```
RK05's ?
RL01/RL02's ?
RK06/RK07's ?
RP02/RP03's ?
Disks on DR controller ?
Disks on DB controller ?
MSCP disks ?
```

Response — Answer NO or press RETURN to see the disk configuration questions. In the example installation, the response is RETURN.

```
RK05's ? <00> (RET)
```

Explanation — The RK05 disk system consists of an RK11 controller and from one to eight RK05 moving-head cartridge disk drives. The RK05F counts as two units.

Note that the program always prints a default of 0 or 8, unless you are using a template monitor. If you use a template monitor, the default is the actual number of units that the template monitor is configured to support.

Response — Type the number (0 to 8) of RK05 disk drives that your RSTS/E monitor supports. In the example installation, the default answer indicates that there are none of these drives; thus, the response is RETURN.

If you type 1 or 0, you skip the next question and go to the RL01/RL02's? question.

Overlapped seek ? <Y>

Explanation — The *overlapped seek driver* is software that increases the efficiency of RK05 disk I/O at the expense of some memory.

Response — Type Y or press RETURN to use the overlapped seek driver; type N to use the non-overlapped seek driver. DIGITAL recommends you type N to this question if you have a single RK05F disk and no RK05 disks. Overlapping cannot occur on the RK05F disk. Because the example installation does not have any RK05 disk drives, there is no response to this question.

RL01/RL02's ? <00> (RET)

Explanation — The RL01/RL02 disk system consists of an RL11 controller and any combination of up to four RL01 and RL02 disk drives.

Response — Type the number (0 to 4) of RL01 and RL02 disk drives that your RSTS/E monitor supports. In the example installation, the program indicates that there are none of these drives; thus, the response is RETURN.

If you type 0 or 1, you skip the next question and go to the RK06/RK07's? question.

Overlapped seek ? <Y>

Explanation — The overlapped seek driver increases the efficiency of RL01/RL02 disk I/O, at the expense of some memory.

Response — Type Y or press RETURN to use the overlapped seek driver; type N to use the non-overlapped seek driver. DIGITAL recommends you choose the overlapped seek driver if you have more than one RL01/RL02 disk drive.

RK06/RK07's ? <02> (RET)

Explanation — The RK06/RK07 disk system consists of an RK611 or RK711 controller and any combination of up to eight RK06 and RK07 disk drives.

Response — Type the number (0 to 8) of RK06 and RK07 disk drives that your RSTS/E monitor supports. In the example installation, the program indicates that there are two of these drives; thus, the response is RETURN.

If you type 0 or 1, you skip the next question and go to the RP02/RP03? question.

Overlapped seek ? <Y> (RET)

Explanation — The overlapped seek driver increases the efficiency of RK06/RK07 disk input/output at the expense of some memory.

Response — Type Y or press RETURN to use the overlapped seek driver; type N to use the non-overlapped seek driver. DIGITAL recommends you choose the overlapped seek driver if you have more than one drive. In the example installation, the response is RETURN.

```
RP02/RP03's ? <00> (RET)
```

Explanation — The RP02/RP03 disk system consists of an RP11 controller and any combination of up to eight RP02 and RP03 disk drives.

Note that the program always prints a default of 0 or 8, unless you are using a template monitor. If you use a template monitor, the default is the actual number of units that the template monitor is configured to support.

Response — Type the number (0 to 8) of RP02 and RP03 disk drives supported by your RSTS/E monitor. In the example installation, the program indicates that there are none of these drives; thus, the response is RETURN.

If you type 0 or 1, you skip the next question and go to the Disks on DR controller? question.

```
Overlapped seek ? <Y>
```

Explanation — The overlapped seek driver increases the efficiency of RP02/RP03 disk input/output at the expense of some memory.

Response — Type Y or press RETURN if you want your RSTS/E monitor to use the overlapped seek driver; type N if you want your RSTS/E monitor to use the non-overlapped seek driver. DIGITAL recommends you choose the overlapped seek driver if you have more than one RP02/RP03 drive. Because the example installation has no RP02/RP03 disk drives, there is no response to this question.

```
Disks on DR controller ? <00> (RET)
```

Explanation — The RH70 controller supports any combination of up to eight RM02, RM03, RM05, RM80, RP04, RP05, and RP06 disk drives. The RH11 controller supports any combination of up to eight RM02, RP04, RP05, and RP06 disk drives. This question asks you to type the number of RM02/RM03/RM05/RM80 and RP04/RP05/RP06 drives your RSTS/E monitor supports on this controller. (RSTS/E supports a maximum of two disk RH70/RH11 controllers.) See Appendix F for more information on mixing RM and RP type disks on the same controller.

Response — Type the number (0 to 8) of RM02/RM03/RM05/RM80 and RP04/RP05/RP06 disk drives that your RSTS/E monitor supports on this controller. In the example installation, the program indicates that there are none of these drives; thus, the response is RETURN.

If you type 0 or 1, you skip the next question and go to the Disks on DB controller? question.

```
Overlapped seek ? <Y>
```

Explanation — The overlapped seek driver increases the efficiency of RM02/RM03/RM05/RM80 and RP04/RP05/RP06 disk input/output, at the expense of some memory.

In addition, answering YES to this question allows those disks to be accessed in “dual-port” mode. When two systems are connected to these disks, they can be accessed read-only by both systems at the same time.

Response — Type Y or press RETURN to use the overlapped seek driver; type N to use the non-overlapped seek driver. DIGITAL recommends you choose the overlapped seek driver if you have more than one RM02/RM03/RM05/RM80 and RP04/RP05/RP06 disk drive. In the example installation there is no response because there are none of these drives.

```
Disks on DB controller ? <00> (RET)
```

Explanation — The RH70 controller supports any combination of up to eight RP04, RP05, RP06, RM02, RM03, RM05, and RM80 disk drives. The RH11 controller supports any combination of up to eight RP04, RP05, RP06, and RM02 disk drives. This question asks you to type the number of RP04/RP05/RP06 and RM02/RM03/RM05/RM80 drives your RSTS/E monitor supports on this controller. (RSTS/E supports a maximum of two disk RH70/RH11 controllers.) See Appendix F for more information on mixing RP and RM type disks on the same controller.

Response — Type the number (0 to 8) of RP04/RP05/RP06 and RM02/RM03/RM05/RM80 disk drives that your RSTS/E monitor supports on this controller. In the example installation, the program indicates that there are none of these drives; thus, the response is RETURN.

If you type 0 or 1, you skip the next question and go to the MSCP disks ? question.

```
Overlapped seek ? <Y>
```

Explanation — The overlapped seek driver increases the efficiency of RP04/RP05/RP06 and RM02/RM03/RM05/RM80 disk input/output at the expense of some memory.

In addition, answering YES to this question allows those disks to be accessed in “dual-port” mode. When two systems are connected to these disks, they can be accessed read-only by both systems at the same time.

Response — Type Y to support the overlapped seek driver; type N to support the non-overlapped seek driver. DIGITAL recommends you choose the overlapped seek driver if you have more than one RP04/RP05/RP06 and RM02/RM03/RM05/RM80 drive. Because the example installation has none of these disk drives, there is no response to this question.

MSCP disks ? <03> (RET)

Explanation — This question asks you to type the number of MSCP class disk drives that your RSTS/E monitor supports. RSTS/E supports up to eight MSCP disk drives on two MSCP controllers. The MSCP controllers include the UDA50, RC25, RQDX1, and RUX50 controllers. The UDA50 controller controls a maximum of four RA60, RA80, and RA81 disk drives. The RC25 controller controls a maximum of two RC25 drives (for 4 units). The RQDX1 controller controls a maximum of either two RD51, two RD52, or two RD53 (or any combination totaling two) plus two RX50 disk drives. The RUX50 controller supports a maximum of four RX50 drives.

Response — Type the number (0 to 8) of MSCP disk drives that your RSTS/E monitor supports. Remember, this question asks for the total number of MSCP disk drives, not the number of MSCP controllers. In the example installation, the program indicates there are three MSCP disk drives; thus the response is RETURN.



Go to Task 4.

Task 4: Answer Peripheral Devices Configuration Questions

Your next task is to answer the *peripheral devices configuration questions*. These questions deal with the number and types of tape drives, printers, and card readers that your RSTS/E monitor supports. There are also questions related to DECnet/E, RJ2780, 3271, and 2780/3780.

Terminal Session



This terminal session lists the peripheral devices configuration questions, explains them, and gives some possible responses (printed in red). After you understand the question, type the response at your console terminal.

If you are generating a monitor for another PDP-11, answer the questions based on the configuration of the target system.

The following questions deal with the peripheral devices attached to this RSTS/E system.

Accept Peripheral defaults ? <N> **RET**

Explanation — You see this question only if you answered NO to the Accept defaults? question in Task 1.

If you answer YES to this question, you receive the default peripheral devices configuration, and skip to the software tuning and features configuration questions (Task 6). If you answer NO or press RETURN, you see these peripheral devices configuration questions:

TU16/TE16/TU45/TU77's ?
TU10/TE10/TS03's ?
TS11/TK25/TSV05/TU80's ?
TMSCP tape drives ?
DECtapes ?
Printers ?
RX01/RX02's ?
CR11/CM11 card reader ?
CD11 card reader ?
P.T. reader/punch ?
DECnet network support ?
DMC11's/DMR11's ?
KMC11's ?
Extended buffering for LP ?
RJ2780 support ?

Response — Type NO or press RETURN to see the peripheral configuration questions. In the example installation, the response is RETURN.

TU16/TE16/TU45/TU77's ? <00> **RET**

Explanation — The TU16/TE16/TU45/TU77 magnetic tape system consists of an RH11 or RH70 massbus interface, a TM02 or TM03 controller, and a maximum of eight TU16, TE16, TU45, or four TU77 magnetic tape drives.

Note that the program always prints a default of 0 or 8, unless you are using a template monitor. If you use a template monitor, the default is the actual number of units that the template monitor is configured to support.

Response — Type the number (0 to 8) of these tape drives that your RSTS/E monitor supports. In the example installation, the response is RETURN.

TU10/TE10/TS03's ? <00> (RET)

Explanation — The TU10/TE10/TS03 magnetic tape system consists of a TM11, TMA11, or TMB11 magnetic tape controller and a maximum of eight TU10, TE10, or TS03 magnetic tape drives.

Note that the program always prints a default of 0 or 8, unless you are using a template monitor. If you use a template monitor, the default is the actual number of units that the template monitor is configured to support.

Response — Type the number (0 to 8) of these tape drives that your RSTS/E monitor supports. In the example installation, the response is RETURN.

TS11/TK25/TSV05/TU80's ? <01> (RET)

Explanation — The TS11 magnetic tape system consists of a TS11 controller and one TS11, TK25, TSV05, or TU80 magnetic tape drive.

Response — Type the number (0 to 4) of TS11, TK25, TSV05, or TU80 tape drives supported by your RSTS/E monitor. In the example installation, the response is RETURN to accept the default of 1.

TMSCP tape drives ? <00> (RET)

Explanation — RSTS/E can support up to two TMSCP class tape drives. Each TMSCP controller can support one TK50 tape drive.

Response — Type the number (0 to 2) of TMSCP tape drives that your RSTS/E monitor supports. In the example installation, the response is RETURN.

DECtapes ? <00> (RET)

Explanation — The DECtape system consists of a TC11 controller, a maximum of eight DEC single-tape drives and/or a maximum of four TU56 DEC dual-tape drives. (Note that these are dual drives; thus, if you have four TU56 units you actually have eight drives.) This question asks for the number of DECtape drives (counting each TU56 unit as two drives) your RSTS/E monitor will support.

Note that the program always prints a default of 0 or 8, unless you are using a template monitor. If you use a template monitor, the default is the actual number of units that the template monitor is configured to support.

Response — Type the number (0 to 8) of DECtape drives that your RSTS/E monitor supports. In the example installation, the response is RETURN.

Printers ? <01> (RET)

Explanation — A RSTS/E monitor can support a maximum of eight LP11, LA11, or LPV11 printers.

Response — Type the number of LP11, LA11, or LPV11 line printers (0 to 8) that your RSTS/E monitor supports. In the example installation, the response is RETURN

to accept the default of 1. (Note that the LP11 line printer includes the LP25, LP26, LP27, and so forth.)

RX01/RX02's ? <00>

Explanation — The RX11 or RX211 flexible diskette system consists of an interface and an RX01 single-density or RX02 double-density flexible diskette subsystem. The RXV11 flexible diskette system consists of an interface and an RX01 single-density subsystem. The RX01 and RX02 flexible diskette subsystems each consist of a disk controller and two flexible diskette drives. The RSTS/E monitor supports a maximum of four RX11 or RX211 flexible diskette systems, for a maximum of eight RX01 or RX02 flexible diskette drives.

Note that the program always prints a default of 0 or 8, unless you are using a template monitor. If you use a template monitor, the default is the actual number of units that the template monitor is configured to support.

Response — Type the number (0 to 8) of RX01 or RX02 flexible diskette drives that your RSTS/E monitor supports. The example installation has none of these drives; thus, the response is RETURN.

CR11/CM11 card reader ? <N>

Explanation — This question asks if your RSTS/E monitor supports the CR11 punched card reader or the CM11 marked card reader.

Response — Type Y if your RSTS/E monitor supports either of these devices; type N if it does not support either of these devices. In the example installation, the response is RETURN.

CD11 card reader ? <N>

Explanation — This question asks if your RSTS/E monitor supports the CD11 high-speed punched card reader.

Response — Type Y if your RSTS/E monitor supports this device; type N if your RSTS/E monitor does not support this device. In the example installation, the response is RETURN.

Card decode ?

Explanation — This question appears only if you answered Y to the CR11/CM11 card reader? or the CD11 card reader? questions. The RSTS/E monitor interprets cards through the use of an ANSI standard card decoder. However, it is possible that your installation uses some other card decoder. This question asks you to type the card decoder you want your RSTS/E monitor to support. See the *RSTS/E Programming Manual* for more information on the card codes.

Response — In the example installation, there is no response because N was the response to the previous card reader questions. Possible responses are:

- ANSI
- 029 for cards punched in DEC 029
- 026 for cards punched in DEC 026
- 1401 for cards punched in IBM 1401

P.T. reader/punch ? <N> (RET)

Explanation — This question asks if your RSTS/E monitor supports the high-speed paper tape reader and the high-speed paper tape punch.

Response — Type Y if your RSTS/E monitor supports these devices; type N if your RSTS/E monitor does not support these devices. In the example installation, the response is RETURN.

DECnet network support ? <Y> N

Explanation — DECnet/E is a DIGITAL software product that lets you communicate with two or more DIGITAL computer systems. If you want the features provided by DECnet/E, you must order the DECnet/E software kit separately from the RSTS/E Distribution Kit. This question asks if you want to add the code needed to support DECnet/E. The DECnet/E documentation set describes the concepts and capabilities of DECnet/E. Before you install DECnet/E, consult the *DECnet/E Network Installation Guide*.

Response — Type Y to add the code needed to support DECnet/E; type N if you do not plan to use DECnet/E. If you type Y, then you will be asked to mount the tape or disk that contains the DECnet/E software in Phase 5. The example installation does not plan to install DECnet. Therefore, the response is N.

DMC11's/DMR11's ? <00> (RET)

Explanation — The DMC11 and DMR11 network links are synchronous communication line interfaces that implement the DDCMP line protocol in the hardware. These interfaces are used primarily with DECnet/E but can be used without it.

Response — Type the number (0 to 16) of DMC11 or DMR11 network links attached to your PDP-11. Because the example installation does not plan to use DECnet/E or the DMC's by themselves, the response is RETURN.

DMV11's/DMP11's ?

Explanation — You see this question only if you typed Y to the DECnet network support? question. (Note that this question shows either DMV11 or DMP11, depending on the hardware on your system.) The DMV11 and DMP11 network links are synchronous communication line interfaces that implement the DDCMP line protocol in the hardware. The DMV11 and DMP11 links can be used only by DECnet. This question asks for the number of DMV11 or DMP11 network links attached to your PDP-11.

Response — Type the number (0 to 16) of DMV11 or DMP11 network links attached to your PDP-11. If you type 0, you go to the KMC11's? configuration question. Because the example installation does not use DECnet/E, there is no response to this question.

DMV11/DMP11 unit xx tributaries ?

Explanation — This question asks for the number of tributaries you will activate at one time. The program prints this question for each DMV11/DMP11 supported by your RSTS/E monitor. For example, if you type 5 to the DMV11/DMP11's? question, this question appears five times. (The guide shows this question only once.) The question refers to either DMV11 or DMP11, depending on the hardware on your system.

The program repeats the DMV11's/DMP11's? configuration question if you specified more than 128 tributaries. See the *DECnet/E Installation Guide* and *DECnet/E Release Notes* for information on this question.

Response — Type the number (1 to 12) for the DMV11, or type the number (1 to 32) for the DMP11. Because the example installation does not use either of these line interfaces, there is no response to this question.

KMC11's ? <00> (RET)

Explanation — The KMC-11 is a microprocessor that attaches to the UNIBUS of a PDP-11. The KMC-11 runs asynchronously with the PDP-11. When loaded with the appropriate microcodes, the KMC-11 controls the 3271 or 2780/3780 IBM protocol emulators.

Response — Type the number (0 to 16) of KMC-11 microprocessors attached to your PDP-11. In the example installation, the response is RETURN.

If you type 0, you skip the next two questions and go to the Extended buffering for LP? question.

KMC IBM Protocol Support ?

Explanation — The KMC-11 microprocessor can emulate different IBM protocols. For example, the KMC-11 can handle IBM 3271 protocol emulation. This reduces PDP-11 central processor overhead because the KMC-11 eliminates almost all binary

synchronous communication character interrupts and protocol processing. IBM protocol emulator products (the 3271 and high performance 2780/3780) use the extended buffer pool rather than small buffers.

Response — Type Y to add this support; type N if you do not want to add this support. If you type N, you see the Extended buffering for LP? question. Because the example installation does not support KMC-11s, there is no response to this question.

3271 or 2780/3780 simultaneous links ?

Explanation — Each KMC-11 microprocessor controls one DUP11 synchronous line interface to the 3271 or 2780/3780 host. The 3271 is a terminal; the 2780/3780 is a remote batch job entry device. An IBM host connected to a RSTS/E computer system can communicate with these devices as though they were actually present because the RSTS/E monitor emulates them. This question asks for the number of 3271 or 2780/3780 simultaneous links you want.

Response — Type the number (0 to 16) of KMC-11/3271 or KMC-11/2780/3780 simultaneous links you want attached to your PDP-11. Because the example installation does not support KMC-11s, there is no response to this question.

Extended buffering for LP ? <Y> (RET)

Explanation — The *extended buffer pool* (XBUF) is an area of memory reserved for data. This question appears only if you type 1 or more in response to the Printers? peripheral devices configuration question. It asks if you want to use the extended buffer pool instead of the small buffer pool to store character output from the line printer.

Each line printer driver uses a maximum of 2.5K words of XBUF while it is running. In addition, the driver is about 70 words longer if you choose this feature.

This feature improves line printer performance and reduces line printer impact on the small buffer pool; therefore, it is more useful for large systems.

Response — Type Y if you want to use XBUF to store character output from the line printer; type N if you do not want to use XBUF. In the example installation, the response is RETURN.

RJ2780 support ? <N> (RET)

Explanation — The *RJ2780 Emulator Package* is a DIGITAL software product that emulates the IBM RJ2780 Model 1 data transmission terminal. This software lets a RSTS/E monitor communicate with any IBM computer that supports your terminal, or with another DIGITAL computer running the RJ2780 terminal emulator package.

Transmission of data can originate from a card reader or disk files. Received data can be directed to a line printer or 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. This package also supports a spooling operation that allows RSTS/E users to queue files for transmission.

If you want to support the RJ2780, you must order the RJ2780 software kit separately from the RSTS/E Distribution Kit. For more information on this software package, see the *RSTS/2780 User's Guide*. In Phase 5, the system will tell you when to mount the tape or disk that contains the RJ2780 software.

Response — Type Y to add the code needed by the RSTS/E monitor to support this optional software; type N if you do not want to add this optional software. In the example installation, the response is RETURN.

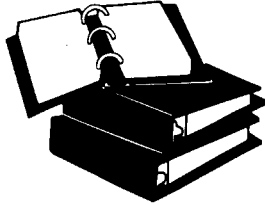


Go to Task 5.

Task 5: Calculate Number of Jobs

This task helps you calculate the maximum number of jobs your system needs. You need to know the number of jobs in order to answer the Maximum jobs? question in Task 6 of this phase. There is no terminal session in this task, only a preparation session.

Preparation Session



The RSTS/E monitor assigns *jobs* to keep track of all user activities.

To calculate the maximum number of jobs your system needs, add the following:

- Number of physical terminals you have or plan to have.
- Number of pseudo keyboards you need. A pseudo keyboard is a logical device that has the characteristics of a terminal, but has no physical terminal associated with it.
- One *detached job* for *ERRCPY*, the error logger program that reads error-related information stored in the monitor area of memory. A detached job is a job that is not associated with a terminal. See the *RSTS/E System Manager's Guide* for information on *ERRCPY*.
- Number of detached jobs for print/batch requests. For the Print/Batch Services (PBS) package, allow one detached job for each copy of the *PRINT* and *BATCH* server programs. For the *OPSER*-based spooling package, allow two detached jobs plus one job for each line printer and batch server. See the *RSTS/E System Manager's Guide* for more information on these programs.
- Two to five jobs if your installation uses dial-up terminals. These terminals may become detached as a result of a faulty phone connection. See the *RSTS/E System Manager's Guide* for more information.
- A number of detached jobs for optional software like *DECWORD/DP* and *DECnet/E*. See the appropriate installation guide for more information on job requirements.

The example installation calculates a total of 40 jobs:

- Terminals - 30
- Pseudo keyboards - 6
- System programs - 4 (1 for Print/Batch Services requests; 3 for OPSER requests).

Figure 2 provides a job calculation worksheet to allow you to write the number of jobs needed by your installation. The maximum number of jobs allowed by the RSTS/E monitor is 63.

How many terminals do you plan to support?	_____
How many pseudo keyboards does your software require at any one time?	_____
How many detached jobs do you need for ERRCPY, Print/Batch Services (PBS), and/or the OPSER-based spooling package?	_____
How many jobs do you need to accommodate detached dial-up jobs?	_____
How many detached jobs do you need for optional software?	_____
Total # of jobs	_____

Figure 2: Job Calculation Worksheet

MK-01092-01

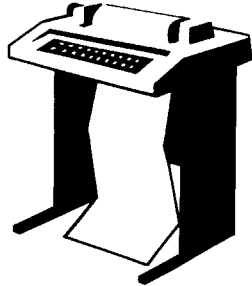


Go to Task 6.

Task 6: Answer Software Tuning and Features Configuration Questions

Your next task is to answer the *software tuning and features configuration questions*. These questions deal with RSTS/E monitor software features, such as maximum number of jobs, small buffers, data caching, and so forth.

Terminal Session



This terminal session lists the software tuning and features configuration questions, explains them, and gives you some possible responses (printed in red). After you understand the question, type the response at your console terminal.

If you are generating a monitor for another PDP-11, answer the questions based on the configuration of the target system.

```
The following questions deal with the
capacity and features of this RSTS/E
system provided at the system manager's
option.
```

```
Accept Software defaults? <N> (RET)
```

Explanation — You see this question only if you answered NO to the Accept defaults? question in Task 1.

If you answer YES to this question, you receive the software tuning and features defaults, and skip to the Proceed? prompt at the beginning of Phase 4. If you answer NO or press RETURN, you see these software tuning and features configuration questions:

```
Maximum jobs ?
Small buffers ?
Monitor statistics ?
EMT logging ?
```

Response — Answer NO or press RETURN to see the software tuning and features configuration questions. In the example installation, the response is RETURN.

```
Maximum Jobs ? <25> 40
```

Explanation — In Task 5 you used the Job Calculation Worksheet to calculate the number of jobs your RSTS/E monitor supports. Once you establish the maximum number of jobs, you cannot increase the number unless you perform another system installation. However, you can decrease the number you enter here online during timesharing by using the SET LOGINS command (see the *RSTS/E System Manager's Guide*).

Response — Check your Job Calculation Worksheet (Task 5, Figure 2) and enter the maximum number of jobs (2 to 63) your RSTS/E monitor supports. In the example installation, the response is 40.

Small buffers ? <440> 550

Explanation — A *small buffer* is a 16-word storage area located in the monitor area of memory. There are two types of small buffers: *general small buffers* and *FIP small buffers*. You allocate the minimum number of general small buffers now by answering this question. Note that the installation procedure automatically calculates a recommended number of general small buffers you need for your installation. In the example installation, the installation procedure calculates a total of 440 general small buffers.

Your default may differ from the default in the example installation. Your installation may also need more than the number printed in the default. A more detailed explanation of how to add general and FIP small buffers is provided in the BUFFERS suboption of the DEFAULT option, located in the Offline Options section of this guide.

Response — Press RETURN to accept the default. In the example installation, the response is 550.

Or, type the number of small buffers (1-999) you want on your system. In general, a response within the range of 600 small buffers is acceptable for most systems.

Note

If the number of small buffers you specify is too high for your system, the command procedure may lower the number when it creates your new monitor (see Task 2 of Phase 5).

If you specify many more buffers than can fit on your system, the command procedure asks the configuration questions again before it creates your new monitor.

Monitor statistics ? <N> (RET)

Explanation — *Monitor statistics* is a software feature that provides tables that record job, disk, and directory (or data) cache statistics. DIGITAL does not provide support for this feature unless you have it in a DIGITAL Software Services Consultation contract. The type of data accumulated and the way the data is accessed may change in future releases.

Response — Type Y if you want this feature; type N if you do not want this feature. In the example installation, the response is RETURN.

EMT logging ? <N> (RET)

Explanation — *EMT logging* is a feature that allows you to pass information on selected monitor directives by means of send/receive to a program that you write after

you build your monitor. Your program can then make use of these monitor directives to log selected kinds of system activity. See the *RSTS/E System Manager's Guide* for more information on EMT logging.

Response — Type Y if you want your monitor to support EMT logging, in which case you will have to write a program (the UNSUPP system program package contains a demonstration program); type N if you do not want this support. In the example installation, the response is RETURN, which accepts the default of NO.

Restoring DECnet/E update components

Use RMS resident libraries in NFT and FAL? <yes>

Explanation — You see this question only if you answered Yes to the DECnet network support? question in Task 4. The resident library versions of the NFT and FAL DECnet/E utilities use the RMS resident library. The overlaid versions of NFT and FAL use disk overlays. The resident library version executes faster than the disk overlay version but requires more memory.

Response — Type YES or press RETURN to receive the resident library versions of NFT and FAL. Type NO to receive the overlaid versions. Because the example installation does not use DECnet/E, there is no response to this question.

End of Monitor Section



Go to Phase 4.

Phase 4 Select RSTS/E System Programs

Now that you have finished answering the configuration questions, you are ready to perform the second part of configuring your RSTS/E system. In this phase, you specify which system programs to install on your system.

The tasks in this phase are:

- Task 1: Answer System Program Installation Questions
- Task 2: Answer Layered Product-Related Questions

These responses have special meaning:

Response	Description
RET	Accept the default response
?	Obtain an online explanation of the question
^	Return to the previous question
CTRL/Z	Return to the beginning of a dialogue section

Task 1: Answer System Program Installation Questions

Your next task is to answer the system program installation questions.

System programs provide you with tools for performing common tasks during timesharing. For example, system programs allow you to efficiently develop programs, manage files, and perform special system management-related tasks.

DIGITAL supplies RSTS/E system programs on the V9 Library media. The programs are grouped into the packages listed in Table 6. See Appendix C for a complete list of system programs contained in each package as well as package sizes.

Table 6: System Program Packages

Package	Description
System Library	The <i>standard system library</i> . You automatically receive this package.
RSX Utilities	Programs that allow you to use RSX from a programming environment, or use the DCL LINK command from any language.
Help	Programs that display online help text.
Error	Programs that detect, log, and display errors, as well as perform crash analysis. You automatically receive this package.
Update	Programs you may need when installing optional software. This package contains the BUILD program. If you plan to install any layered products, you should select this package.
Device Testing	The Device Testing Package. See the <i>RSTS/E System Manager's Guide</i> for more information.
Print/Batch Services (PBS)	The RSTS/E V9.0 Print/Batch Services package. See the <i>RSTS/E System Manager's Guide</i> for more information.
File Restore	The pre-V9.0 BACKUP package. See the <i>RSTS/E Utilities Reference Manual</i> for more information.
OPSER-based Spooling	The pre-V9.0 OPSER-based spooling package. See the <i>RSTS/E System Manager's Guide</i> for more information.
Unsupported Utility	Utility programs that are unsupported by DIGITAL. See the <i>RSTS/E Release Notes</i> for more information.
Auxiliary Library	System programs and data files used with certain peripheral devices and optional software.

(continued on next page)

Table 6: System Program Packages (Cont.)

Package	Description
RMS-11	A set of routines that allows your programs to gain access to and process (add, modify, and delete) records and files. For information about RMS-11, see the following manuals: • <i>RSTS/E RMS-11: An Introduction</i> and the <i>RSTS/E RMS-11 User's Guide</i> provide introductory and user information (MACRO-11 and high-level language programmer). • <i>RSTS/E RMS-11 Macro Programmer's Guide</i> contains reference information on the RMS-11 operation routines for MACRO-11 programmers. • <i>RSTS/E RMS-11 Utilities</i> manual provides usage and reference information on the RMS-11 utility programs.
RMS DAP	RMS DECnet Access Package, a set of routines that provides DECnet support for RMS-11. See the <i>RSTS/E RMS-11 User's Guide</i> and the <i>RSTS/E Release Notes</i> for more information.
EDT	A text editor that provides line and character editing, screen editing, and journaling capabilities. See the <i>Introduction to the EDT Editor</i> and the <i>EDT Editor Manual</i> for more information.
TECO	TECO (Text Editor and COrrector), a text editing program that you can use to edit any form of ASCII text. DIGITAL does not support TECO. See the <i>PDP-11 TECO User's Guide</i> for more information.
SORT/MERGE	SORT/MERGE V3.0, a set of routines that allows you to read an input file, sort it, and write the data to an output file. See the <i>PDP-11 SORT/MERGE User's Guide</i> for more information. (You answer the SORT/MERGE configuration questions in Task 5B of Phase 5.)
BASIC-PLUS	BASIC-PLUS, a BASIC interpreter that lets you perform interactive BASIC programming and also gives you access to system programming features such as system function calls and block I/O. See the <i>BASIC-PLUS Language Manual</i> for more information. (You answer the BASIC-PLUS configuration questions in Task 5A of Phase 5.)

Note that the System Library and Error packages are automatically installed on your V9.0 system.

Terminal Session



This terminal session explains the system program installation dialogue and provides some possible responses. In some cases, your response will differ from the response shown in red in the example installation.

**** Starting System Programs Section ****

Do you want to install the System Program packages? <yes> **RET**

Explanation — You are at the beginning of the System Programs Section. If you answer YES, you begin the dialogue to install system programs.

Answer NO if you are only creating a RSTS/E monitor and do not want to install system programs. You then skip this phase and go to the Are you ready to proceed? question in Task 1 of Phase 5.

Response — Type YES or press RETURN to begin the dialogue. In the example installation, the response is RETURN.

Packages to install: ?

Explanation — This question asks for the names of the packages you want to install on your system.

Response — Type a question mark to list the packages that are available.

The valid responses are:

DIALOGUE	Switches you to the long form of the System Software Packages dialogue where a more detailed description of each package is provided
ALL	Selects all packages
ALL,NOPKG[,...]	Selects all packages except PKG

Use a comma as a separator, e.g.: RSX,PBS,RMS

Package names:

AUXLIB	Auxiliary Library	RMS	RMS-11
BASIC	Basic-Plus		(includes RSX Utilities)
DAP	RMS DECnet Data Access Package	RSX	RSX Utilities
	(includes RMS-11)	SORT	Sort/Merge
EDT	EDT Editor		(includes RMS-11)
HELP	Help Package	TECO	TECO Editor
OPSER	Opscr-based Spooler	TEST	Device Testing
PBS	Print/Batch Services	UNSUPP	Unsupported Utilities
RESTORE	File Restore	UPDATE	Update Package

Packages to install: ALL,NODAP,NOUNSUPP,NOSORT

Explanation — After you type a ?, you see the list of available system program packages. Then the system reprompts for the packages to install. Note that the RMS, DAP, and SORT packages need other packages to work properly. If you specify any of these packages, you automatically receive the associated package.

Response — If you know what packages you want to install, type a list of the package names, separated by commas. Remember, if you make a mistake you can type ^ to return to the previous question, or enter CTRL/Z to return to the beginning of the section.

If you want more information before deciding whether to install a package, type DIALOGUE to see the long form of the dialogue.

Type ALL to install all the packages. If you plan to install nearly all of the packages, type:

ALL,NOnnnnnn,NOnnnnnn

where nnnnnn refers to a package you want to exclude.

In the example installation, the response is ALL,NODAP,NOUNSUPP,NOSORT.

The following will be installed:

```
RSX
RMS
PBS
EDT
UPDATE
TEST
TECO
AUXLIB
RESTORE
OPSER
HELP
BASIC
```

Proceed? <yes> (RET)

Explanation — The system lists the packages it will install and prompts you to proceed. If you answer NO to this question, you return to the Packages to install: prompt.

Response — Type YES or press RETURN to continue with the installation. Or, type NO if you want to change the packages to install on your system. In the example installation, the response is RETURN.

Do you want the I&D versions of tasks? <no> (RET)

Explanation — The system copies some required files and then asks if you want the I&D versions of tasks. You see this question only if you specified RSX and/or AUXLIB in response to the Packages to install: question.

Instruction and Data (I&D) space is available on the PDP-11/44, 45, 50, 55, 70, 73, 83, or 84. DIGITAL does not recommend that systems with less than 256K words of memory (PDP-11/45, 50, or 55) use I&D space. If your system has more than 256K words of memory (PDP-11/44, 70, 73, 83, or 84.), you may want to take advantage

of this hardware feature which yields better performance from the following tasks: TKB, MAC, STK, and REORDR.

Note that if you answer YES to this question, you must specify a SWAP MAX of 64K words to accommodate the larger amount of physical memory required by the tasks. Use the INIT.SYS DEFAULT option to change the SWAP MAX. See the Offline Options section for details.

The system uses your response to this question later in the installation when it asks whether you want to create a SWAP1.SYS file (see Task 1 of Phase 5). If you answer YES to this question, the system assumes a SWAP MAX of 64K words. Otherwise, the system assumes a SWAP MAX of 32K words.

Response — Type YES to receive the I&D versions of tasks. Type NO or press RETURN to receive the normal versions. The example installation does not plan to use I&D space; thus, the response is RETURN.

```
Use resident library version of RMS? <yes> (RET)
```

```
Use RMS resident libraries in DAP? <yes>
```

```
Use RMS resident libraries in PBS? <yes> (RET)
```

```
Use resident library version of EDT? <yes> (RET)
```

Explanation — If you choose RMS, DAP, PBS, or EDT, the system asks you to choose either the resident library or overlaid version. The example installation sees the RMS, PBS, and EDT resident library questions. In general, the overlaid version requires less memory, but can impact performance. The resident library version requires less disk space, but requires more memory. Choose the resident library versions if your system has sufficient memory and you have more than one user accessing a program simultaneously.

Response — Type YES or press RETURN to install the resident library version. Type NO to install the overlaid version. The response in the example installation is RETURN because it has sufficient memory to install the resident library versions.

```
During the build phase there will be further questions  
for BASIC-PLUS and SORT/MERGE
```

Explanation — You see these messages if you chose the BASIC-PLUS and/or SORT/MERGE packages. You answer the BASIC-PLUS configuration questions in Task 5A of Phase 5. You answer the SORT/MERGE questions in Task 5B of Phase 5.

```
** End of System Programs Section **
```

```
** Starting Layered Products Section **
```

```
Do you want to transfer the layered product update components  
from the Installation Kit? <yes> NO
```

Explanation — You are finished with the System Programs Section. This question asks if you want to transfer any layered product updates from the Installation kit while

it is still mounted. Answer YES to this question if you plan to install any layered products on your system. If you answer YES, you continue the Layered Products Section.

Response — Type YES or press RETURN to continue the Layered Products Section. Type NO to skip the section. In the example installation, the response is NO.



If you answered YES to the previous question, go to Task 2.



If you answered NO to the previous question, go to Phase 5.

Task 2: Answer Layered Product-Related Questions

You perform this task if you plan to install layered products on your RSTS/E system. A *layered product*, also called optional software, is software that you must purchase from DIGITAL. Examples of layered products are BASIC-PLUS-2, COBOL-81, and DIBOL.

In this task, you specify which layered products you plan to install on your system, so that the installation procedure can transfer updates for those products from the Installation kit.

Note

The RSTS/E Installation Procedure does not perform a layered product installation. See the individual layered product installation guide for the procedures to perform the installation.

Terminal Session



This terminal session explains the layered product-related questions and provides some possible responses.

```
** Starting Layered Products Section**
```

```
Do you want to transfer the layered product update components  
from the Installation Kit? <yes>
```

Explanation — You see this question at the end of Task 1.

Response — Type YES or press RETURN to begin the dialogue to transfer layered products updates. Type NO to skip this section. The example installation does not plan to transfer any layered product updates.

```
Product updates to transfer: ?
```

Explanation — This question asks for the names of the layered product updates you want to transfer to your system.

Response — Type a ? to list the layered product packages that are available with RSTS/E.

The valid responses are:

```
ALL                Transfers all product updates
ALL,NOProd[,...]   Transfers all product updates except Prod
```

Use a comma as a separator, e.g.: BP2,CB1

Product names:

ADE	DECDX	DIBS	FORTRAN	MAIL	PROIV	2780	3780
BP2	DECGRAPH	DMS500	FRTRN77	MENU	REGIS CAI	3271	
COBOL	DECWORD	DTR	F77DBG	MSGROUTER	RJ2780		
CB1	DIBOL	FMS	INDENT	PLXY	RPG		

Product updates to transfer:

Explanation — After you type a ?, you see the list of available layered products. Then the system reprompts for the product updates to transfer.

Response — Type a list of the product names, separated by commas. Remember, if you make a mistake you can type ^ to return to the previous question, or enter CTRL/Z to return to the beginning of the section.

Type ALL to transfer all the updates. If you plan to transfer nearly all of the product updates, type:

ALL,NOnnnnnn,NOnnnnnn

where nnnnnn refers to a product update you want to exclude.

The following will be transferred:

<list of Products>

Proceed? <yes>

Explanation — The system lists the product updates it will transfer to your system and then asks if you want to continue. If you type NO, you return to the Product updates to transfer: prompt.

Response — Type YES or press RETURN to continue the layered product update transfer. Type NO if you want to specify a different list of layered product updates to transfer to your system.

Note: Any files currently in the PATCH ACCOUNT will be deleted

Since some layered products may require the Update Package (from the System Programs section), it will be included. To install a layered product please refer to the individual layered product installation guide.

Patch account <PATCH\$:> :

Explanation — Now you must specify the account in which you want the layered product update information placed. The default account is PATCH\$.

After you complete the RSTS/E installation, you must follow the installation procedures outlined in the specific layered product installation guide to install that layered product. Some of the layered products use the BUILD program to perform the installation. See Appendix E for a description of BUILD.

Response — Press RETURN to accept the default patch account, PATCH\$. Or specify a different account.

**** End of Layered Products Section ****

Explanation — You are finished with Phase 4. If any error messages appear in the printout, see Appendix A.



Go to Phase 5.

Phase 5 Generate RSTS/E System

You have answered all the configuration questions and are ready to install your RSTS/E system. In this phase, you create some required system files if they do not already exist. Then you create the RSTS/E monitor and install the system programs you selected in Phase 4. See the appropriate installation guides for instructions on building optional software such as BASIC-PLUS-2.

The tasks you perform in this phase are:

- Task 1: Create Additional System Files
- Task 2: Create RSTS/E Monitor
- Task 3: Install System Programs from the Installation Media
- Task 4: Physically Mount V9 Library Media
- Task 5: Install System Programs from the V9 Library Media
- Task 5A: Answer BASIC-PLUS Installation Questions
- Task 5B: Answer SORT/MERGE Installation Questions

These responses have special meaning:

Response	Description
RET	Accept the default response
?	Obtain an online explanation of the question

Task 1: Create Additional System Files

System files are files of special use to the system itself. They reside in account [0,1].

SWAP files are the most important system files. They store jobs transferred out of memory. Without at least one SWAP file, the system cannot swap jobs out of memory and will not work. There are four available SWAP files: SWAP0.SYS, SWAP1.SYS, SWAP2.SYS (always referred to as SWAP.SYS), and SWAP3.SYS.

During system start-up, INIT.SYS automatically creates the SWAP.SYS file at a size large enough to store one job at the maximum size of 32K words. In addition, INIT.SYS automatically creates the system files ERR.SYS and CRASH.SYS during system start-up.

In this task, the installation procedure creates the SWAP1.SYS file at a size large enough to hold the number of jobs you specified when you answered the Maximum jobs? question in Task 6 of Phase 3. If necessary, the system also creates the BUFF.SYS file which is required if you have TU56 DECtapes on your system. You answered the DECtapes? question in Task 4 of Phase 3.

You can create other system files later by using the INIT.SYS REFRESH option or the DCL INSTALL command. For a detailed description of system files, see the REFRESH Option section in the Offline Options.

Terminal Session



This terminal session explains how to create additional system files. First, you must specify a password for account [1,2].

```
You must now set the password for account _SY:[1,2]
New Password:
New Password again, for verification:
Password set for account _SY:[1,2]
```

Explanation — This question asks you to specify a password for the system library account, [1,2]. This is a precautionary measure to provide you with an account that you can log in to in case of unforeseen problems. DIGITAL does not recommend that you log in to and use account [1,2] on a regular basis, because of the importance of the files that reside in the account.

Response — Type a password from 6 to 14 characters. You can specify any ASCII character except the ? character. Retype the password when prompted.

* End of dialogue phase *

* Starting build phase *

Are you ready to proceed? <yes> (RET)

Explanation — The system asks if you are ready to generate your RSTS/E system. If you are ready to proceed, type YES or press RETURN.

If you are not ready, type NO. You then see the dollar sign (\$) prompt. You may need to answer NO, for example, if you want to modify the SYSGEN.COM or the CONFIG.MAC configuration files, which generate the RSTS/E monitor. EDT is available at this point for unsupported modifications. After making any modifications, type PROCEED to continue the installation.

Response — Type YES or press RETURN to begin the build phase of the installation. In the example installation, the response is RETURN because it is ready to proceed.

31-May-85 05:31 AM

Do you want _SY0:SWAP1.SYS created? <yes> (RET)

Creating _SY0:[0,1]SWAP1.SYS at 4992 blocks

Explanation — The system checks for a SWAP1.SYS file on your system. If it does not find SWAP1.SYS, the system asks if you want to create a SWAP1.SYS file at a size large enough to hold all the jobs on your system. It automatically creates SWAP1.SYS as close to the center of the system disk as possible. The system determines the size of SWAP1.SYS according to this formula:

$(\text{JOB MAX}-1) * \text{SWAP MAX} * 4$

where:

JOB MAX-1 is the number of jobs you specified in Task 6 of Phase 3, minus 1.

SWAP MAX is 32K words if you did not see or answered NO to the Do you want the I&D versions of tasks? question in Task 1 of Phase 4.

is 64K words if you answered YES to the Do you want the I&D versions of tasks? question in Task 1 of Phase 4.

You do not see this message if your system has a SWAP1.SYS file.

If the system is unable to create SWAP1.SYS, it prints an error followed by the message Can not create SWAP1.SYS. If you see this message, you must use the INIT.SYS REFRESH option to create SWAP1.SYS before you start timesharing. See the Offline Options section for more information on REFRESH.

Response — Type YES or press RETURN to create SWAP1.SYS. Type NO to skip the creation of SWAP1.SYS. Type a ? if you want to know the size of SWAP1.SYS before you answer the question. In the example, the response is RETURN. The system then creates SWAP1.SYS at a size of 4992 blocks.

```
Creating _SY0:[0,1]BUFF.SYS at xx blocks
```

Explanation — You see this message only if you have TU56 DECtapes on your system. You must have a BUFF.SYS file for your RSTS/E monitor to support one or more TU56 DECtapes.

The system automatically creates BUFF.SYS as close to the center of the system disk as possible. It determines the size of BUFF.SYS (shown as xx blocks) according to this formula:

4 blocks for each TU56 DECtape

Response — In the example installation, you do not see this message because there are no DECtapes on the system.

```
Please mount the DECnet/E Installation media and enter the name
and unit number of the device.
```

```
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'
```

```
DECnet/E installation device <dev:> :
```

Explanation — You see this question only if you answered YES to the DECnet network support? question in Task 4 of Phase 3. Mount the DECnet/E Installation media on a free drive when prompted. You may have to dismount the RSTS/E Installation media to make room for the DECnet/E kit, if you do not have a free drive available. The system prompts you to remount the RSTS/E Installation media later.

Response — After you have mounted the DECnet Installation media, type the device name and unit number of the drive on which it is mounted. Or, press RETURN to accept the default <dev:>.

The example installation does not see this question, because it does not plan to install DECnet/E.

```
Restoring required components
```

```
Enabling DECnet/E Monitor components
```

```
Please ensure that the Installation media is mounted
on dev: and press RETURN when ready:
```

Explanation — You see these messages only if you are installing DECnet/E. After the system has transferred the DECnet files, it prompts you to remount the Installation tape or disk.

Response — Dismount the DECnet media and mount the Installation tape or disk on the drive indicated by dev:. Make sure the tape or disk is on line. Then press RETURN when you are ready to proceed.

Creating RSTS/E monitor



Go to Task 2.

Task 2: Create RSTS/E Monitor

The command procedure now creates your RSTS/E monitor. The entire process should take 30 to 45 minutes, depending on the size of your monitor.

If the command procedure encounters an error during the monitor build, it prints the error and returns to the configuration questions in Phase 3. You see the Beginning of RSTS/E system generation message. If you see this message, return to Phase 3 and answer the configuration questions again. For example, you may have to answer the configuration questions again if the monitor you configured is too big for your system.

Terminal Session



This terminal session explains the procedures that generate the RSTS/E monitor. The procedures will differ depending on your response to certain configuration questions in Phase 3.

```
Creating RSTS/E monitor
```

```
31-May-85 05:32 AM
```

Explanation — The command procedure now begins the RSTS/E monitor generation.

If you answered YES to the RJ2780 support? question in Task 4 of Phase 3, the program prompts you to mount the RJ2780 Software Kit at this time. Mount the RJ2780 kit when you see this prompt:

```
Please mount the RJ2780 Installation Kit and enter the name
and unit number of the device,
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM', 'DL', or 'SY'
```

```
Installation device <dev:> :
```

You may have to dismount the RSTS/E Installation media to make room for the RJ2780 kit, if you do not have a free drive available. The system prompts you to remount the RSTS/E Installation media later. Remount the installation media on the indicated drive when prompted.

```
%Small buffers lowered by xxx buffers
This will leave you with yyy buffers
```

Explanation — The command procedure checks whether the number of small buffers you specified in Task 6 of Phase 3 will fit on your system. If the number you specified is too high, the command procedure attempts to decrease the number of buffers so that the monitor fits on your system.

If the number of small buffers you specified in Task 6 of Phase 3 is much too high for the maximum number allowed for your system, you see the message:

```
?LINK-F-Address space exceeded
```

```
Beginning of RSTS/E system generation
```

In general this indicates that the system you configured is too big. Rather than make such a radical adjustment to your monitor by significantly decreasing the small buffers, the command procedure returns to the configuration questions in Phase 3 of Part I. If you see this message, return to Phase 3 and answer the configuration questions. You may want to decrease the size of your system by changing the answers to some of the questions (for example, fewer devices, terminals, or pseudo keyboards). Also, specify a much smaller number to the Small buffers? question in Task 6. In general, 600 is a good response to the Small buffers? question.

See the BUFFERS suboption of DEFAULT in the Offline Options part of this guide for more information on small buffers.

The command procedure did not lower the number of small buffers in the example installation.

```
This monitor has a valid buffer count
```

Explanation — You see this message if your new monitor is an acceptable size. Next the command procedure prints a table that shows how many general and FIP small buffers you currently have. In addition, the table tells you how many general and FIP small buffers you can add if you have data space and how many FIP small buffers you can add if you do not have data space. See the section, BUFFERS Dialogue, in the Offline Options for an example buffer table.



Go to Task 3.

Task 3: Install System Programs from the Installation Media

The system now installs the system programs according to the instructions you gave in Phase 4. First, the system transfers the remaining files from the Installation tape or disk. The system also transfers any layered product updates you specified in Phase 4. This task should take ten to fifteen minutes, depending on the size of the installation.

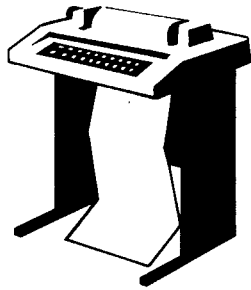
The system installs each package at the location pointed to by its associated logical name. If the program finds no associated logical name, it installs the package at the default location. This is the case in a new installation.

Table 7 lists the logical names and default locations for each package.

Table 7: System Program Package Logical Names

Package	Logical Name	Location
System Library	SYSLIB\$:	[1,2]
RSX Utilities	LB:	[1,1] [1,2]
Help	HELP\$:	[0,2]
Error	ERROR\$:	[0,3]
Update	UPDATE\$:	[0,4] [1,2]
Device Testing	TEST\$:	[0,5]
Print/Batch Services (PBS)	PBS\$:	[0,6]
File Restore	RESTOR\$:	[0,7]
OPSER-based Spooling	OPSER\$:	[0,8]
Unsupported Utility	UNSUPP\$:	[0,9]
Auxiliary Library	AUXLIB\$:	[0,14]
RMS-11	RMS\$:	[0,10]
EDT	EDT\$:	[0,11]
TECO	TECO\$:	[0,13]
SORT/MERGE	SORT\$:	[0,15]
BASIC-PLUS	BASIC\$:	[0,12]

Terminal Session



This terminal session explains the procedures that transfer the system programs from the Installation media.

```
31-May-85 05:48 AM
```

```
Restoring the xxxxxx Package from the Installation Kit
```

```
There are no updates for the xxxxxx Package
```

Explanation — The system now installs the system programs. First it installs updates for the three packages that are automatically installed on all systems: System Startup, System Library, and Error. Then, as the system installs each optional package, it prints one of the above messages. In both messages, xxxxxx is the name of the specific software package.

In the example installation, the system prints the following messages. The messages for your installation may vary depending on how you answered the system program questions in Phase 4.

```
There are no updates for the System Startup files
There are no updates for the System Library Package
There are no updates for the Error Package
There are no updates for the RSX Libraries
There are no updates for the RSX Utilities
Restoring the RMS-11 Package from the Installation Kit
Restoring the RMS Libraries from the Installation Kit
Restoring the Print/Batch Services Package from the Installation Kit
There are no updates for the EDT Package
There are no updates for the Update Package
There are no updates for the Device Testing Package
There are no updates for the TECO Package
There are no updates for the Auxiliary Library Package
There are no updates for the File Restore Package
There are no updates for the OFser-based Spooling Package
Restoring the Help Package from the Installation Kit
There are no updates for the BASIC-PLUS Package
Restoring the Resident Libraries from the Installation Kit
```

After the system completes the system program file transfers, it restores the layered product updates you specified in Phase 4. As the system transfers each layered product update, it prints the message:

```
Restoring the xxxxxx update components from the Installation Kit
```

where xxxxxx is the name of the layered product.

Then the system prompts you to mount the V9 Library tape or disk.

31-May-85 05:52 AM

Please mount the RSTS/E Library media and enter the
name and unit number of the device.

Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'

Library device <_MS0:>



Go to Task 4.

Task 4: Physically Mount V9 Library Media

You no longer need the Installation tape or disk. In this task, you mount the V9 Library media.

Terminal Session



This terminal session explains how to mount the V9 Library media.

```
Please mount the RSTS/E Library media and enter the
name and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'

Library device <_MS0:> (RET)
```

Explanation — After the system copies files from the Installation media, it prompts you to mount the V9 Library media. Remove the Installation media from its drive and mount the V9 Library media. Follow the tape or disk mount instructions in Task 2 of Phase 1.

Response — Type the device name and unit number of the drive on which the V9 Library media is mounted. The device name within the brackets (MS0 in the example installation) is the drive on which the Installation media was mounted. In the example installation, the response is RETURN to indicate the drive MS0.



Go to Task 5.

Task 5: Install System Programs from the V9 Library Media

The system now transfers the rest of the system programs from the V9 Library media, according to the instructions you gave in Phase 4. This task should take 20 to 30 minutes, depending on the size of the installation.

Terminal Session



This terminal session explains how to transfer the system programs from the V9 Library media.

```
Restoring the xxxxxx Package from the Library Kit
```

Explanation — The command procedure now installs the system programs. First it installs the three packages that are automatically installed on all systems: System Startup, System Library, and Error. As the command procedure installs each optional package, it prints the above message, where xxxxxx is the name of the specific software package.

The system also prints the message File not replaced for files that were already transferred from the Installation kit. You should see this message only for packages that had updates restored from the Installation kit.

In the example installation, the system prints the following messages. The messages for your installation may vary depending on how you answered the system program questions in Phase 4.

```
Restoring the System Startup files from the Library Kit
Restoring the System Library Package from the Library Kit
Restoring the Error Package from the Library Kit
Restoring the RSX Libraries from the Library Kit
Restoring the RSX Utilities from the Library Kit
Restoring the RMS-11 Package from the Library Kit
Restoring the RMS Libraries from the Library Kit
Restoring the Print/Batch Services Package from the Library Kit
Restoring the EDT Package from the Library Kit
Restoring the Update Package from the Library Kit
Restoring the Device Testing Package from the Library Kit
Restoring the TECO Package from the Library Kit
Restoring the Auxiliary Library Package from the Library Kit
Restoring the File Restore Package from the Library Kit
Restoring the Opser-based Spooling Package from the Library Kit
Restoring the Help Package from the Library Kit
Restoring the BASIC-PLUS Package from the Library Kit
Restoring the Resident Libraries from the Library Kit
```

```
31-May-85 06:10 AM
```

```
Installing software Packages
```


Explanation — After the system completes the file transfers, it prints these messages. Then, if you specified BASIC-PLUS as one of the packages to install, the system begins the BASIC-PLUS dialogue. Otherwise, you continue with the rest of the installation dialogue.

```
Beginning of RSTS/E Basic-Plus generation.
```

```
BASIC-PLUS RTS name? <BASIC>
```

Explanation — You see this question only if you specified BASIC-PLUS as one of the packages to install on your system (see Task 1 of Phase 4). You now see a series of questions that determine the configuration of BASIC-PLUS for your system.

Go to Task 5A for a complete description of the BASIC-PLUS dialogue. Otherwise, continue with this task.

```
Beginning SORT/MERGE installation
```

Explanation — You see this question only if you specified SORT/MERGE as one of the packages to install on your system (see Task 1 of Phase 4). You now see a series of questions that determine the configuration of SORT/MERGE for your system.

Go to Task 5B for a complete description of the SORT/MERGE dialogue. Otherwise, continue with this task. The example installation does not plan to install SORT/MERGE.

```
To install/update layered products, please see the individual layered
product installation guides.
```

Explanation — You see this question only if you transferred layered product updates to your system (see Task 2 of Phase 4).

See the installation instructions that came with each layered product for a complete description of the installation procedures.

```
* End of build phase *
```

```
The RSTS/E Software Installation Procedure is complete
```

```
Deleting all global symbols
```

```
Deassigning system logicals
```

```
31-May-85 06:17 AM
```

```
System tape label default set to DOS
```

```
SY:[1,2]INSTAL.LOG is a log file of this session
```

```
$
```

Explanation — You have completed the installation. The command procedure prints informational messages and reminds you that the INSTAL.LOG file is a record of the installation.



Go to Phase 6.

Task 5A: Answer BASIC-PLUS Installation Questions

You perform this task if you are installing BASIC-PLUS on your system. In this task you specify the particular BASIC-PLUS configuration for your system. The BASIC-PLUS installation questions relate to optional features of the BASIC-PLUS run-time system such as math precision, logarithmic functions, and trigonometric functions.

Certain combinations of features will cause your BASIC-PLUS run-time system to exceed 16K words. This limits programs running under BASIC-PLUS to a maximum size of 12K words.

If you select double-precision floating point math precision (see Math precision? question) and do not select FPP (see FPP? question), then you must omit some optional features.

Table 8 lists the BASIC-PLUS optional features. If you must omit some optional features, use Table 8 to determine which combinations you can select. You can include features with a total size of up to 6.

Table 8: BASIC-PLUS Optional Features

Feature	Size
Log functions	1
Trig functions	1
Print using	2
Matrices	2
String arithmetic	3

Terminal Session



This terminal session explains the BASIC-PLUS installation questions and provides some possible responses. For more information on any of these features, see the *BASIC-PLUS Language Manual*. In some cases, your response will differ from the response shown in red in the example installation.

```
BASIC-PLUS RTS name? <BASIC> (RET)
```

Explanation — This question asks for a BASIC-PLUS run-time system name. The system automatically assigns a file type of .RTS to this name. Your run-time system will be stored as a save image library (SIL) in account [0,1] on your system disk.

Response — Type a one- to six-character alphanumeric name for your BASIC-PLUS run-time system or press RETURN to accept the default of BASIC, as in the example installation.

FPP? <Y>

Explanation — The *floating point processor (FPP)* is hardware that supports both single-precision (2-word) or double-precision (4-word) floating point instructions. FPP is available for the PDP-11/23 PLUS, 11/24, 11/34, 11/44, 11/45, 11/50, 11/55, and 11/70. It is standard hardware on the 11/60, 11/73, 11/83, and 11/84.

Response — You see a Y default if your PDP-11 has FPP; you see a N default if your PDP-11 does not have FPP. Type YES or press RETURN if your PDP-11 has FPP; type NO or press RETURN if it does not. If you type YES, the program goes to the Math precision? question. In the example installation, the response is RETURN.

Math precision? <02> 4

Explanation — This question asks if you want your math package to support single-precision or double-precision floating point instructions. The single-precision floating point instructions provide floating-point numbers that are precise to 6 significant digits; the double-precision floating point instructions provide floating point numbers that are precise to 15 significant digits. In addition, the double-precision floating-point instructions provide a *scaled arithmetic* feature. Scaled arithmetic is useful for calculating sums that cannot be easily expressed as integer quantities, such as dollars and cents.

Response — Type 2 or press RETURN if you want the single-precision floating point instruction; type 4 if you want the double-precision floating point instruction. In the example installation, the response is 4.

Log functions? <Y>

Explanation — This question asks if you want the BASIC-PLUS run-time system to use the logarithmic functions SQR, EXP, LOG, and LOG10. Some installations may not need this feature, in which case you can reduce the size of the BASIC-PLUS run-time system by answering N to this question. (The polynomial calculation portion of the math functions is present if you include either this feature or the trigonometric feature.) Operations such as X^Y require the log functions if Y is not an integer.

Response — Type YES or press RETURN to add the logarithmic functions; type NO if you do not want to add the logarithmic functions. In the example installation, the response is RETURN.

Trig functions? <Y>

Explanation — This question asks if you want the BASIC-PLUS run-time system to use the trigonometric functions SIN, COS, TAN, and ATN. Some installations may not need this feature, in which case you can reduce the size of the BASIC-PLUS run-time system by answering N to this question. (The polynomial calculation portion of the math functions is present if you include either this feature or the logarithmic feature.)

Response — Type YES or press RETURN if you need to add these functions; type NO if you do not need to add these functions. In the example installation, the response is RETURN.

Print using? <Y>

Explanation — This question asks if you want special output formatting with the PRINT-USING statement of BASIC-PLUS. Some layered products require this feature. You can reduce the size of the BASIC-PLUS run-time system by answering N to this question.

Response — Type YES or press RETURN if you need this feature; type NO if you do not need this feature. In the example installation, the response is RETURN.

Matrices? <N> Y

Explanation — This question asks if you want BASIC-PLUS to operate on an entire matrix using single MAT statements.

Response — Type YES if you need this feature; type NO or press RETURN if you do not need this feature. In the example installation, the response is Y.

String arithmetic? <N>

Explanation — The BASIC-PLUS run-time system can use special string arithmetic functions like SUM\$, DIF\$, PROD\$, QUO\$, PLACE\$, and COMP%. These functions perform arithmetic functions on strings of numeric characters, minus signs, and decimal points with an accuracy of up to 56 significant digits. The string arithmetic functions, although slow to execute, are useful for applications that involve large numbers, such as monetary conversions.

Response — Type YES if you need this feature; type NO or press RETURN if you do not need this feature. In the example installation, the response is RETURN to accept the default of NO.

Beginning SORT/MERGE installation

Explanation — You see this question only if you specified SORT/MERGE as one of the packages to install on your system (see Task 1 of Phase 4). You now see a series of questions that determine the configuration of SORT/MERGE for your system.

Go to Task 5B for a complete description of the SORT/MERGE dialogue. Otherwise, continue with this task.

* End of build Phase *

The RSTS/E Software Installation Procedure is complete

Deleting all global symbols

Deassigning system logicals

31-May-85 06:17 AM

System tape label default set to DOS

SY:[1,2]INSTAL.LOG is a log file of this session

\$

Explanation — You have completed the installation. The command procedure prints informational messages and reminds you that the INSTAL.LOG file is a record of the installation.



Go to Phase 6.

Task 5B: Answer SORT/MERGE Installation Questions

This task describes the SORT/MERGE installation questions. You see these questions if you specified SORT/MERGE in response to the Packages to install: prompt in Task 1 of Phase 4. See the *PDP-11 SORT/MERGE User's Guide* for more information on SORT/MERGE.

Terminal Session



This terminal session describes the SORT/MERGE installation questions and provides some possible responses.

Note

In the following section, the expression <SWAP-MAX-SIZE> means the SWAP MAX size for your system. During the installation procedure, the actual SWAP MAX size (for example, 28K words) is displayed in place of <SWAP-MAX-SIZE>

```
*****
*   This is the beginning of the dialogue to   *
*   define the attributes of your SORT/MERGE utility. *
*****
```

This procedure will, by default, build and install
SORT and MERGE for optimum performance. The utility
SORT and MERGE tasks will have the following attributes:

```
SORT built at <SWAP-MAX-SIZE>/ MERGE built at <SWAP-MAX-SIZE>
Have ASCII as the default character collating sequence
Process duplicate records
Do a nonstable SORT and MERGE
Retry 2000 times when trying to read a locked bucket
Allow 55% of the SORT work area for SORT tree structure
Allow 30% of the MERGE work area for MERGE data structure
Use five (5) work files for SORT
Use the RECORD sort process
Sequence check the input files for MERGE
```

Additionally, the default will NOT build the
SORT and MERGE callable subroutines as a resident library.

If you want the installation to proceed using
these defaults, answer YES. If you want to
change any of these defaults, answer NO.

Do you want to proceed with the default installation <Yes>?

If you answer YES, go to Question 22 to verify your selection of attributes. If you answer NO, go to Question 1.

1. If you want to change the default size of the SORT or MERGE task, answer YES, otherwise answer NO.

Do you want to change the default task size <NO>?

If you answer NO, go to question 5. If you answer YES, go to Question 2.

2. The size of the final SORT and MERGE tasks can be varied by changing the default size of the work area. The work area is currently set to be the maximum allowed by your operating system in order to give SORT/MERGE the optimum performance.

Which task size do you want to change
SORT MERGE BOTH NEITHER <BOTH>?

If your answer is either BOTH or SORT, go to Question 3. If your answer is MERGE, go to Question 4. If your answer is NEITHER, go to Question 5.

3. The maximum SORT task size is the SWAP MAX on your system. The minimum SORT task size is 17K words. The chosen size must be a whole number between these inclusive limits. Decimals will be truncated.

What size do you want your SORT task to be <<SWAP-MAX-SIZE>>?

If you answered SORT to Question 2, go to Question 5. If you answered BOTH to Question 2, go to Question 4, then go to Question 5.

4. The maximum MERGE task size is the SWAP MAX on your system. The minimum MERGE task size is 17K words. The chosen size must be a whole number between these inclusive limits. Decimals will be truncated.

What size do you want your MERGE task to be <<SWAP-MAX-SIZE>>?

5. If you want to change any of the default runtime options, answer YES, otherwise, answer NO.

Do you want to change any of the default runtime options <NO>?

```
*****
*   IF YOU CHANGE ANY OF THE DEFAULTS, BE SURE TO   *
*   INFORM YOUR USERS, SINCE THOSE DEFAULTS MAY     *
*   NOW BE DIFFERENT FROM THE DEFAULTS STATED IN    *
*   THE SORT/MERGE DOCUMENTATION!                   *
*****
```

If you answer NO, go to Question 21. If you answer YES, go to Question 6.

6. By default, SORT/MERGE will use the ASCII collating sequence when operating on character data keys.

Do you want to change the default collating sequence <NO>?

If you answer NO, go to Question 8. If you answer YES, go to Question 7, then go to Question 8.

7. The choices are ASCII, EBCDIC, or MULTINATIONAL.
What do you want the default character key collating sequence to be?

ASCII EBCDIC MULTI <ASCII>?

8. By default, SORT/MERGE will process records which are found to have duplicate key fields.

If you wish to have SORT/MERGE eliminate records with duplicate keys by default, answer YES.

If you wish to have SORT/MERGE keep all records with duplicate keys by default, answer NO.

Should SORT/MERGE eliminate duplicate records by default <NO>?

If you answer NO, go to Question 9 and then Question 10. If you answer YES, you see the following message:

```
*****
* YOU HAVE CHOSEN TO ELIMINATE DUPLICATE RECORDS BY DEFAULT, *
* STABLE SORT/MERGE AFFECTS DUPLICATE RECORDS. THEREFORE, THE *
* STABLE AND NODUPLICATES OPTIONS ARE MUTUALLY EXCLUSIVE.      *
* YOUR DEFAULT FOR THE STABLE OPTION MUST BE NOSTABLE,         *
*****
```

If you answered YES, go to Question 10.

9. Stable SORT/MERGE imposes extra overhead during the key comparison process. For this reason, the default is for a nonstable SORT/MERGE. If you wish to change this default, answer YES, otherwise answer NO.

Do you wish the default to be a stable SORT/MERGE <NO>?

10. The SORT work area is divided into two areas, one for the SORT tree data structure, and one for the RMS I/O data structures. For SORT, the default division giving optimum performance is 55% to the tree and 45% to I/O. If the majority of the files you are sorting requires a large number of I/O data structures (for example, INDEXED files with many keys, or a consistently large number of input files), you may want to alter the split so that there will be enough room for the I/O requirements.

If you want to change the default split, answer YES, otherwise answer NO.

Do you want to change the SORT default split <NO>?

If you answer NO, go to Question 12. If you answer YES, go to Question 11 and then 12.

11. What percentage of the work area should be allotted to the SORT tree data structure? The lower limit is 45%. The upper limit is 65%. Your answer must be in whole numbers. <55>?

12. The MERGE work area is divided into two areas, one for the MERGE data structure and one for the RMS I/O data structures. For MERGE, the default division giving optimum performance is 30% to the data structure and 70% to the RMS data structures.

If the majority of the files you are merging requires a large number of I/O data structures (for example, INDEXED files with many keys, or a consistently large number of input files), you may want to alter the split so that there will be enough room for I/O requirements.

If you want to change the default split, answer YES, otherwise answer NO.

Do you wish to change the MERGE default split <NO>?

If you answer NO, go to Question 14. If you answer YES, answer Question 13 and then go to Question 14.

13. What percentage of work area should be allotted to the MERGE data structure? The lower limit is 20%. The upper limit is 40%. Your answer must be in whole numbers. <30>?

14. The optimum number of work files for SORT is 5. If you wish to change this default, answer YES, otherwise answer NO. <NO>?

If you answer NO, go to Question 16. If you answer YES, go to Question 15 and then to Question 16.

15. The minimum number of work files is 3, the maximum is 10. How many work files should SORT use by default? <5>?

16. By default, SORT will carry complete records throughout the process and output complete records. If you are sorting large records with small keys and wish to conserve disk space, you may change this default.

```
*****
*   PLEASE NOTE THAT FOR SORTS USING OTHER THAN THE RECORD   *
*   PROCESS, ALL INPUT FILES MUST RESIDE ON DISK.             *
*****
```

If you wish to change the default sort process, answer YES, otherwise answer NO.

Do you wish to change the default sort process <NO>?

If you answer NO, skip Question 17 and answer Questions 18 and 19. If your answer is YES, answer Questions 17-19.

17. What should the default sort process be?
RECORD TAG ADDRESS INDEX <RECORD>?

18. By default, MERGE will sequence check the input records. If you want to change this default, answer YES, otherwise answer NO. <NO>?

19. SORT/MERGE will read input files which are in use and opened in a shareable mode. If SORT/MERGE encounters a locked bucket, the operation will be retried a maximum of 2000 times before a fatal error is returned. If you want to change the number of retries, answer YES, otherwise answer NO.

Do you want to change the number of retries <NO>?

If you answer NO, go to Question 21. If you answer YES, go to Question 20 and then to Question 21.

20. The maximum number of retries allowed is 9999.
The minimum number of retries allowed is 1.
How many times should SORT/MERGE try to re-read a locked bucket <2000>?

21. By default, the callable SORT and MERGE subroutines will be available via two object libraries. Additionally, if you want to build a combined callable SORT and MERGE resident library answer YES, otherwise answer NO.

Do you want to build a combined callable SORT and MERGE cluster library <NO>?

This completes the selection of attributes for your SORT/MERGE utility. The installation procedure now shows you the attributes that you have selected, and you have the opportunity to change the attributes. (The attributes shown in this example are not necessarily the default attributes, nor does DIGITAL necessarily recommend them for your system — they are only a sample.)

22. *****
* Your SORT and MERGE product will be built *
* according to the following specifications: *

SORT TASK SIZE IS 32K WORDS
MERGE TASK SIZE IS 32K WORDS
YOU HAVE THE FOLLOWING RUNTIME DEFAULTS:
ASCII CHARACTER COLLATING SEQUENCE
RECORDS WITH DUPLICATE KEYS ELIMINATED
NO STABLE PROCESS
2000 LOCKED BUCKET RETRIES
55% OF WORK AREA FOR SORT DATA STRUCTURES
45% OF WORK AREA FOR SORT RMS DATA STRUCTURES
30% OF WORK AREA FOR MERGE DATA STRUCTURES
70% OF WORK AREA FOR MERGE RMS DATA STRUCTURES
03 WORK FILES
RECORD SORT
DO NOT SEQUENCE CHECK MERGE INPUT
A SORT/MERGE RESIDENT/CLUSTER LIBRARY WILL BE BUILT

ARE THE ABOVE DEFAULTS THE DESIRED ONES <YES or NO> <YES>?

If you answer NO, go back to Question 1 and repeat the dialogue procedure. If you answer YES, you see the following message:

* This is the end of the installation dialogue. *
* The installation will now proceed without *
* further operator intervention. *

The installation procedure then continues without operator intervention. It will task build and install the utilities, place the callable overlay description files in the system directory, and then make a verification pass to ensure that the utility has been properly installed. If an error is encountered, you see the following message:

```

????????????????????????????????????????????????????????
?                                                                 ?
?   Either SORT or MERGE did not install   ?
?   Properly. Contact your software       ?
?   specialist for further assistance!     ?
????????????????????????????????????????????????????????

```

If no errors are encountered, you see the following messages and the installation is complete:

```

PDP-11 SORT/MERGE V3.0 is now built.

END STMGV3.CMD - PDP-11 SORT/MERGE VERSION 3.0

```

* End of build phase *

The RSTS/E Software Installation Procedure is complete

Deleting all global symbols

Deassigning system logicals

31-May-85 06:17 AM

System tape label default set to DOS

SY:[1,2]INSTAL.LOG is a log file of this session

\$

Explanation — You have completed the installation. The command procedure prints informational messages and reminds you that the INSTAL.LOG file is a record of the installation.



Go to Phase 6.

Create Accounts and Edit System Start-Up File **Phase 6**

After you finish Phase 5, you are ready to tailor your new RSTS/E system.

The tasks in this phase are:

- Task 1: Create the System Management Account (CREATE/ACCOUNT)
- Task 2: Create User Accounts (CREATE/ACCOUNT)
- Task 3: Edit System Start-Up File

Task 1: Create the System Management Account (CREATE/ACCOUNT)

In this task you create the system management account on your system disk with the CREATE/ACCOUNT command. The *system management account* is the account you use to perform system management tasks. DIGITAL recommends that you make this account different from the account you are currently working in, [1,2]. Normally you grant all privileges to the system management account.

You use qualifiers with the CREATE/ACCOUNT command to establish such things as disk quotas and privileges. If you are not familiar with the qualifiers for the CREATE/ACCOUNT command, see the *RSTS/E System Manager's Guide*.

Terminal Session



This terminal session explains how to use the CREATE/ACCOUNT command to create the system management account.

```
The RSTS/E Software Installation Procedure is complete
.
.
.
$
```

Explanation — The software installation is finished. You now see the DCL \$ prompt.

Type a command of the following format:

```
CREATE/ACCOUNT dev:[P,Pn]/PRIVILEGES=(abc,def,...)
Password: <password>
Password again, for verification: <password>
```

Explanation — The CREATE/ACCOUNT command establishes accounts on your RSTS/E system. If you omit the device specification, the default is the system disk, SY0:. You specify the account privileges as a list following the /PRIVILEGES qualifier. See the *RSTS/E System Manager's Guide* for more information about privileges. The password can be any combination of ASCII characters except the ? character, and can be from 6 to 14 characters long. By default in V9.0, the password is /NOLOOKUP. This makes it impossible to look up the password, thus providing additional account security.

The example installation plans to create a fully privileged system management account [1,4] on the system disk. The command line in the example installation looks like:

```
CREATE/ACCOUNT [1,4]/PRIVILEGES=ALL  
Password:  
Password again, for verification:  
Account _SY0:[1,4] created at DCN 27345
```

Explanation — These commands create a new account [1,4] on the system disk, SY0:. The account has all privileges. The account password cannot be looked up.

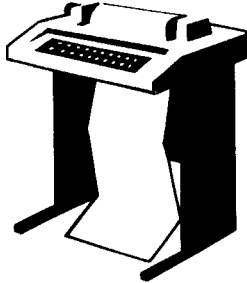


Go to Task 2.

Task 2: Create User Accounts (CREATE/ACCOUNT)

In this task you create user accounts on your system disk with the CREATE/ACCOUNT command. You use qualifiers with the command to establish such things as disk quotas and privileges. If you are not familiar with the qualifiers of the CREATE/ACCOUNT command, see the *RSTS/E System Manager's Guide*.

Terminal Session



This terminal session explains how to use the CREATE/ACCOUNT command.

Type a command in the following format:

```
CREATE/ACCOUNT dev:[P,Pn][/QUALIFIERS]  
Password: <Password>  
Password again, for verification: <Password>
```

Explanation — The CREATE/ACCOUNT command establishes accounts on your RSTS/E system. If you omit the device specification, the default is the system disk. SY0:. The password can be any combination of ASCII characters except the ? character, and can be from 6 to 14 characters long.



Go to Task 3.

Task 3: Edit System Start-Up File

Your next task is to edit START.COM, the system start-up file. This command file must contain the information required to properly initialize the system for both normal time-sharing operations and system recovery after a crash.

DIGITAL provides this file in the system account [0,1]. Edit this file as your installation requires. You may need to edit START.COM for one or more of these reasons:

- Add start-up commands for terminals and line printers.
- Add system logical definitions or commands associated with optional products such as DECnet. See the installation guide for the particular optional product for specific information.
- Add start-up commands for the OPSER-based spooling package.
- Add system logical definitions or commands associated with third-party software.

See the *RSTS/E System Manager's Guide* for more information about editing the START.COM file.

Note

The START.COM file provided by DIGITAL contains sufficient commands to start your new V9.0 monitor. If you are using a hard-copy terminal to perform your installation, you may prefer to wait until you have started timesharing under your new monitor to edit START.COM. Then you can log in to a video terminal to edit the file.

If you choose to edit START.COM later, be sure to shut the system down after you make your edits. Then start timesharing again to make sure your new START.COM file works properly.

This session uses EDT to edit the system start-up file. If you do not have EDT on your system, use the editor you have.

Terminal Session



This terminal session explains how to edit the DIGITAL-provided START.COM command file. First you make a backup copy of START.COM. Responses in the example installation are printed in red.

```
$ COPY [0,1]START.COM [0,1]START.BAK
```

Explanation — Use the DCL COPY command to make a backup copy of START.COM. This provides additional protection in case something goes wrong during your editing session. You can delete the backup version after you successfully start your system using START.COM.

Response — Type a command in the format shown. The example installation creates a copy of START.COM named START.BAK in account [0,1].

```
$ TYPE [0,1]START.COM
```

Explanation — Use this command to print the START.COM command file at your terminal. You may want to study the file before deciding where to make your edits. If you are not using a hard-copy terminal and want to get a printed copy of START.COM, type PRINT [0,1]START.COM.

Response — Type the command as shown to list the START.COM file.

```
$ EDIT/EDT [0,1]START.COM
```

Explanation — Use this command to start the EDT editor. The text of the file appears on your screen. Edit the file according to the needs of your installation. For more information on EDT, see the *Introduction to the EDT Editor* and the *EDT Editor Manual*.

Response — Type the command as shown. Note that you need the SYSIO and WWRITE privileges to alter files in account [0,1].

```
* EXIT
```

```
$
```

Response — Type EXIT and then press the ENTER key on the keypad when you are ready to exit EDT.

When you use EDT to edit a file, the monitor replaces the sample file in account [0,1] with your version.



Go to Phase 7.

Phase 7 Start RSTS/E Monitor

This phase describes the tasks you must perform to start your RSTS/E monitor.

The tasks in this phase are:

- Task 1: Shut Down SYSGEN Monitor (SHUTUP)
- Task 2: Start RSTS/E Monitor (START)

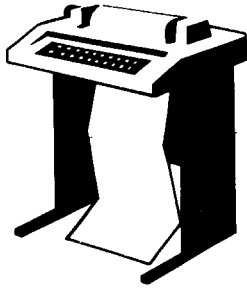
These responses have special meaning:

Response	Description
RET	Accept the default response
?	Obtain an online explanation of the question

Task 1: Shut Down SYSGEN Monitor (SHUTUP)

Now that you have built your RSTS/E monitor, you no longer need the SYSGEN monitor. To shut down your monitor, run the SHUTUP program. Make sure you are logged in to the console terminal when you run SHUTUP.

Terminal Session



This terminal explains how to use SHUTUP to shut down your SYSGEN monitor.

```
$ RUN $SHUTUP
```

Explanation — You are logged in to the console terminal and you see the DCL \$ prompt on your screen. You can now shut down the SYSGEN monitor.

Response — Type RUN \$SHUTUP to shut down the monitor.

```
SHUTUP V9.0-14 RSTS V9.0-14 SYSGEN
```

```
6:19 AM 31-May-85 ***** Set-up Dialogue Phase *****
```

```
Type '^' to any query to backUp one question
```

```
Minutes until system shutdown (0-99) <5>? 0
```

Explanation — SHUTUP prints a header and some preliminary information. It then asks you to type the minutes to wait before the RSTS/E monitor shuts down. This question is useful for giving system users fair warning when shutting down the system.

Response — Type 0.

```
6:19 AM 31-May-85 *****      Warning Message Phase      *****  
Further LOGINs are now disabled
```

```
6:19 AM 31-May-85 *****      Initial Job Killing Phase   *****
```

```
6:19 AM 31-May-85 *****      Remove RTS/RES LIB Phase    *****
```

```
6:19 AM 31-May-85 *****      SWAP File Removal Phase     *****
```

```
6:19 AM 31-May-85 *****      Disk DISMOUNT Phase        *****
```

```
6:19 AM 31-May-85 *****      Final Shutdown Phase        *****
```

Please wait for system to re-boot itself

RSTS V9.0-14 SYSGEN (DUO) INIT V9.0-14

31-May-85 - 6:20 AM

Start timesharing <Yes>?

Explanation — SHUTUP prints several messages before shutting down your system. It then returns to the Start timesharing? question. See the *RSTS/E System Manager's Guide* for more information on SHUTUP.



Go to Task 2.

Task 2: Start RSTS/E Monitor (START)

In Task 1 you ran the SHUTUP program to shut down the SYSGEN monitor. Now you need to start your RSTS/E monitor. You must first decide whether to perform any of these additional preparatory tasks:

- Change monitor defaults (INIT.SYS DEFAULT option)
- Save system disk onto another disk or tape (INIT.SYS SAVRES option)

Change Monitor Defaults (DEFAULT Option)

You can set RSTS/E monitor defaults in two ways:

- Accept preselected defaults (START option). INIT.SYS sets defaults for your RSTS/E monitor and then starts timesharing.
- Set your own RSTS/E monitor defaults (DEFAULT option).

INIT.SYS can determine many of your RSTS/E monitor defaults, based on the configuration of your system. You can set the others online during timesharing.

Table 9 shows the default settings of your new monitor.

Table 9: Monitor Defaults

Default	Current Setting
INIT.SYS Settable Defaults	
SWAP MAX	32K words
Swap file	SWAP.SYS
Error message file	ERR.ERR
Crash dump file	CRASH.SYS, if enough space is present
Extended buffer pool memory (XBUF)	15% of USER memory is allocated to XBUF, if the total amount of system memory exceeds 128K words. Otherwise, 10% of USER memory is allocated to XBUF. USER memory is memory that is not allocated to any other entity, such as the monitor or run-time system. The minimum size of XBUF is 2K words. The maximum size is 496K words.
Small buffer pool memory	The maximum allowed for your system, over and above the minimum number you specified in Task 6 of Phase 3: 11K words for PDP-11s with I&D space; 3K words for PDP-11s without I&D space.
System clock	KW11-L Line Time Clock
Online Settable Defaults	
Cache cluster size	4
Magtape labeling	DOS
Date and time format	If the line frequency is 60 Hz, the American standard date and time format is selected. If the line frequency of the clock is 50 Hz, the European standard date and time format (numeric date and 24-hour time) is selected.
Power fail delay	300 seconds
Installation name	The six-character SIL name

If you do not plan to change any of the defaults selected by INIT.SYS, or if the defaults you do plan to change can be altered on line, then you do not need to use the DEFAULT option before you start timesharing under your RSTS/E monitor.

On the other hand, if you want to perform any of the following operations, you need to use the DEFAULT option before you start timesharing:

- Allocate memory for the virtual disk (VIRTUAL suboption of DEFAULT).
- Change the amount of memory allocated to the extended buffer pool (XBUF suboption of DEFAULT).
- Change the amount of memory allocated to the small buffer pool (BUFFERS suboption of DEFAULT).
- Change the SWAP MAX (DEFAULT option).

See the Offline Options section of this guide for a complete description of DEFAULT.

Choose the monitor defaults that are suited to your needs. The example installation plans to accept the INIT.SYS selected defaults.

Save System Disk Onto Another Disk or Tape (SAVRES Option)

You may want to create a backup copy of your system disk at this time. If so, use the INIT.SYS SAVRES option to copy your system disk before you start your RSTS/E monitor. See the Offline Options section of this guide for a complete description of SAVRES.

As an alternative to using the offline SAVRES option, you can later use the online V9.0 BACKUP utility to copy your system disk. See the *RSTS/E System Manager's Guide* for more information.

The example installation does not plan to make a backup copy of the system disk at this time.

If you are ready to start your RSTS/E monitor, continue with this task.

If you need to change the monitor defaults or back up your system disk, answer NO to the Start timesharing? question. Then go to the Offline Options section before continuing with this task.

Terminal Session



To start your RSTS/E monitor, you must answer the START questions. This terminal session lists the START questions, explains them, and gives you some possible responses. After you understand the question, type the response at your console terminal. In some cases, your response will differ from the response shown in red in the example installation.

```
Start timesharing? <Yes> START RSTS90
```


Explanation — This question asks if you are ready to start timesharing. If you answer YES to this question, INIT.SYS starts the currently installed monitor, SYSGEN.SIL, and starts timesharing under it. To start timesharing under your new V9.0 monitor, type START <monitor name>, where <monitor name> is the name of the new monitor.

If you answer NO to this question, INIT.SYS prints its Option: prompt. You can then use the INIT.SYS offline options to perform additional preparatory tasks. Finally, when you are ready to start your RSTS/E monitor, use the INIT.SYS START option.

Response — Type START <monitor name> where <monitor name> is the name of your new RSTS/E monitor. In the example installation, the response is START RSTS90 because RSTS90 is the name of the new V9.0 RSTS/E monitor.

If you do not specify a monitor name, START installs and starts the monitor that was used in the previous timesharing session.

Memory allocation table:

```
OK: 00000000 - 00407777 ( 66K) : EXEC
66K: 00410000 - 03467777 ( 396K) : USER
462K: 03470000 - 03777777 ( 50K) : XBUF
512K: 04000000 - End           : NXM
```

Explanation — START prints the current memory allocation table. Then START checks that the SWAP.SYS file exists in account [0,1] on the system disk, is large enough to hold one job at the current SWAP MAX, and is contiguous. If the file does not exist, START attempts to create SWAP.SYS at the required size. If the file exists but is not contiguous or large enough, START deletes the current SWAP.SYS file and attempts to create a new SWAP.SYS file that is both contiguous and large enough (SWAP MAX * 4). If START cannot find enough free contiguous disk space to create a minimum SWAP.SYS file, it prints the following error message:

```
?Not enough contiguous disk space to create minimum SWAP.SYS file
```

START then attempts to create a SWAP.SYS file that is smaller than the one you specified yet still meets the minimum requirements. This may take up to one minute. If START finds it can create a SWAP.SYS file, it prints these messages:

```
SWAP.SYS can be created if SWAP MAX is reduced to xxK
```

```
New SWAP MAX <xxK>?
```

Press RETURN to accept the default value, indicated by xx in the example. Or enter CTRL/C to return to the Option: prompt. You can then use the FILE suboption of REFRESH to create more disk space.

If START cannot find enough contiguous disk space to create a minimum SWAP.SYS file, it prints these messages:

```
You must free some disk space to start timesharing.
```

```
Option:
```

Use the FILE suboption of REFRESH to create more contiguous disk space.

Re-creating CRASH.SYS file with minimum size of 380 blocks

Explanation — START now checks that the CRASH.SYS file exists in account [0,1] on the system disk, is large enough for the installed RSTS/E monitor and extended buffer pool allocation, and is contiguous. If the file does not exist, START attempts to create CRASH.SYS at the required size. If the file exists but is not contiguous or large enough, START deletes the current CRASH.SYS file and attempts to create a new CRASH.SYS file that is both contiguous and large enough. If START is successful it prints the previous message. If START is unsuccessful it prints the following error messages:

```
?Not enough contiguous disk space to create minimum CRASH.SYS file
Crash dump automatically disabled
```

The CRASH.SYS file is important because it protects you from losing information during a system crash. When a crash occurs, the RSTS/E monitor dumps the contents of the read/write area of monitor memory into CRASH.SYS. Because the crash dump facility preserves the state of the system at the time of the crash, CRASH.SYS contains important diagnostic information. For these reasons, DIGITAL recommends that you always have crash dump enabled during timesharing.

Therefore, if you see the error message, Crash dump automatically disabled, follow these steps to enable crash dump:

1. After you begin timesharing, delete unnecessary files to create more contiguous disk space. Or, move some files to a nonsystem disk.
2. Shut down the RSTS/E monitor using the SHUTUP program.
3. Use the START option to start timesharing. If you do not see the Crash dump disabled message, you know that INIT.SYS was able to create the CRASH.SYS file.

```
31-May-85 06:22 AM
```

```
8 devices disabled
```

```
Proceed with system startup? <YES> (RET)
```

```
Beginning RSTS/E startup...
```

```
31-May-85 06:22 AM    Mounting disks
31-May-85 06:22 AM    Assigning logical names
31-May-85 06:22 AM    Starting error logging
31-May-85 06:22 AM    Setting system characteristics
31-May-85 06:22 AM    Installing run-time systems
31-May-85 06:23 AM    Setting terminal characteristics
31-May-85 06:23 AM    Defining system commands
31-May-85 06:23 AM    Setting printer characteristics
31-May-85 06:23 AM    Starting spoolers
Print/Batch Services started at 06:23 AM
```

Explanation — START prints the current date and time and pauses for several seconds while it performs the necessary tasks to start timesharing. Then START transfers control to the START.COM command file. START.COM asks if you are

ready to proceed with the start up. Then START.COM prints a message as it enters each section of commands. See the *RSTS/E System Manager's Guide* for more information on the START.COM command file.

Response — Type YES or press RETURN to start timesharing. Or, type NO if you are not ready to start timesharing. You then see the DCL \$ prompt. In the example installation, the response is RETURN.

```
*** From [1,2] on KBO: at 06:23 AM on 31-May-85
** RSTS/E is on the air...
```

(RET)

```
RSTS V9.0-14 31-May-85 06:24 AM
User:
```

Explanation — You are finished with the installation. You can now press RETURN to log in to the system. RSTS/E then prints its banner followed by the User: prompt.

Phase 8 lists some optional tasks that you may want to perform.

If you plan to install layered products, see the individual layered product installation guides for instructions.

Phase 8 Optional Tasks

This phase describes optional tasks you may want to perform to tune your RSTS/E system to your needs.

The tasks in this phase are:

- Task 1: Reposition System Program Packages
- Task 2: Apply a Mandatory Patch

Task 1: Reposition System Program Packages

This task describes the procedures for moving system program packages to another disk. You may want to perform this task if your system disk is full.

If you have a two disk system and receive your RSTS/E Distribution Kits on disk distribution, DIGITAL does not recommend that you move any system program packages to a second disk. During updates you will not have a free drive on which to mount the second disk.

You selected the system program packages in Phase 4. Then the system installed each package at the default location on your system disk. The system also associated a logical name with each package.

Table 10 lists the logical names and default locations of the RSTS/E system programs.

Table 10: System Program Package Logical Names

Package	Logical Name	Location
RSX Utilities	LB:	[1,1] [1,2]
Help	HELP\$:	[0,2]
Error	ERROR\$:	[0,3]
Update	UPDATE\$:	[0,4] [1,2]
Device Testing	TEST\$:	[0,5]
Print/Batch Services (PBS)	PBS\$:	[0,6]
File Restore	RESTOR\$:	[0,7]
OPSER-based Spooling	OPSER\$:	[0,8]
Unsupported Utility	UNSUPP\$:	[0,9]
Auxiliary Library	AUXLIB\$:	[0,14]
RMS-11	RMS\$:	[0,10]
EDT	EDT\$:	[0,11]
TECO	TECO\$:	[0,13]
SORT/MERGE	SORT\$:	[0,15]

You can increase performance by moving the RSX Object Libraries and the Help packages to a nonsystem disk.

If you need to free space on your system disk, you should consider moving any of the following packages to a nonsystem disk: Unsupported Utility, Auxiliary Library, SORT/MERGE, EDT, Error Reporting, Device Testing, Print/Batch Services, Opser-based spooling, and RMS-11.

Terminal Session



This terminal session outlines the procedures you use to reposition a system program package. For more information on a particular step in the process, see the manual or the task and phase referenced.

Step 1: Mount and Initialize a Nonsystem Disk

Mount and initialize the disk on which you intend to reposition the system program packages. Use the mount procedures described in Task 1 of Phase 2. To initialize the disk, use the INITIALIZE command. The INITIALIZE dialogue is identical to the INIT.SYS DSKINT dialogue, which is described in the Offline Options.

Step 2: List the System Logical Names

Type SHOW LOGICAL/SYSTEM/ALL to list the logical names on your system.

Step 3: Create a New Directory

Create a new directory for the system package by typing a command of the format:

```
CREATE/ACCOUNT/NOUSER dev:[p,pn]
```

where:

dev: specifies the new disk

[p,pn] specifies the new directory. Use the same [p,pn] as the existing directory.

See the *RSTS/E System Manager's Guide* for more information on the CREATE/ACCOUNT command.

Step 4: Copy the Package to the New Location

Transfer the package to the new location by typing a command of the format:

```
COPY <logical name>*. * dev:[p,pn]*.*
```

where:

<logical name>*. * specifies all the files in the current location of the system program package

dev:[p,pn]*.* specifies the new location of the system program package.

See the *RSTS/E System User's Guide* for more information on the COPY command.

Step 5: Reassign the System Logical Name

Deassign the current logical name by typing a command of the format:

```
DEASSIGN/SYSTEM <logical name>
```

where <logical name> refers to the current logical name you listed in Step 2.

Assign the new logical name by typing a command of the format:

```
ASSIGN/SYSTEM dev:[p,pn] <logical name>
```

where:

dev:[p,pn] refers to the new directory you created in Step 3

<logical name> is the name you listed in Step 2.

Note

The logical name associated with a system program package is reserved for use by RSTS/E. If you assign a different name to a package, you will not be able to update that package in the future.

See the *RSTS/E System Manager's Guide* for more information on the DEASSIGN and ASSIGN commands.

Step 6: Point the Logical Name at the New Location

Edit the START.COM system start-up file to point the logical name at the new location. See Task 3 of Phase 6 for more information on editing the START.COM file.

Step 7: Delete the Old Directory

If you have no further use for the old account, delete the directory by typing a command of the format:

```
DELETE/ACCOUNT [P,Pn]
```

where [p,pn] refers to the old location of the system package on the system disk.

The system then asks if you want to delete the files in the directory. Type YES.

Task 2: Apply a Mandatory Patch

A mandatory patch applies an emergency correction to software that might otherwise cause a serious malfunction to your system. For example, DIGITAL would issue an emergency patch to the monitor if in certain instances you could not boot your system after an installation.

The *RSTS/E Software Dispatch* contains the latest software changes between releases. Published monthly, it also contains descriptions of mandatory patches.

You have to apply patches manually if you install:

- Paper patches from articles in the *RSTS/E Software Dispatch*.
- Patches to non-DIGITAL software.

There are several dangers when you type in a mandatory patch:

- You could enter incorrect values, causing new problems to occur, which you may not recognize as yours.
- You may not be able to “undo” an incorrect patch because you may not know the value that was there before you replaced it with a new value. (Because of the possibility of errors, you should keep a hard-copy log of patches installed manually.)

For example, if you entered an instruction incorrectly, the software could fail, and you may not be able to find the instruction you mistyped. Sometimes the only way to “undo” a bad patch is to reinstall the distributed version of the software. In the case of a monitor patch, you would have to do another monitor installation.

When you use manual patching to install a paper patch, follow the directions in the *RSTS/E Software Dispatch*, and type exactly what is printed. This way you do not need to understand fully the commands used for manual patching. If you catch a mistake before pressing the RETURN key on each line, you can use the standard keyboard editing characters, such as CTRL/R, CTRL/U, and the DELETE key. Furthermore, you can reenter input if you cause an error message and are reprompted.

You may need to use a RSTS/E program such as ONLPAT to install patches. See Appendix E for information on RSTS/E patching programs.

System Installation Example

This section summarizes the example RSTS/E system installation. This summary shows only those points in the installation where you type a command, respond to a prompt, or take an action. It does not show everything you see on your terminal during the installation. For more information on a question or procedure, see Part I of this guide.

Note the use of callouts in the right margin of the example. The purpose of these callouts is to direct your attention to points in the installation where you are required to perform an action, such as mounting a tape or disk.

This is only a sample. Your responses and output will probably differ from this example because your hardware and software requirements are not the same. Remember that you can type a question mark (?) in response to any question or prompt to obtain an online explanation.

The example installation has the following characteristics:

- CPU: PDP-11/44
- Memory: 512K words
- System Disk: RA80
- RSTS/E Distribution Kit: 1600 bpi magnetic tape
- Installation Kit: V9.0

Phase 1

Mount V9.0 Installation Media

Bootstrap V9.0 Installation Media

>>>B MS0

Enabling only console, disks, and tapes.

RSTS V9.0 (MS0) INIT V9.0-14

Phase 2

Mount Target System Disk

Current date <DD-MMM-YY>? 31-May-85

Current time <HH:MM AM/PM>? 05:00 AM

Installing RSTS on a new system disk? <Yes> (RET)

31-May-85 - 05:02 AM

Disk? DU

Unit? 0

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

Pack ID:	NATHAN
Pack cluster size:	8
Pack is currently:	Private, Update access on writes, Level: 1.1

Pack ID? SYSDSK

Pack cluster size <4>? (RET)

MFD cluster size <16>? (RET)

SATT,SYS base <118595>? (RET)

Pre-extend directories <NO>? (RET)

PUB, PRI, or SYS <SYS>? (RET)

[1,1] cluster size <16>? (RET)

[1,2] cluster size <16>? (RET)

[1,1] and [1,2] account base <118595>? (RET)

Date last modified <YES>? (RET)

New files first <NO>? (RET)

Read-only <NO>? (RET)

Use previous bad block info <YES>? (RET)

Patterns <3>? (RET)

(continued on next page)

```

Proceed (Y or N)? Y

31-May-85 - 05:17 AM

Enabling only console, disks, and tapes.

RSTS V9.0 (DUO) INIT V9.0-14

Start timesharing? <Yes> (RET)
  Starting SYSGEN.SIL . . .
  Rebooting . . .

RSTS V9.0 (DUO) INIT V9.0-14

31-May-85 - 05:17 AM

Creating SWAP.SYS file with minimum size of 128 blocks

Memory allocation table:

    0K: 00000000 - 00407777 ( 66K) : EXEC
    66K: 00410000 - 03467777 ( 396K) : USER
   462K: 03470000 - 03777777 ( 50K) : XBUF
   512K: 04000000 - End           : NXM

Creating CRASH.SYS file with minimum size of 320 blocks

31-May-85 - 05:19 AM

8 devices disabled

Do you want to perform an installation or an update? <installation> (RET)

```

Phase 3

Please mount the RSTS/E Installation media and enter the name and unit number of the device.

Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'

Installation device: MS0

Restoring required _SY:[0,1] components

Deleting all global symbols

31-May-85 5:21 AM

Beginning of the RSTS/E Software Installation Procedure

Type '?' for help

Type '^' to go back to the previous question

Type CTRL/Z to return to the beginning of the present section

* Starting dialogue Phase *

Are you ready to proceed? <yes> (RET)

Please enter the name and unit number of the disk to which you want to install the software. This disk should be physically mounted and write-enabled.

(continued on next page)

```

Target disk? <_SY:> : (RET)

Restoring required SY:[1,2] components

Assigning system logicals

    ** Starting Monitor Section **

Do you want to install the RSTS/E monitor? <yes> (RET)

Restoring required SYSGEN components

Use template monitor ? <N> NO
New monitor name ? <RSTS> RSTS90
Accept defaults ? <N> (RET)

Now you must specify the hardware configuration on which this RSTS/E system will run.

The following questions deal with the numbers and types of terminal interfaces on the system.

Accept terminal defaults ?           <N > (RET)
DL11A compatible lines ?           <01> (RET)
DL11C, DL11D's ?                   <00> (RET)
DL11E, DLV11E's ?                  <00> (RET)
DJ11's ?                           <00> (RET)
DH11's ?                           <00> (RET)
DZ11/DZV11/DZQ11's ?               <03> (RET)
DZ11 unit 00 lines enabled ?        <08> (RET)
DZ11 unit 01 lines enabled ?        <08> (RET)
DZ11 unit 02 lines enabled ?        <08> (RET)
Dataset support for DZ11's ?        <N > (RET)
DHU11's ?                           <01> (RET)
DHU11 unit 00 lines enabled ?        <16> (RET)
Dataset support for DHU11's ?        <N > (RET)
Pseudo keyboards ?                  <04> 6
Multi-terminal service ?             <Y > (RET)
Echo control ?                       <Y > (RET)
One-line status report ?             <Y > (RET)
FMS-11 support ?                     <N > (RET)
Multiple private delimiters ?        <N > (RET)

The following questions deal with the numbers and kinds of disk units on this system.

Accept Disk defaults ?               <N > (RET)
RK05's ?                             <00> (RET)
RL01/RL02's ?                       <00> (RET)
RK06/RK07's ?                       <02> (RET)
Overlapped seek ?                   <Y > (RET)
RPO2/RPO3's ?                       <00> (RET)
Disks on DR controller ?             <00> (RET)
Disks on DB controller ?             <00> (RET)
MSCP disks ?                        <03> (RET)

The following questions deal with the peripheral devices attached to this RSTS/E system.

```

(continued on next page)

```

Accept Peripheral defaults ?      <N>  (RET)
TU16/TE16/TU45/TU77's ?        <00>  (RET)
TU10/TE10/TS03's ?              <00>  (RET)
TS11/TK25/TSV05/TU80's ?        <01>  (RET)
TMSCP tape drives ?              <00>  (RET)
DECTapes ?                       <00>  (RET)
Printers ?                       <01>  (RET)
RX01/RX02's ?                   <00>  (RET)
CR11/CM11 card reader ?          <N>  (RET)
CD11 card reader ?               <N>  (RET)
P.T. reader/punch ?             <N>  (RET)
DECnet network support ?         <Y>  N
DMC11's/DMR11's ?               <00>  (RET)
KMC11's ?                       <00>  (RET)
Extended buffering for LP ?      <Y>  (RET)
RJ2780 support ?                 <N>  (RET)

```

The following questions deal with the capacity and features of this RSTS/E system provided at the system manager's option.

```

Accept Software defaults ?      <N>  (RET)
Maximum Jobs ?                  <25>  40
Small buffers ?                 <440> 550
Monitor statistics ?            <N>  (RET)
EMT logging ?                   <N>  (RET)

```

**** End of Monitor Section ****

Phase 4

**** Starting System Programs Sections ****

Do you want to install the System Program packages? <yes> (RET)

Packages to install: ?

The valid responses are:

```

DIALOGUE      Switches you to the long form of the System
                Software Packages dialogue where a more
                detailed description of each package is provided
ALL           Selects all packages
ALL,NOPKG[,...] Selects all packages except PKG

```

Use a comma as a separator, e.g.: RSX,PBS,RMS

Package names:

AUXLIB	Auxiliary Library	RMS	RMS-11
BASIC	Basic-Plus		(includes RSX Utilities)
DAP	RMS DECnet Data Access Package	RSX	RSX Utilities
	(includes RMS-11)	SORT	Sort/Merge
EDT	EDT Editor		(includes RMS-11)
HELP	Help Package	TECO	TECO Editor
OPSER	Opser-based Spooler	TEST	Device Testing
PBS	Print/Batch Services	UNSUPP	Unsupported Utilities
RESTORE	File Restore	UPDATE	Update Package

Packages to install: ALL,NODAP,NOUNSUPP,NOSORT

(continued on next page)

The following will be installed:

RSX
RMS
PBS
EDT
UPDATE
TEST
TECO
AUXLIB
RESTORE
OPSER
HELP
BASIC

Proceed? <yes> (RET)

Do you want the I&D versions of tasks? <no> (RET)

Use resident library version of RMS? <yes> (RET)

Use RMS resident libraries in PBS? <yes> (RET)

Use resident library version of EDT? <yes> (RET)

During the build phase there will be further questions
for BASIC-PLUS.

**** End of System Programs Section ****

**** Starting Layered Products Section ****

Do you want to transfer the layered product update components
from the Installation Kit? <yes> NO

**** End of Layered Products Section ****

Phase 5

You must now set the password for account _SY:[1,2]
New password:
New password again, for verification:
Password set for account _SY:[1,2]

*** End of dialogue phase ***

*** Starting build phase ***

Are you ready to proceed? <yes> (RET)

31-May-85 05:31 AM

Do you want _SY0:SWAP1.SYS created? <yes> (RET)

Creating _SY0:[0,1]SWAP1.SYS at 4992 blocks

31-May-85 05:32 AM

Creating RSTS/E monitor

This monitor will fit OK

(continued on next page)

31-May-85 05:48 AM

There are no updates for the System Startup files
There are no updates for the System Library Package
There are no updates for the Error Package
There are no updates for the RSX Libraries
There are no updates for the RSX Utilities
Restoring the RMS-11 package from the Installation Kit
Restoring the RMS Libraries from the Installation Kit
Restoring the Print/Batch Services package from the Installation Kit
There are no updates for the EDT package
There are no updates for the Update package
There are no updates for the Device Testing package
There are no updates for the TECO package
There are no updates for the Auxiliary Library package
There are no updates for the File Restore package
There are no updates for the OPser-based Spooling package
Restoring the Help package from the Installation Kit
There are no updates for the BASIC-PLUS package
Restoring the Resident Libraries from the Installation Kit

31-May-85 05:52 AM

Please mount the RSTS/E Library media and enter the
name and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'

Dismount V9.0 Installation Media

Mount V9 Library Media

Library device <_MS0:> (RET)

Restoring the System Startup files from the Library Kit
Restoring the System Library package from the Library Kit
Restoring the Error package from the Library Kit
Restoring the RSX Libraries from the Library Kit
Restoring the RSX Utilities from the Library Kit
Restoring the RMS-11 package from the Library Kit
Restoring the RMS Libraries from the Library Kit
Restoring the Print/Batch Services package from the Library Kit
Restoring the EDT package from the Library Kit
Restoring the Update package from the Library Kit
Restoring the Device Testing package from the Library Kit
Restoring the TECO package from the Library Kit
Restoring the Auxiliary Library package from the Library Kit
Restoring the File Restore package from the Library Kit
Restoring the OPser-based Spooling package from the Library Kit
Restoring the Help package from the Library Kit
Restoring the BASIC-PLUS package from the Library Kit
Restoring the Resident Libraries from the Library Kit

(continued on next page)

```

31-May-85 06:06 AM

Installing software packages

31-May-85 06:10 AM

Beginning of RSTS/E Basic-Plus generation.

BASIC-PLUS RTS name? <BASIC> (RET)
FPP? <Y> (RET)
Math precision? <02> 4
Log functions? <Y> (RET)
Trig functions? <Y> (RET)
Print using? <Y> (RET)
Matrices? <NO> Y
String arithmetic? <NO> (RET)

    * End of build phase *

The RSTS/E Software Installation Procedure is complete

Deleting all global symbols

Deassigning system logicals

31-May-85 06:17 AM

System tape label default set to DOS

SY:[1,2]INSTAL.LOG is a log file of this session

$

```

Phase 6

```

$ CREATE/ACCOUNT [1,4]/PRIVILEGES=ALL (RET)
Password:
Password again, for verification:
Account _SY0:[1,4] created at DCN 27345

```

Phase 7

```

$RUN $SHUTUP

SHUTUP V9.0-14 RSTS V9.0-14 SYSGEN

6:19 AM 31-May-85 *****      Set-up Dialogue Phase      *****

Type '^' to any query to backup one question

Minutes until system shutdown (0-99) <5>? 0

6:19 AM 31-May-85 *****      Warning Message Phase      *****
Further LOGINs are now disabled

6:19 AM 31-May-85 *****      Initial Job Killing Phase    *****

6:19 AM 31-May-85 *****      Remove RTS/RES LIB Phase     *****

6:19 AM 31-May-85 *****      SWAP File Removal Phase      *****

```

(continued on next page)

```

6:19 AM 31-May-85 *****      Disk DISMOUNT Phase      *****
6:19 AM 31-May-85 *****      Final Shutdown Phase      *****

Please wait for system to re-boot itself

RSTS V9.0-14 SYSGEN (DUO) INIT V9.0-14

31-May-85 - 6:20 AM

Start timesharing <Yes>? START RSTS90

Memory allocation table:

    OK: 00000000 - 00413777 ( 67K) : EXEC
    67K: 00414000 - 03367777 ( 379K) : USER
    446K: 03370000 - 03777777 ( 66K) : XBUF
    512K: 04000000 - End           : NXM

Re-creating CRASH.SYS file with minimum size of 380 blocks

31-May-85 - 06:22 AM

8 devices disabled

Proceed with system startup? <YES> (RET)

Beginning RSTS/E startup...
31-May-85 06:22 AM      Mounting disks
31-May-85 06:22 AM      Assigning logical names
31-May-85 06:22 AM      Starting error logging
31-May-85 06:22 AM      Setting system characteristics
31-May-85 06:22 AM      Installing run-time systems
31-May-85 06:23 AM      Setting terminal characteristics
31-May-85 06:23 AM      Defining system commands
31-May-85 06:23 AM      Setting printer characteristics
31-May-85 06:23 AM      Starting spoolers
Print/Batch Services started at 06:23 AM

*** From [1,2] on KBO: at 06:23 AM on 31-May-85
** RSTS/E is on the air...

(RET)

RSTS V9.0-14 31-May-85 06:24 AM
User:

```


Installing RSTS/E V9.0 On a Pre-V9.0 System

Upgrading a previous version of RSTS/E (V7.2, V8.0, or earlier) to RSTS/E version 9.0 is similar to building a new RSTS/E monitor, which is described in Part I of this guide. Part II of this guide outlines a number of tasks you perform to upgrade a previous version of RSTS/E to version 9.0, 9.1, 9.2, and so forth. You should be familiar with the following V8.0 INIT.SYS program options, which are discussed in the V8.0 *RSTS/E System Generation Manual*:

- SET LIST
- HARDWR LIST
- DEFAULT
- START

Figure 3 is a flowchart that outlines how to do a system installation to upgrade an existing RSTS/E monitor. Keep the flowchart handy when you are performing the upgrade.

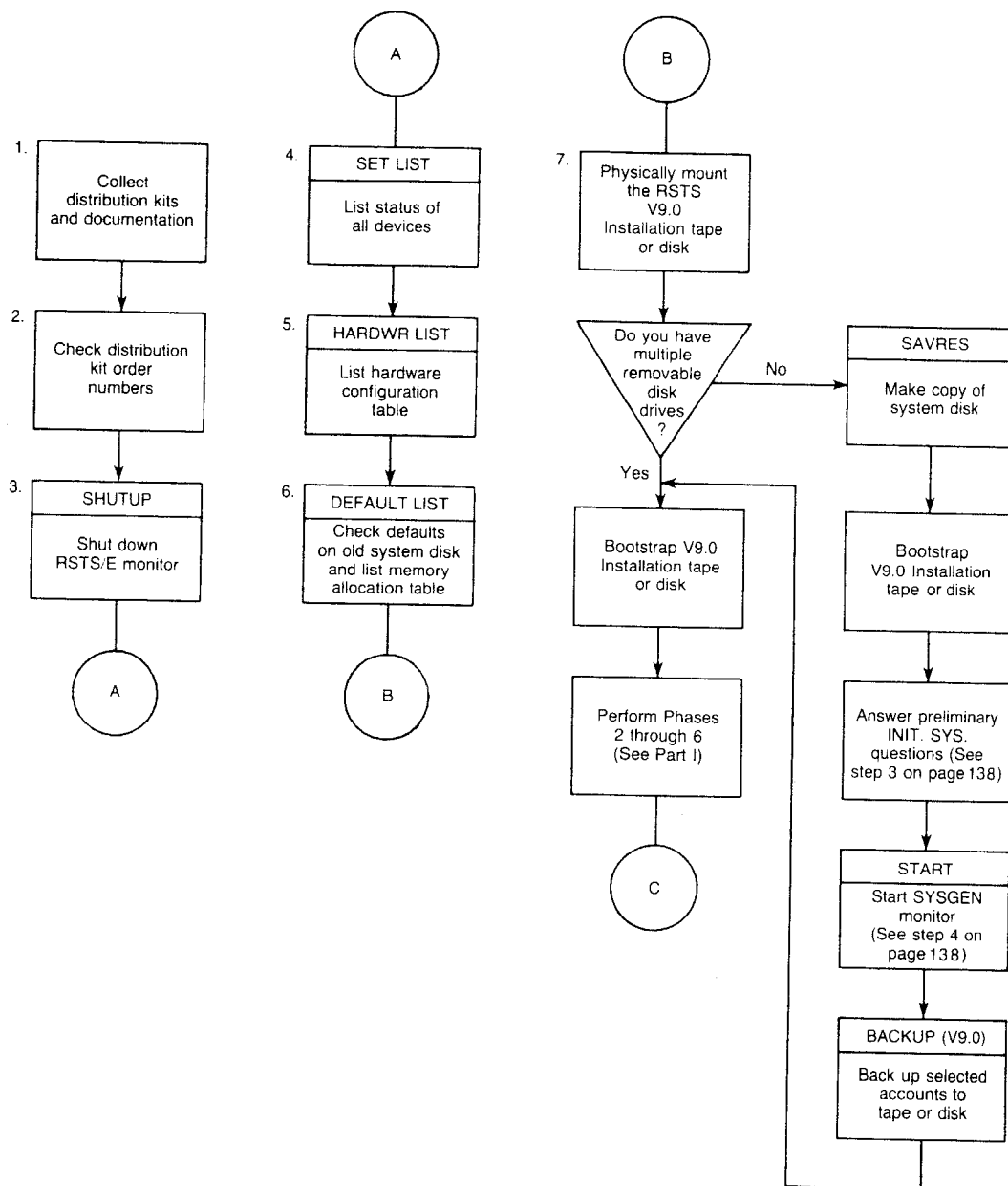
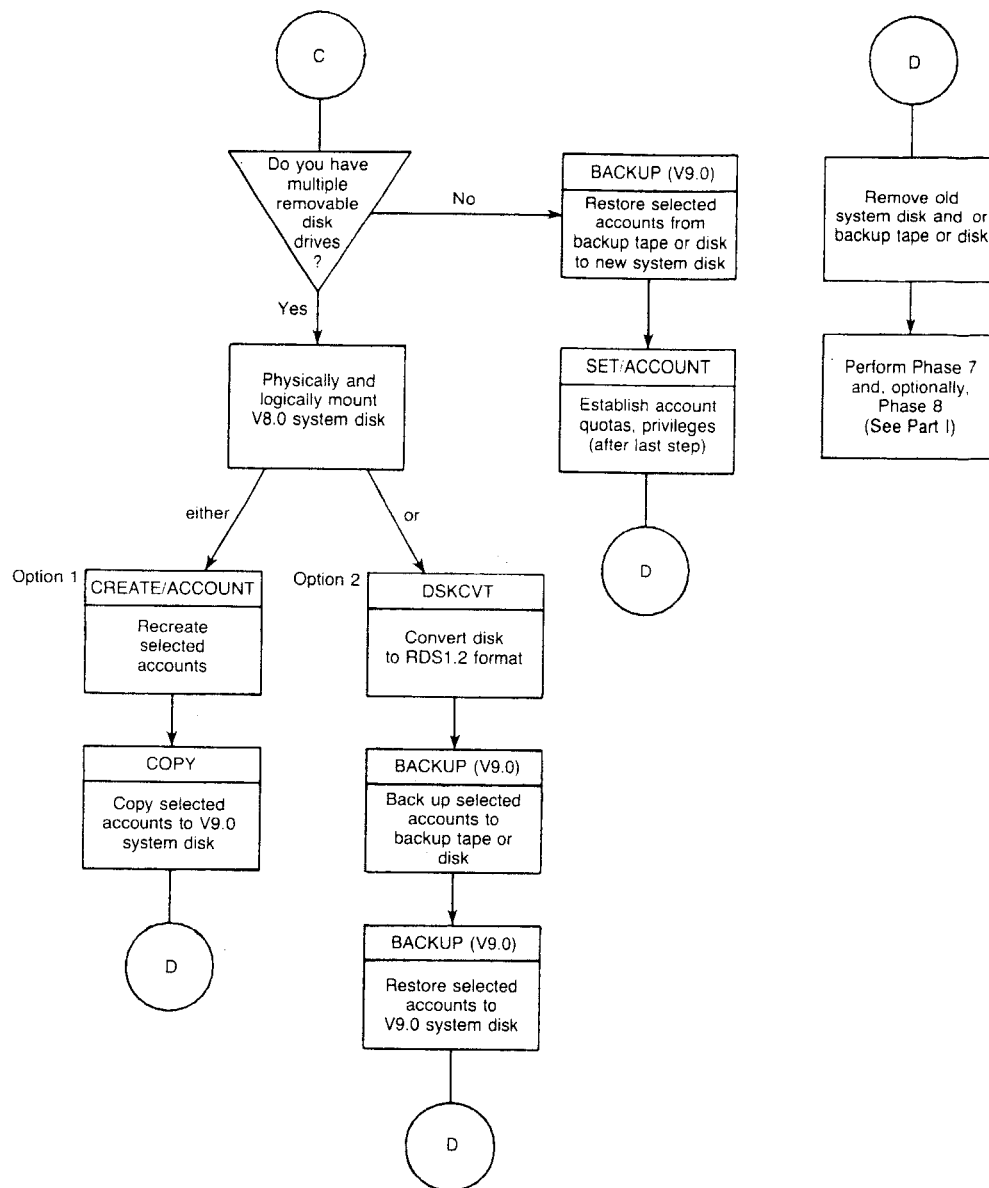


Figure 3: System Upgrade Flowchart



MK-01606-00

Follow these steps to upgrade your system:

Preliminary Steps

1. Collect distribution kits and documentation. (See Task 1 of Phase 1 in Part I of this guide.)
2. Check distribution kit order numbers. (See Task 2 of Phase 1 in Part I of this guide.)
3. Shut down your RSTS/E monitor, using the SHUTUP system program.
4. Use the LIST suboption of SET to list all of your devices. This list may be useful when you specify device characteristics on your new system disk.
5. Use the LIST suboption of HARDWR to list the hardware configuration table. The hardware configuration table may be useful when you specify hardware characteristics on your new system disk.
6. Use the DEFAULT option to check the defaults of your old monitor. When you get to the Any memory allocation changes? prompt, answer YES. Then use the memory allocation table suboption LIST to list the current memory allocation table. Exit from the memory allocation table suboptions and complete the DEFAULT questions. You can use these lists to help you establish defaults and make changes to the memory allocation table for the new system disk.
7. Physically mount your RSTS/E V9.0 Installation tape or disk. (See Task 2 of Phase 1 in Part I of this guide for instructions and an example of how to mount the Installation media.) If you do not have multiple removable disk drives, you should wait until Step 2 of the next section to mount the Installation media.

If you do not have multiple removable disk drives, continue with the next section, No Multiple Removable Disk Drives. If you have multiple removable disk drives, go to the section, Multiple Removable Disk Drives.

No Multiple Removable Disk Drives

This section lists the steps you perform if your system does not have multiple removable disk drives.

Note

Though these upgrade steps may seem unorthodox, they provide the best method for you to recreate your current accounts on your V9.0 system. However, do not use these procedures until you have made a copy of your system disk (see Step 1).

1. Use the SAVRES SAVE option of INIT.SYS to make a copy of your system disk. See the Offline Options section for more information.
2. Bootstrap your RSTS/E V9.0 Installation tape or disk. (See Task 2 of Phase 1 in Part I of this guide for instructions and an example of how to bootstrap the installation media.)
3. INIT.SYS prompts for the date and time, and then asks the following questions. Type the response as indicated:

```
Installing RSTS on a new system disk <Yes>? NO
Are you updating an existing RSTS system disk <Yes>? YES
To which disk? current system disk
```

After you answer these questions, INIT.SYS performs a COPY operation to transfer the components you need to perform the installation. One of these components is the V9.0 BACKUP program.

4. Answer START SYSGEN to the Start timesharing? question. This starts the SYSGEN monitor, a prebuilt monitor supplied by DIGITAL.

The installation cannot continue at this point because your disk is not yet RDS1.2 format and therefore RSTS/E mounted your disk read-only. You see a number of DCL errors, followed by the \$ prompt. You are now running under the SYSGEN monitor, with DCL as the keyboard monitor.

5. Physically mount a backup tape or disk. Then use the V9.0 BACKUP program to do a full backup of your system. Use a command of the format:

```
BACKUP/ACCOUNT/FILE -
    [*]**/EXCLUDE=[0,1]*.SYS -
    xx:OLDSYS.BCK
```

You may want to include the /NOLIST qualifier to suppress the listing of backed-up files.

See the *RSTS/E System Manager's Guide* for more information on BACKUP.

6. When BACKUP completes, reboot your Installation tape or disk. Use the hardware bootstrap loader on your PDP-11 to halt the system and boot the media. (At this point you do not need to run SHUTUP, since your disk is mounted read-only.) See Task 2 of Phase 1 in Part I of this guide for instructions and an example of how to bootstrap the installation media.
7. See Part I of this guide and perform all of the tasks associated with Phases 2 through 6. This time answer the questions correctly as if you are performing a new installation.
8. Mount your backup tape or disk and use the RESTORE command to restore the accounts you saved earlier to your new system disk. Use a command of the format:

```
RESTORE/ACCOUNT/FILE/NOREPLACE -
    xx: = OLDSYS.BCK [*]*.*
```

You may want to include the /NOLIST qualifier to suppress the listing of restored files.

Note that when BACKUP restores account [1,2] it changes the password back to whatever it was in V8.0.

9. Remove your backup tape or disk.
10. See Part I of this guide and perform all of the tasks associated with Phase 7 and, optionally, Phase 8.
11. The last step uses the SET ACCOUNT command to establish V9.0 quotas and privileges. Use the following command format:

```
SET ACCOUNT [1,*]/JOB=a/DETACH=b/INQUOTA=c -  
/PRIV=(ALL,NOSYSMOD,NOEXQTA)/NOEXPIRE  
SET ACCOUNT [2-254,*]/JOB=w/DETACH=x/INQUOTA=y/NOEXPIRE
```

You may want to use other qualifiers such as /PRIV to set different account privileges, or /NAME= to set the accounts name. The above commands (with appropriate values for a,b,c,w,x,y) make your accounts V8.0 compatible. See the *RSTS/E System Manager's Guide* for more information on SET ACCOUNT.

Multiple Removable Disk Drives

This section lists the steps you perform if your system has multiple removable disk drives.

1. Physically mount and bootstrap your RSTS/E V9.0 Installation tape or disk. (See Task 2 of Phase 1 in Part I of this guide for instructions and an example of how to mount and bootstrap the installation media.)
2. See Part I of this guide and perform all of the tasks associated with Phases 2 through 6.
3. Physically and logically mount your original system disk. You can then create accounts on your new system disk with one of two options:

Option 1:

- a. Recreate selected accounts on your new system disk, using the CREATE/ACCOUNT command. See the *RSTS/E System Manager's Guide* for instructions on how to use CREATE/ACCOUNT.
- b. After you recreate all of your selected accounts, copy the accounts from your old system disk to your new system disk, using the COPY command. Use the /NOREPLACE qualifier to ensure that it does not copy a file that already exists. See the *RSTS/E System User's Guide* for instructions on how to use COPY.

Option 2:

- a. Use the DSKCVT program to convert your old system disk to RDS1.2 format. See Appendix E for instructions on how to use DSKCVT.
- b. Back up selected accounts to a tape or disk using the BACKUP (V9.0) program. To copy all the accounts, type a command of the format:

```
BACKUP/ACCOUNT/FILE –  
    [,]*./EXCLUDE=[0,1]*.SYS –  
    xx:OLDSYS.BCK
```

You may want to include the /NOLIST qualifier to suppress the listing of backed-up files.

See the *RSTS/E System Manager's Guide* for more information on BACKUP.

- c. Restore selected account to your V9.0 system disk using the RESTORE command of the BACKUP program. To restore all accounts, type a command of the format:

```
RESTORE/ACCOUNT/FILE/NOREPLACE –  
    xx:OLDSYS.BCK [,]*.*
```

You may want to include the /NOLIST qualifier to suppress the listing of restored files.

4. Remove your old system disk (if used) and backup tape or disk.
5. See Part I of this guide and perform all of the tasks associated with Phase 7 and, optionally, Phase 8.

Performing an Online System Installation

You can use the `INSTAL.COM` command file to perform an online RSTS/E installation, without disturbing your existing system.

You used the `INSTAL.COM` command file to perform your original V9.0 installation. `INSTAL.COM` resides in account [0,1]. You can also use it to:

- Generate a new monitor
- Install one or more system program packages
- Install layered products (integrated layered products only)
- Transfer layered product updates to your system
- Perform a full installation

Note

You cannot perform an online system installation to build a V9.0 RSTS/E monitor from a V8.0 or earlier monitor.

In order for the installation to succeed, you must be logged in to an account with the following privileges: `MOUNT`, `INSTAL`, `TUNE`, `WREAD`, `WWRITE`, and `WACNT`. In addition, if you have `DATES` privilege, the creation date of the new files will be the date the files were placed on the installation kit. If you do not have `DATES` privilege, the file creation date will be the current date.

To access INSTAL.COM, type a command of the following format:

@[0,1]INSTAL function [package,...]

where:

@[0,1]INSTAL	invokes the INSTAL.COM command procedure.
function	specifies the operation to perform. Legal functions are: ALL (the default), MONITOR, SYSTEM_PROGRAMS, and LAYERED_PRODUCTS.
[package,...]	specifies the software package(s) to install when performing a SYSTEM_PROGRAMS, LAYERED_PRODUCTS, or COPYUP operation (see Table 11). See Task 1 of Phase 4 in Part I for a complete list of RSTS/E system program packages. See Task 2 of Phase 4 in Part I for a list of layered products.

INSTAL.COM Entry Points

When you use INSTAL.COM to perform an installation, you enter the installation process at different points depending on the command format. Table 11 lists the INSTAL.COM commands and the resulting entry points into the installation process. See the appropriate Phase and Task in Part I for details on the actual installation procedures.

When you use INSTAL.COM to perform an online installation, you first see this question:

```
Please mount the Installation media and enter the name
and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM', 'DL' or 'SY'
(a response of SY allows monitor only)
```

```
Installation device:
```

This question prompts you to mount the Installation tape or disk and specify its location. See the example later in this section if you need help answering this question.

Table 11 lists the INSTAL.COM commands and the resulting entry points into the installation process.

Table 11: INSTAL.COM Entry Points

Command	Installation Entry Point	Comment
@[0,1]INSTAL	Phase 3, Task 1	Performs new installation (same as INSTAL ALL).
@[0,1]INSTAL ALL	Phase 3, Task 1	Performs new installation (the default).
@[0,1]INSTAL SYSTEM.PROGRAMS	Phase 4, Task 1	Begins system program installation questions.
@[0,1]INSTAL SYSTEM.PROGRAMS [pkg,...]	Phase 5, Task 3	Installs specified package while preserving existing software packages.
@[0,1]INSTAL MONITOR	Phase 3, Task 1	Begins monitor installation section. Skips system program and layered product sections.
@[0,1]INSTAL LAYERED.PRODUCTS	—	This function is available only to integrated layered products. Use this function only if you are directed to do so by a specific layered product installation guide.
@[0,1]INSTAL LAYERED.PRODUCTS [pkg,...]	—	This function is available only to integrated layered products. Use this function only if you are directed to do so by a specific layered product installation guide.
@[0,1]COPYUP	Phase 4, Task 2	Begins dialogue to transfer layered product updates from the Installation kit.
@[0,1]COPYUP [pkg,...]	Phase 5, Task 3	Transfers specific layered product updates from the Installation kit.

Online Installation Example

This example uses `INSTAL.COM` to install the RSX system program package. Before you run `INSTAL.COM`, you must mount the Installation media. Mount the tape or disk on a free drive. Follow the tape or disk mount instructions in Task 2 of Phase 1 in Part I.

```
$ @[0,1]INSTAL SYSTEM_PROGRAMS RSX
```

```
  * Starting dialogue phase *
```

```
Please mount the RSTS/E Installation media and enter the name
and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM', 'DL' or 'SY'
(a response of SY allows monitor only)
```

```
Installation device: MM0:
```

```
Please enter the name and unit number of the disk to
which you want to install the software. This disk
should be physically mounted and write-enabled.
```

```
Target disk? <_SY:> : (RET)
```

```
Assigning system logicals
```

```
The following will be installed:
```

```
  RSX
```

```
Proceed? <yes> (RET)
```

```
Do you want the I&D versions of tasks? <no> (RET)
```

```
  * End of dialogue phase *
```

```
  * Starting build phase *
```

```
31-May-85 11:43 AM
```

```
Restoring the RSX Libraries from the Installation Kit
Restoring the RSX Utilities from the Installation Kit
```

```
31-May-85 11:45 AM
```

```
Please mount the RSTS/E Library media and enter the
name and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'
```

```
Library device <MM0:> : (RET)
```

```
Restoring the RSX Libraries from the Library Kit
Restoring the RSX Utilities from the Library Kit
```

```
31-May-85 11:49 AM
```

(continued on next page)

Installing software packages

* End of build phase *

Deleting all global symbols

Deassigning system logicals

31-May-85 11:50 AM

System tape label default set to DOS

SY:[1,2]INSTAL.LOG is a log file of this session

\$

You have successfully installed the RSX package on your system. Type DIR RSX\$: to list the files in the directory.

Updating a RSTS/E V9.0 System

Part IV describes how to update a RSTS/E V9.0 system to a new release.

DIGITAL supplies an Installation Kit with each new release of RSTS/E. After V9.0, subsequent kits are labeled in numeric sequence. For example, the first kit distributed after the V9.0 release is called V9.1; the second kit is V9.2.

Each new Installation Kit contains new software features as well as updates to existing software. In addition, the kit may contain mandatory corrections to RSTS/E software.

The contents of each Installation Kit are cumulative. This means that each new installation kit includes updates from all previous kits, as well as any new ones. For example, the V9.3 Installation Kit would include all features of the V9.0, V9.1, and V9.2 kits.

Each new release of RSTS/E also contains the *RSTS/E Release Notes*. The *RSTS/E Release Notes* describes new features of RSTS/E and explains differences between the latest version and previous version. Read the *RSTS/E Release Notes* before performing a system update.

Structure of Part IV

Part IV divides the system update into five phases plus one optional phase, each consisting of one or more task(s).

For convenience, a summary of all the tasks in a phase appears at the start of that section. The option, program, or command file you use in a task (such as DSKINT or COPY) appears in parentheses next to the task.

The contents of each phase follow:

Phase 1: Getting Started

Explains how to make backup copies of your system disk and shut down your current monitor.

Phase 2: Prepare System

Describes how to mount your Installation media, copy files to your system disk, and start the SYSGEN monitor.

Phase 3: Configure New Monitor

Explains how to use information from a template monitor to configure your new monitor. It also explains how to answer the software update questions.

Phase 4: Generate RSTS/E System

Explains how to create the new RSTS/E monitor. It also describes how to update system programs and layered products.

Phase 5: Start New Monitor

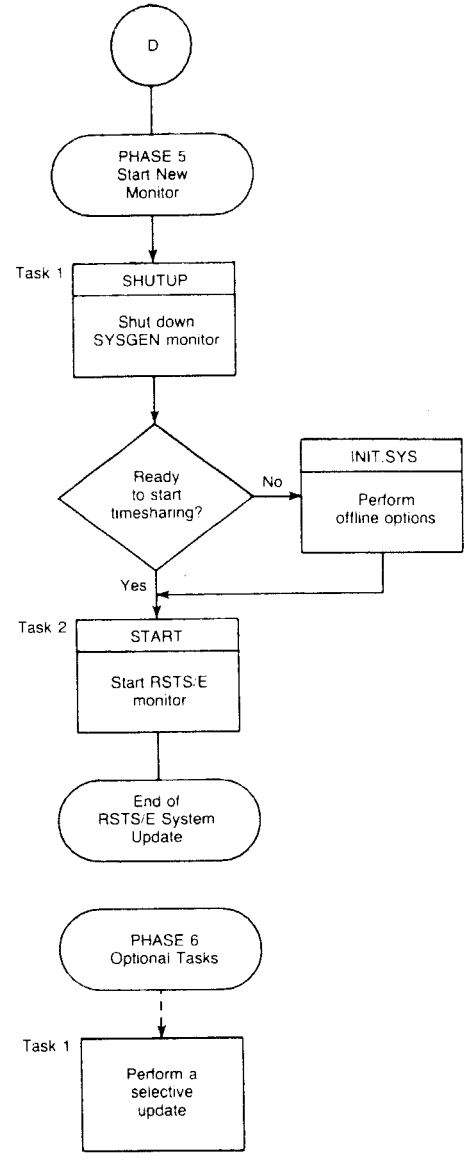
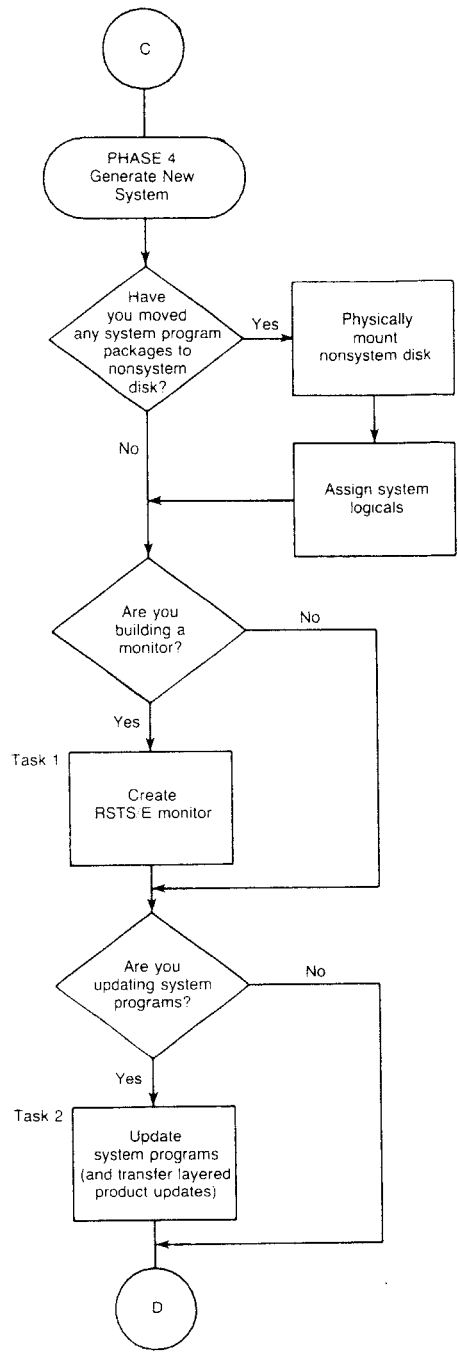
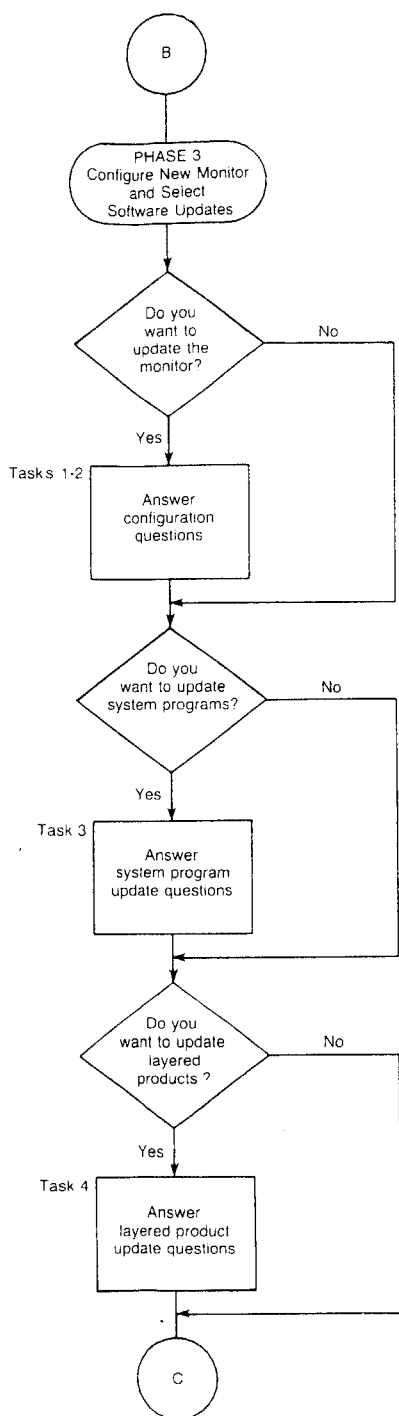
Explains how to shut down the SYSGEN monitor and start the new RSTS/E monitor.

Phase 6: Optional Tasks

Explains how to use the UPDATE.COM command procedure to perform a selective update.

System Update Flowchart

Figure 4, the System Update Flowchart, summarizes how to update a V9.0 RSTS/E system. You may want to use this flowchart while you perform the update.



MK-01607-00

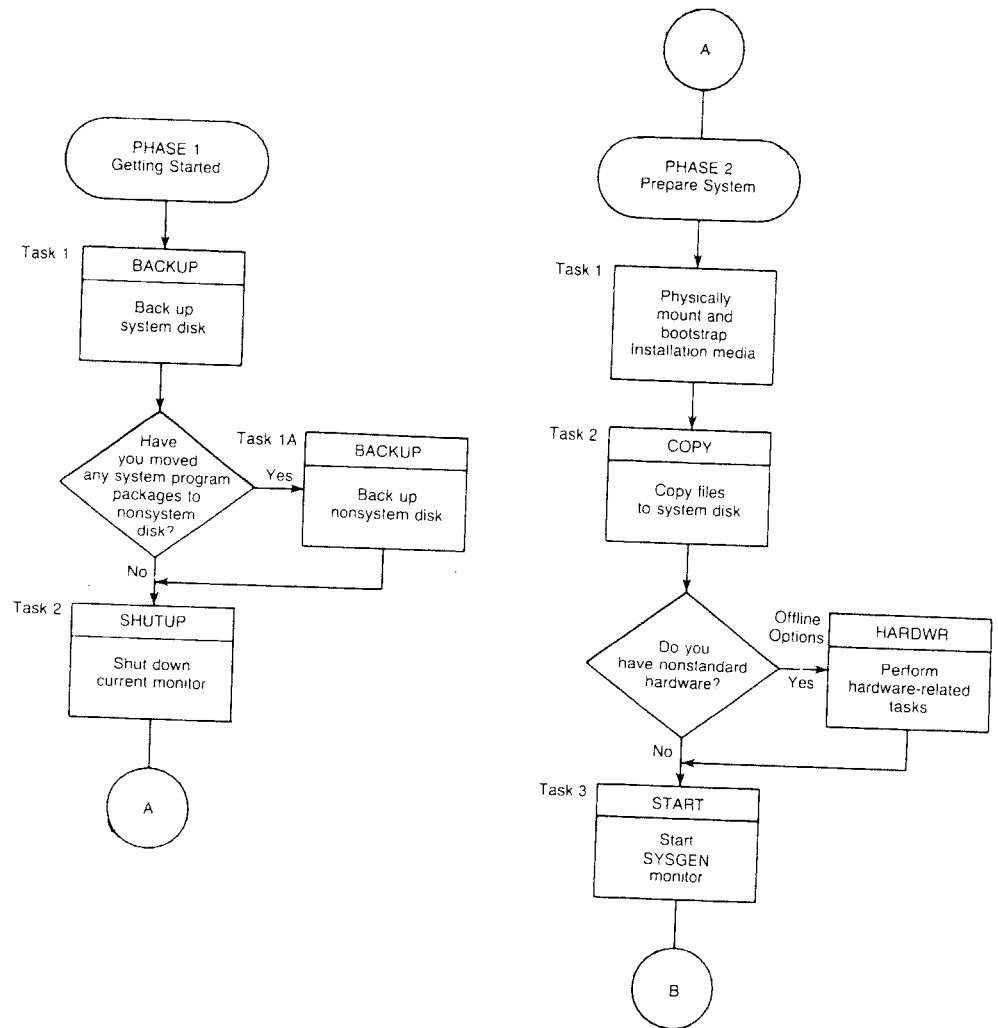


Figure 4: System Update Flowchart

Phase 1 Getting Started

This phase describes the tasks you must perform to prepare for a RSTS/E system update. In order for the update to succeed, you must be logged in to an account with the following privileges: SHUTUP, MOUNT, WREAD, WWRITE, WACNT, INSTAL, and TUNE. In addition, if you have DATES privilege, the creation date of new files will be the date they were placed on the Installation media. If you do not have DATES privilege, the creation date will be the current date.

The tasks in this phase are:

- Task 1: Back Up System Disk (BACKUP)
- Task 1A: Back Up Nonsystem Disk (BACKUP)
- Task 2: Shut Down Current Monitor (SHUTUP)

Task 1: Back Up System Disk (BACKUP)

In this task you use the RSTS/E BACKUP utility to make a backup copy of your system disk. (See the *RSTS/E System Manager's Guide* for a full description of BACKUP.)

This example backs up a RA80 system disk to 1600 bpi tape, mounted on a TU77 tape drive.

```
$ BACKUP DUO:[*,*]*,* MM0:SYSBK
```

Explanation — You see the DCL \$ prompt. Type a command of the format:

BACKUP <input-file-spec> <output-file-spec>

where:

BACKUP	invokes the RSTS/E BACKUP utility
<input-file-spec>	specifies the disk, accounts, and files to back up
<output-file-spec>	specifies the disk or tape on which to copy the data, and the save set name

Response — Type an appropriate BACKUP command line for your system. The example BACKUP command line backs up all files in all accounts on the system disk (DU0:) to a magnetic tape mounted on drive MM0:.

```
Please mount volume 1 of Backup set SYSBK.BCK
```

```
Where can this volume be located? <MM0:/NOINITIALIZE> MM0:/INITIALIZE
```

Explanation — BACKUP asks for the location of your save set volume. BACKUP prints the device designator you specified in the command line as the default answer (MM0 in this example).

Response — Type the device designator and unit number of the drive on which the output volume is mounted. If you want to initialize the tape, append /INITIALIZE to your response. In the example, the response is MM0:/INITIALIZE.



Go to Task 1A if you want to back up your nonsystem disk(s).



Go to Task 2 if you do not want to back up your nonsystem disk(s).

Task 1A: Back Up Nonsystem Disk (BACKUP)

You should perform this task if you intend to update system programs and you have moved any system programs packages to a nonsystem disk.

To back up your nonsystem disk, follow the procedures described in Task 1.



Go to Task 2.

Task 2: Shut Down Current Monitor (SHUTUP)

In this task, you run the SHUTUP program to shut down your current monitor. To run SHUTUP, you must have SHUTUP privilege and be logged in to the console terminal.

Terminal Session



This terminal session shows how to run SHUTUP to shut down your system.

```
$ RUN $SHUTUP
```

Explanation — You are logged in to the console terminal and see the DCL \$ prompt on your screen. You can now shut down the current monitor.

Response — Type RUN \$SHUTUP to shut down the monitor.

```
SHUTUP V9.0-14 RSTS V9.0-14 <monitor name>
```

```
11:55 AM 31-May-85 ***** Set-up Dialogue Phase *****
```

```
Type '^' to any query to backup one question
```

```
Allow Print & Batch entries to complete (YES/NO) <Yes>?
```

Explanation — SHUTUP prints a header and some preliminary information. SHUTUP then asks you whether to allow print and batch entries to complete.

Response — Type YES or press RETURN to allow the entries to complete. Type NO to shut down the print and batch queues immediately.

```
Minutes until system shutdown (0-99) <5>?
```

Explanation — SHUTUP asks you to type the minutes to wait before the RSTS/E monitor shuts down. This question is useful for giving system users fair warning when shutting down the system.

Response — Type a number from 0 to 99. Or, press RETURN to accept the default of 5 minutes.

```
11:55 AM 31-May-85 ***** Warning Message Phase *****
Further LOGINs are now disabled

11:55 AM 31-May-85 ***** Initial Job Killing Phase *****

11:55 AM 31-May-85 ***** Print/Batch Shutdown Phase *****
Print/Batch Services shutdown complete at 11:55 AM.

11:55 AM 31-May-85 ***** ' EVTLOG ' Shutdown Phase *****

11:55 AM 31-May-85 ***** ' ERRCPY ' Shutdown Phase *****

11:55 AM 31-May-85 ***** Remove RTS/RES LIB Phase *****

11:55 AM 31-May-85 ***** SWAP File Removal Phase *****

11:55 AM 31-May-85 ***** Disk DISMOUNT Phase *****

11:55 AM 31-May-85 ***** Final Shutdown Phase *****

Please wait for system to re-boot itself

RSTS V9.0-14 RSTS/E V9.0 (dev) INIT V9.0-14

31-May-85 - 11:56 AM

Start timesharing <Yes>? NO

Option:
```

Explanation — SHUTUP prints several messages before shutting down your system. It then returns to the Start timesharing? question. See the *RSTS/E System Manager's Guide* for more information on SHUTUP.

Response — Type NO. INIT.SYS then prints its Option: prompt.



Go to Phase 2.

Phase 2 Prepare System

This phase describes the tasks you must perform to bootstrap the installation tape or disk and prepare your system disk for a RSTS/E system update. It also explains how to start your SYSGEN monitor.

The tasks in this phase are:

- Task 1: Physically Mount and Bootstrap Installation Media
- Task 2: Copy Files to System Disk (COPY)
- Task 3: Start SYSGEN Monitor (START)

These responses have special meaning:

Response	Description
RET	Accept the default response
?	Obtain an online explanation of the question

Task 1: Physically Mount and Bootstrap Installation Media

This task requires you to mount and bootstrap the appropriate tape or disk from your RSTS/E Installation Kit. First, the task provides instructions for mounting the tape on a tape drive, or mounting a disk on a disk drive. Choose the appropriate section depending on the type of media for your installation. Second, the task provides an example of bootstrapping the tape or disk.

Tape Mount Session

Mount the 800 or 1600 bpi 9-track Installation tape. To load the tape on the drive:

1. Physically mount the tape on drive unit 0 or 1 with the write-enable ring removed. If you have a combination of TU10, TE10, TU16, TE16, TU45, and TU77 tape drives, load the 800 bpi distribution tape onto unit 0 or 1 of the TU10 or TE10 tape drive. If you have a combination of TU16, TE16, TU45, TU77, TS11, TSV05, and TU80 tape drives, load the 1600 bpi distribution tape on unit 0 or 1 of the TS11 drive.
2. Press the LOAD indicator.
3. The drive automatically winds the tape until the beginning of tape (BOT) indicator light comes on. This indicates the tape is at its load point.
4. Make sure that the write-lock (WR) indicator light is on. (If not, dismount the tape, remove the write-enable ring, and then remount the tape.)
5. Press the ONLINE indicator. The indicator light comes on.
6. Make sure the console terminal is on line.

Note

The previous instructions may not apply to your tape drive. If so, see the hardware manual supplied with your tape drive for the load instructions.

Disk Mount Session

Mount the RSTS/E Installation disk. To load the disk onto the disk drive:

1. Physically mount the disk in drive unit 0 or 1. For an RL02 disk, you can use drive units 0, 1, 2, or 3.
2. Make sure that the READY light is on.
3. Make sure that the write-protect (WR PROT) light is on.
4. Make sure that the console terminal is on line.

Note

The previous load instructions may not apply to your disk drive. If so, see the hardware manual supplied with your disk drive for the load instructions.

Bootstrap Installation Media

Now you must bootstrap the installation tape or disk. You can use either of these methods:

- Use the INIT.SYS BOOT option.
- Use the PDP-11 Central Processing Unit (CPU) switches to activate a hardware bootstrap loader.

Both bootstrap methods are described in the following sections.

Use the INIT.SYS BOOT Option

The INIT.SYS BOOT option bootstraps magnetic tape and disk devices.

Option: BOOT

Explanation — After you shut down the system, answer NO to the Start timesharing? question. INIT.SYS returns to the Option: prompt.

Response — Type BOOT or BO.

Boot device:

Boot unit:

Explanation — BOOT asks for the device designator of the unit.

Response — Type the device designator and unit number of the drive on which you mounted the Installation tape or disk. If you type both a device designator and a unit number, BOOT does not print the Boot unit: prompt. Table 12 lists the tape device designators. Table 13 lists the disk device designators.

About 30 seconds after you type the device designator, the following prints on the console terminal:

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

```
RSTS V9.x (dev) INIT V9.x
```

```
Current date <DD-MMM-YY>?
```

The Date prompt means that INIT.SYS is loaded into memory. You have successfully bootstrapped your Installation media. Note that the device designator of the tape or disk drive you bootstrapped appears within parentheses.



Go to Task 2.

Use the Hardware Bootstrap Loader

The hardware bootstrap loader is a device inside your PDP-11 that reads a bootstrap record from the tape or disk into memory. This bootstrap record contains a program that loads and executes additional program code from the tape or disk. There are different types of hardware bootstrap loaders; the type you have on your PDP-11 determines which CPU switches you should use.

Your DIGITAL field service representative or software support specialist should already have identified the type of hardware bootstrap loader on your PDP-11. The representative should also have given instructions for bootstrapping your tape or disk.

If you do not know how to bootstrap the Installation media, see Appendix D, which contains bootstrap instructions for the different types of hardware bootstrap loaders.

This example shows how to bootstrap the 1600 bpi tape from a TU80 tape drive, by activating switches on a PDP-11/44. These bootstrap instructions are:

1. Move the control switch (CONT) to the HALT position.
2. Move the control switch to the BOOT position.

The CPU prints some octal numbers on the console terminal, followed by three angle brackets:

```
>>>B MS0
```

The >>> asks for a command. Type B to indicate a BOOT operation, followed by the device designator of the drive on which your tape or disk is mounted. A device designator consists of two letters that identify the device type, followed by the decimal unit number of the drive and a colon. (However, do not specify a colon here.) The example uses a TU80 tape drive: thus, the tape device designator is MS0.

Table 12 lists the tape device designators. Table 13 lists the bootable disk device designators. Enter the appropriate device designator for your installation.

About 30 seconds after you type the device designator, the following prints on the console terminal:

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

```
RSTS V9.x (MS0) INIT V9.x
```

```
Current date <DD-MMM-YY>?
```


The Current date prompt means that INIT.SYS is loaded into memory. You have successfully bootstrapped your Installation media. Note that the device designator of the tape or disk drive you bootstrapped appears within parentheses. In the example, the device designator is MS0.



Go to Task 2.

Table 12 lists the tape device designators.

Table 12: Tape Device Designators

Designator	Device
MM0: to MM7:	TE16/TU16/TU45/TU77 magnetic tape units 0 to 7
MS0: to MS3:	TS11/TSV05/TU80/TK25 magnetic tape units 0 to 3
MT0: to MT7:	TE10/TU10/TS03 magnetic tape units 0 to 7 *
MU0: to MU7:	TK50 magnetic tape units 0 to 7
*Note: You cannot use a TS03 drive for system installation.	

Table 13 lists the bootable disk device designators.

Table 13: Bootable Disk Device Designators

Designator	Device
DB0: to DB7:	RP04/RP05/RP06 disk drive units 0 to 7*
DK0: to DK7:	RK05/RK05F disk drive units 0 to 7
DL0: to DL3:	RL01/RL02 disk drive units 0 to 3
DM0: to DM7:	RK06/RK07 disk drive units 0 to 7
DP0: to DP7:	RP02/RP03 disk drive units 0 to 7
DR0: to DR7:	RM02/RM03/RM05/RM80 disk drive units 0 to 7 *
DU0: to DU15:	RA60/RA80/RA81/RCF25,RC25/RD51/RD52/RD53/ RX50 disk drive units 0 to 15
*See Appendix F for more information on multiple RH controller configurations.	

Task 2: Copy Files to System Disk (COPY)

Your next task is to answer the preliminary INIT.SYS questions. Then the INIT.SYS COPY option transfers some necessary files from the Installation media to your system disk.

Terminal Session



This terminal session lists the preliminary INIT.SYS questions, explains them, and gives you some possible responses. After you understand the question, type the response at your console terminal.

The common error messages appear in Table 14, at the end of this task. If your error message does not appear there, see Appendix A.

You have now successfully bootstrapped your Installation media, and the INIT.SYS program is loaded into memory.

```
RSTS V9.x (dev:) INIT V9.x  
Current date <DD-MMM-YY>?  
Current time <HH:MM AM/PM>?
```

Explanation — INIT.SYS searches for a valid date and time and prompts you if it cannot find one. You see the date and time prompts, for example, when you bootstrap a tape or bootstrap a disk from the console boot/restart switch.

Response — Type the current date and time in the alphabetic format.

```
Installing RSTS on a new system disk <Yes> ? NO
```

Explanation — INIT.SYS asks this question whenever you bootstrap a tape or disk read-only. (RSTS/E Distribution Kits are always read-only.) If you answer YES, INIT.SYS assumes you are performing a first time V9.0 system installation and want to use the DSKINT option to initialize your system disk.

If you answer NO, INIT.SYS assumes that you are bootstrapping the Installation media to perform an update on the current system disk. INIT.SYS then asks the next question.

Response — Type NO because you are updating an existing RSTS/E V9.0 system.

```
Are you updating an existing RSTS system disk? <Yes> (RET)
```

Explanation — This question asks if you are updating a previously generated V9.0 monitor. If you answer YES, INIT.SYS executes the COPY operation with forced supersede of all files found on the system disk.

If you answer NO, INIT.SYS prints its Option: prompt.

Response — Type YES or press RETURN.

Disk to update?

Explanation — INIT.SYS asks you to specify the device designator and unit number of your system disk. Possible device designator responses are: DL, DM, DP, DB, DR, or DU.

Response — Type the device designator of your system disk.

Superseding file xxxxxx

Enabling only console, disks, and tapes.

RSTS V9.x (dev:) INIT V9.x

Start timesharing? <Yes>

Explanation — After you type the system disk device designator and unit number, COPY transfers the files to the system disk. Because you answered YES to the Are you updating an existing RSTS system disk? question, COPY automatically supersedes existing files. COPY prints a message on your terminal as it supersedes each file.

On completion, INIT.SYS bootstraps your system disk, prints a message on your console terminal, and returns to the Start timesharing? question.

Note

At this point in system installation you might have to manually install a patch to the SYSGEN monitor or the INIT.SYS program before continuing with system installation. Should this ever occur, your DIGITAL software support representative or the *RSTS/E Release Notes* will provide you with the patch installation instructions. See Task 2 of Phase 8 in Part I for more information on applying a patch.



Go to Task 3.

Table 14 lists the COPY error messages.

Table 14: COPY Error Messages

Message and Meaning
CANNOT COPY TO THE SYSTEM DISK You specified the RSTS/E Installation media, which is invalid as an output disk for the COPY option. Specify another disk.
ILLEGAL DISK NAME You typed an invalid disk name. All DF, DK, and DS disks are illegal.
INVALID UNIT NUMBER The disk unit number you specified does not exist on this system.
INVALID RESPONSE The only valid responses to the FILE FILNAM.TYP EXISTS: prompt are Y, N, or CTRL/C, and you typed something else.
SORRY, BUT THAT DISK DOESN'T EXIST The disk type you specified does not exist on this system.

Task 3: Start SYSGEN Monitor (START)

In this task you use the INIT.SYS START option to start your SYSGEN monitor. Your system must run under the SYSGEN monitor during the update.

If you have hardware that has nonstandard CSR addresses, you must first perform a hardware task. Because the COPY operation in Task 2 transferred a new copy of INIT.SYS, you must use the HARDWR CSR suboption (Declare a Nonstandard Controller Address) before you install the monitor. See the Offline Options section for information on the CSR suboption of HARDWR.

If you are in a country that uses 50 Hz power, you must use the HERTZ suboption of HARDWR before you install the monitor. See the Offline Options section for information on the HERTZ suboption of HARDWR.

If your installation uses 60 Hz power and does not have hardware with nonstandard controller addresses, then you are ready to begin Task 3 and start timesharing under the SYSGEN monitor.

Terminal Session



This terminal session lists the START questions, explains them, and gives you some possible responses. After you understand a question, type the response at your console terminal.

```
Start timesharing? <Yes> (RET)
```

Explanation — INIT.SYS asks if you are ready to start timesharing.

If you answer YES to this question, INIT.SYS prompts for the monitor name to start. If you answer NO to this question, INIT.SYS prints its Option: prompt.

Response — Type YES or press RETURN.

```
Monitor name to START <xxxxxx>? SYSGEN  
Rebooting . . .
```

Explanation — When you answer YES to the Start timesharing? question, INIT.SYS searches the list of monitors, which are stored in account [0,1] with the file type of .SIL. SIL stands for save image library, which is a file that stores the monitor code.

If INIT.SYS finds only one SIL, it installs that SIL and prints the message Starting xxxxxx monitor. If INIT.SYS finds more than one SIL, it prompts for the monitor name instead. The name inside the brackets refers to the first monitor name it found in the directory.

Response — Type SYSGEN to start the SYSGEN monitor.

Caution

Do not press RETURN to accept the default response to this question (first monitor SIL in the directory). The update process must run under the SYSGEN monitor. If you press RETURN, INIT.SYS restarts your current monitor, causing the system update to fail later.

```
RSTS V9.x (dev:) INIT V9.x
```

```
dd-mmm-yy  hh:mm AM/PM  
.  
.  
.
```

Explanation — START now starts the SYSGEN monitor. At this time START may also print the memory allocation table. Then START transfers control to the INSTAL.COM command file. INSTAL.COM prints this prompt:

```
Do you want to perform an installation or an update? <installation>
```



Go to Phase 3.

Phase Configure New Monitor and Select Software Updates 3

This phase describes the tasks you must perform to configure your RSTS/E monitor. In this phase you also select the software packages you want to update.

The tasks in this phase are:

- Task 1: Answer Preliminary Questions
- Task 2: Use Information from a Template Monitor
- Task 3: Answer System Program Update Questions
- Task 4: Answer Layered Product Update Questions

These responses have special meaning:

Response	Description
<code>(RET)</code>	Accept the default response
<code>?</code>	Obtain an online explanation of the question
<code>^</code>	Return to the previous question
<code>(CTRL/Z)</code>	Return to the beginning of the dialogue section
<code>(CTRL/C)</code>	Abort the operation and return to the DCL \$ prompt

Task 1: Answer Preliminary Questions

Your next task is to answer the questions asked by the the `INSTAL.COM` command file. The system executes `INSTAL.COM` immediately after it starts your monitor.

Before `INSTAL.COM` asks any questions, it opens a log file named `UPDATE.LOG` in the account from which you are running the update ([1,2] in most cases). `INSTAL.COM` closes this log file at the end of the update. You can then print `UPDATE.LOG` to obtain a record of the update session.

Note

The update procedure does not replace your existing [0,1]`START.COM` and [0,1]`LOGIN.COM` files. If `START.COM` and `LOGIN.COM` already exist on your system, the update procedure copies new versions of the files to account [0,1] with the names `START.09x` and `LOGIN.09x`, where `x` refers to the specific release of RSTS/E.

You may want to examine these files for any new ideas, then delete the files if you do not need them.

Terminal Session



This terminal session lists the preliminary installation questions, and provides some possible responses. In some cases, your response will differ from the response shown in red in the example.

```
Do you want to perform an installation or an update? <installation> UP
```

Explanation — You stopped here in Phase 2. The system asks if you are performing an installation or are updating an existing V9.0 monitor.

Response — Type `UP` because you are updating an existing V9.0 monitor.

```
Please mount the Installation media and enter the name  
and unit number of the device.  
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'  
Installation device:
```

Explanation — This question asks for the location of your Installation media.

Response — Type the device name and unit number of the drive on which your Installation media is mounted.

```
Restoring required _SY0:[0,1] components
```

```
Deleting all global symbols
```

```
Beginning of the RSTS/E Software Update Procedure
```

```
Type '?' for help
```

```
Type '^' to go back to the previous section
```

```
Type CTRL/Z to return to the beginning of the present section
```

```
* Starting dialogue phase *
```

```
Are you ready to proceed? <yes>
```

Explanation — This question asks if you are ready to continue with the installation procedure. If you type YES or press RETURN, you continue the dialogue. If you type NO, INSTAL exits, returning you to the \$ prompt. You can then:

- Start normal timesharing under the current monitor by typing @[0,1]SYSINI.
- Recover a corrupted system disk by issuing the \$RESTORE command.
- Continue the installation procedure by typing PROCEED.

Response — Type YES or press RETURN to continue the installation. Type NO to exit INSTAL.COM.

```
Please enter the name and unit number of the disk to  
which you want to install the software. This disk  
should be physically mounted and write-enabled.
```

```
Target disk? <SY:> :
```

Explanation — This question is for anyone updating a RSTS/E system for another PDP-11. Your response to this question determines the disk where the new RSTS/E monitor and updated system programs will be installed.

If you specify a disk other than the system disk (SY:), physically mount and write-enable the disk before you answer this question. The disk does not need to be initialized at this time, because the next question asks if you want to initialize it.

Response — Type the disk name and unit number of the target disk if you are updating RSTS/E for another PDP-11. You then see the Do you want to initialize the target disk? question.

Type SY or press RETURN to update RSTS/E on your present system disk.

```
Restoring required _SY:[1,2] components
```

```
Assigning system logicals
```

```
** Starting Monitor Section **
```

```
Do you want to update the RSTS/E monitor? <yes>
```

Explanation — This question asks if you want to update the monitor. Answer NO to this question if you want to update only the system programs. You then skip the monitor generation.

If you answer YES or press RETURN, you continue with the dialogue to update a RSTS/E V9.0 monitor.

If you answer NO to this question, go to Task 3.

Response — Type YES or press RETURN to proceed with the RSTS/E monitor generation.



Go to Task 2.

Task 2: Use Information from a Template Monitor

In this task you use a *template monitor* to help configure your new monitor. A template monitor is a previous V9.0 monitor that you use as a model for another monitor.

Terminal Session



This terminal session lists the configuration questions, explains them, and gives you some possible responses (printed in red). After you understand the question, type the response at your console terminal.

If you want to start over at any time while answering the configuration questions, press CTRL/C. Then type @[0,1]INSTAL when you see the DCL \$ prompt. You return to the beginning of Phase 3.

```
Restoring required SYSGEN components
```

```
Use template monitor? <Y>
```

Explanation — You now begin the monitor section of dialogue. This question asks if you want the program to obtain the information it needs from a template monitor. If you answer YES to this question, you need to answer only the remaining questions in this task to complete Phase 3. You can still answer YES to this question, even if you intend to make some changes to your new monitor's configuration. You have the opportunity to make changes later in this task.

Response — Type YES to use an existing monitor as the template. Or, type NO to this question. You then see the configuration questions in Phase 3 of Part I of this guide.

If you answer YES to this question, continue with this task.

If you answer NO to this question, perform Tasks 1 through 6 of Phase 3 in Part I of this guide. Then proceed to Task 3 of this section.

```
Template monitor's name?
```

Explanation — You can use an existing V9.0 monitor as a template. The template monitor can be in any account on any disk that is both physically and logically mounted. If you do not specify the location, the default location is account [0,1] on the system disk. The program looks up the file and reads the necessary information from it. If the file does not exist, the program returns an error message and reprompts you.

Response — Type the name of the installed SIL you want to use as a template monitor.

```
New Monitor name? <RSTS>
```

Explanation — This question asks for the name of your new RSTS/E monitor, which will be stored as a save image library (SIL) in account [0,1] on your system disk. The program performs a lookup to see if the monitor name you specify already exists. If it already exists and it is the currently installed SIL, the program returns an error message and reprompts you.

Response — Type a one- to six-character alphanumeric name for your RSTS/E monitor. The default response is RSTS.

```
A monitor by that name already exists.  
Do you wish to supersede this monitor?
```

```
Supersede existing monitor? <N>
```

Explanation — You see this question only if the monitor name specified already exists and is not the currently installed SIL. If you type NO or press RETURN to accept the default, the program returns to the New monitor name? question. If you type YES, the program supersedes the existing monitor.

Response — Type NO or press RETURN to return to the New monitor name? prompt. Type YES to supersede the existing monitor.

```
Accept defaults? <N>
```

Explanation — This question lets you modify the configuration of your new monitor. If you answer NO, you have the opportunity to make changes at the beginning of each configuration section. If you answer YES, the program selects the entire configuration from the template monitor and asks no configuration questions.

If you type a ?, you see a list of the default configuration you will receive if you answer YES to the question.

Answer YES if you do not need to change the configuration.

Answer NO if you need to make configuration changes. This can occur, for instance, when you perform a monitor update to add support for new hardware.

Response — Type NO or press RETURN if you want to make changes. Type YES if you do not want to make changes.



If you answered YES to the Accept defaults? question, go to Task 3.



If you answered NO to the Accept defaults? question, perform Tasks 2 through 6 of Phase 3 in Part I of this guide. Then proceed to Task 3 of this section.

Task 3: Answer System Program Update Questions

Your next task is to answer the system program update questions. Your responses determine which system programs are updated on your system. DIGITAL recommends that you update all the system programs you selected during system installation. For a complete description of the system programs available with RSTS/E, see Phase 4 in Part I of this guide.

DIGITAL supplies updates to RSTS/E system programs on the Installation media. The programs are grouped into the packages listed in Table 15. See Appendix C for a complete list of system programs contained in each package.

The system updates each package at the location pointed to by its associated logical name. The update occurs in Phase 4.

Note

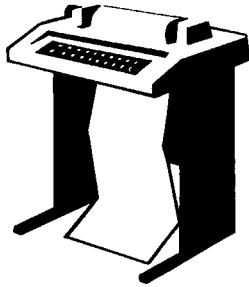
If you have moved a software package from its default location to a disk other than the system disk, you will need to mount the other disk on a free drive at the beginning of Phase 4.

Table 15 lists the logical names for each system program package.

Table 15: System Program Package Logical Names

Package	Logical Name
System Library	SYSLIB\$:
RSX Utilities	LB:
Help	HELP\$:
Error	ERROR\$:
Update	UPDATE\$:
Device Testing	TEST\$:
Print/Batch Services (PBS)	PBS\$:
File Restore	RESTOR\$:
OPSER-based Spooling	OPSER\$:
Unsupported Utility	UNSUPP\$:
Auxiliary Library	AUXLIB\$:
RMS-11	RMS\$:
EDT	EDT\$:
TECO	TECO\$:
SORT/MERGE	SORT\$:
BASIC-PLUS	BASIC\$:

Terminal Session



This terminal session explains the procedures to update system programs.

```
** End of Monitor Section **
```

```
** Starting System Programs Section **
```

```
Do you want to update the System Program packages? <yes>
```

Explanation — You are finished with the monitor update section. You now begin the system programs section.

Response — Type YES or press RETURN to begin the dialogue to update system programs. Type NO if you are only updating a RSTS/E monitor and do not want to update system programs. You then skip this task.

If you answer NO to this question, go to Phase 4.

```
Packages to update: ?
```

Explanation — This question asks for the names of the packages you want to update on your system.

Response — Type a ? to list the packages that are available.

The valid responses are:

DIALOGUE	Switches you to the long form of the System Software Packages dialogue where a more detailed description of each package is provided
ALL	Selects all packages
ALL,NOpkg[,...]	Selects all packages except pkg

Use a comma as a separator, e.g.: RSX,PBS,RMS

Package names:

AUXLIB	Auxiliary Library	RMS	RMS-11
BASIC	Basic-Plus		(includes RSX Utilities)
DAP	RMS DECnet Data Access Package	RSX	RSX Utilities
	(includes RMS-11)	SORT	Sort/Merge
EDT	EDT Editor		(includes RMS-11)
HELP	Help Package	TECO	TECO Editor
OPSER	Opser-based Spooler	TEST	Device Testing
PBS	Print/Batch Services	UNSUPP	Unsupported Utilities
RESTORE	File Restore	UPDATE	Update Package

```
Packages to update:
```

Explanation — After you type a ?, you see the list of available system program packages. Then the system reprompts for the packages to update.

Response — If you know what packages you want to update, type a list of the package names, separated by commas. Remember, if you make a mistake you can type ^ to return to the previous question, or enter CTRL/Z to return to the beginning of the section. Do not specify any package that is not currently installed on your system.

If you want more information before deciding whether to update a package, type DIALOGUE to see the long form of the dialogue.

Type ALL to update all the packages. If you plan to update nearly all of the packages, type:

ALL,NOnnnnnn,NOnnnnnn

where nnnnnn refers to a package you want to exclude.

The following will be installed:

<list of packages>

Proceed? <yes>

Explanation — The system lists the packages it will update on your system and then asks if you want to continue. If you type NO, you return to the Packages to update: prompt.

Response — Type YES or press RETURN to continue the system program update. Type NO if you want to specify a different list of packages to update on your system.

Do you want the I&D versions of tasks? <no> ?

Explanation — The system copies some required files and then asks if you want the I&D versions of tasks. You see this question only if you specified RSX and/or AUXLIB in response to the Packages to update: question.

Instruction and Data (I&D) space is available on the PDP-11/44, 45, 50, 55, 70, 73, 83, and 84. DIGITAL does not recommend that systems with less than 256K words of memory (PDP-11/45, 50, or 55) use I&D space. If your system has more than 256K words of memory (PDP-11/44, 70, 73, 83, or 84), you may want to take advantage of this hardware feature which yields better performance from the following tasks: TKB, MAC, STK, and REORDR.

Note that if you answer YES to this question, you must specify a SWAP MAX of 64K words to accommodate the larger amount of physical memory required by the tasks. Use the INIT.SYS DEFAULT option to change the SWAP MAX. See the Offline Options section for details.

The system uses your response to this question later in the update when it asks whether you want to create a SWAP1.SYS file (see Task 1 of Phase 4). If you answer YES to this question, the system assumes a SWAP MAX of 64K words. Otherwise, the system assumes a SWAP MAX of 32K words.

Response — Type YES to receive the I&D versions of tasks. Type NO or press RETURN to receive the normal versions.

```
Use resident library version of RMS? <yes>
```

```
Use RMS resident libraries in DAP? <yes>
```

```
Use RMS resident libraries in PBS? <yes>
```

```
Use resident library version of EDT? <yes>
```

Explanation — If you choose RMS, DAP, PBS, or EDT, the system asks you to choose either the resident library or overlaid version. In general, the overlaid version requires less memory, but can severely impact performance. The resident library version requires less disk space, but requires more memory. Choose the resident library versions if your system has sufficient memory and you have more than one user accessing a program simultaneously.

Response — Type YES or press RETURN to use the resident library version. Type NO to use the overlaid version.

```
During the build phase there will be further questions  
for BASIC-PLUS and SORT/MERGE
```

Explanation — You see these messages if you specified the BASIC-PLUS and/or SORT/MERGE packages. You answer the BASIC-PLUS and SORT/MERGE questions in Phase 4.

```
** End of System Programs Section **
```

```
** Starting Layered Products Section **
```

```
Do you want to transfer the layered product update components  
from the Installation Kit? <yes>
```


Explanation — You are finished with the System Programs Section. This question asks if you want to transfer any layered product updates from the Installation kit while it is still mounted. Answer YES to this question if you plan to update any layered products on your system. If you answer YES, you continue the Layered Products Section.

Response — Type YES or press RETURN to continue the Layered Products Section. Type NO to skip the section.



If you answered YES to the previous question, go to Task 4.



If you answered NO to the previous question, go to Phase 4.

Task 4: Answer Layered Product Update Questions

You perform this task if you plan to update layered products on your RSTS/E system. A layered product, also called optional software, is software that you must purchase from DIGITAL. Examples of layered products are BASIC-PLUS-2, COBOL-81, and DIBOL.

In this task, you specify which layered products you plan to update on your system, so that the installation procedure can transfer updates for those products from the Installation kit.

Note

The RSTS/E Update Procedure does not perform a layered product installation. See the individual layered product installation guide for the procedures to perform the layered product update.

Terminal Session



This terminal session explains the layered product update questions and provides some possible responses.

```
** Starting Layered Products Section **
```

```
Do you want to transfer the layered product update components  
from the Installation Kit? <yes>
```

Explanation — You see this question at the end of Task 1.

Response — Type YES or press RETURN to begin the dialogue to transfer layered products updates. Type NO to skip this section.

```
Product updates to transfer:
```

Explanation — This question asks for the names of the layered product updates you want to transfer to your system.

Response — Type a ? to list the layered product packages that are available with RSTS/E.

Type a list of the product names, separated by commas. Remember, if you make a mistake you can type ^ to return to the previous question, or enter CTRL/Z to return to the beginning of the section.

Type ALL to transfer all the updates. If you plan to transfer nearly all of the product updates, type:

ALL,NOOnnnnnn,NOOnnnnnn

where nnnnnn refers to a product update you want to exclude.

The following will be transferred:

<list of products>

Proceed? <yes>

Explanation — The system lists the product updates it will transfer to your system and then asks if you want to continue. If you type NO, you return to the Product updates to transfer: prompt.

Response — Type YES or press RETURN to continue the layered product update transfer. Type NO if you want to specify a different list of layered product updates to transfer to your system.

Note: Any files currently in the PATCH ACCOUNT will be deleted

Since some layered products may require the Update Package (from the System Programs section), it will be included. To install a layered product please refer to the individual layered product installation guide.

Patch account <PATCH\$:> :

Explanation — Now you must specify the account in which you want the layered product update information placed. The default account is PATCH\$:. Note that the update procedure deletes any existing files in the current PATCH account before it transfers the updates. If you have files in the PATCH account that you want to keep, specify a different account for PATCH\$:.

After you complete the RSTS/E update, you must follow the update procedures outlined in the specific layered product installation guide to update a layered product. Some of the layered products use the BUILD program to perform the update. See Appendix E for a description of BUILD.

Response — Press RETURN to accept the default patch account, PATCH\$. Or, specify a different account.

** End of Layered Products Section **

Explanation — You are finished with Phase 3.



Go to Phase 4.

Phase 4 Generate New System

You are now ready to generate your updated RSTS/E system. In this phase, you create the new RSTS/E monitor and update the system programs you specified in Phase 3. See the appropriate installation guides for instructions on updating optional software such as COBOL-81 or DIBOL.

The tasks you perform in this phase are:

- Task 1: Create RSTS/E Monitor
- Task 2: Update System Programs and Transfer Layered Product Updates

Task 1: Create RSTS/E Monitor

The system now generates your new monitor according to the instructions you gave it in Phase 3.

Terminal Session



This terminal session explains the procedures that generate the RSTS/E monitor. The procedures will differ depending on your response to certain configuration questions in Phase 3.

```
You must now set the Password for account _SY:[1,2]
New Password:
New Password again, for verification:
Password set for account _SY:[1,2]
```

Explanation — This question asks you to specify a password for the system library account, [1,2]. This is a precautionary measure to provide you with an account that you can log in to in case of unforeseen problems. DIGITAL does not recommend that you log in to and use account [1,2] on a regular basis, because of the importance of the files that reside in the account.

Response — Type a password from 6 to 14 characters. You can specify any ASCII character except the ? character. Retype the password when prompted.

```
* End of dialogue Phase *
```

```
* Starting build Phase *
```

```
Are you ready to proceed? <yes>
```

Explanation — This question asks if you are ready to generate your RSTS/E system. You are not ready to proceed if you need to mount a disk other than the system disk on which any of the software packages targeted for update reside. Before you proceed you must:

1. Physically mount the nonsystem disk
2. Issue the MOUNT command to logically mount the disk
3. Assign the appropriate system logicals

If you are ready to proceed, type YES or press RETURN. If you are not ready, type NO. You then see the \$ prompt. When you are ready to proceed, type PROCEED.

Response — Type YES or press RETURN to proceed.

```
Do you want _SY0:SWAP1.SYS created? <yes>
```

```
Creating _SY0:[0,1]SWAP1.SYS at xxxx blocks
```

Explanation — The command procedure asks if you want to create a SWAP1.SYS file at a size large enough to hold all the jobs on your system. It creates SWAP1.SYS as close to the center of the system disk as possible. The system determines the size of SWAP1.SYS according to this formula:

$(\text{JOB MAX}-1) * \text{SWAP MAX} * 4$

where:

JOB MAX-1 is the number of jobs you specified in Task 6 of Phase 3 in Part I, minus 1.

SWAP MAX is 32K words if you did not see or answered NO to the Do you want the I&D versions of tasks? question in Task 3 of Phase 3.

is 64K words if you answered YES to the Do you want the I&D versions of tasks? question in Task 3 of Phase 3.

If your system already has a SWAP1.SYS file and it is protected, the command procedure prints the error:

```
SWAP1.SYS already exists and is protected, can not re-create
```

If you see this message, you also see a message later in the installation that informs you how much swap file space you need on your updated system. If you need to recreate SWAP1.SYS, use the INIT.SYS REFRESH option before you start timesharing. See the Offline Options section for more information on REFRESH.

Response — Type YES or press RETURN to create SWAP1.SYS. Type NO to skip the creation of SWAP1.SYS. Type a ? if you want to know the size of SWAP1.SYS before you answer the question.

```
Creating _SY0:[0,1]BUFF.SYS at xx blocks
```

Explanation — You see this message only if you have TU56 DECtapes on your system and do not already have a BUFF.SYS file. You must have a BUFF.SYS file for your RSTS/E monitor to support one or more TU56 DECtapes.

The system automatically creates BUFF.SYS as close to the center of the system disk as possible. It determines the size of BUFF.SYS (shown as xx blocks) according to this formula:

4 blocks for each TU56 DECtape

Please mount the DECnet/E Installation media and enter the name and unit number of the device.

Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM' or 'DL'
DECnet/E installation device <dev:> :

Explanation — You see this question only if your template monitor supports DECnet/E or you answered YES to the DECnet network support? question in Phase 3 of Part I. Mount the DECnet/E Installation media on a free drive when prompted. You may have to dismount the Installation media to make room for the DECnet/E kit, if you do not have a free drive available. The system prompts you to remount the Installation media later.

Response — After you have mounted the DECnet/E Installation media, type the device name and unit number of the drive on which it is mounted. Or, press RETURN to accept the default <dev:>.

```
Please ensure that the Installation media is mounted
on dev: and Press RETURN when ready:
```

Explanation — After the system has transferred the DECnet/E files, it prompts you to remount the Installation tape or disk.

Response — Dismount the DECnet/E media and mount the Installation tape or disk on the drive indicated by dev:. Make sure the tape or disk is on line. Then press RETURN when you are ready to proceed.

```
Creating RSTS/E monitor
```

Explanation — The command procedure now begins the RSTS/E monitor generation. The entire process should take 30 to 45 minutes, depending on the size of your monitor.

If your template monitor supports RJ2780 or you answered YES to the RJ2780 support? question in Phase 3 of Part I, the program prompts you to mount the RJ2780 Software Kit at this time. Mount the RJ2780 kit when you see this prompt:

```
Please mount the RJ2780 Installation kit and enter the name
and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM', 'DL', or 'SY'
```

```
Installation device <dev:> :
```

You may have to dismount the Installation media to make room for the RJ2780 kit, if you do not have a free drive available. The system prompts you to remount the Installation media later. Remount the installation media on the indicated drive (dev: in the example) when you see this prompt:

```
Please ensure that the Installation media is mounted
on dev: and Press RETURN when ready:
```

```
%Small buffers lowered by xxx buffers
This will leave you with yyy buffers
```

Explanation — The command procedure checks whether the number of small buffers you specified in Task 6 of Phase 3 in Part I will fit on your system. If the number you specified is too high, the command procedure attempts to decrease the number of buffers so that the monitor fits on your system.

If the number of small buffers you specified in Task 6 of Phase 3 is much too high for the maximum number allowed for your system, you see the message:

```
?LINK-F-Address space exceeded
```

```
Beginning of RSTS/E system generation
```

In general this indicates that the system you configured is too big. Rather than make such a radical adjustment to your monitor by significantly decreasing the small buffers, the command procedure returns to the configuration questions in Phase 3 of Part I. If you see this message, return to Phase 3 in Part I of this guide and answer the configuration questions. You may want to decrease the size of your system by changing the answers to some of the questions (for example, fewer devices, terminals, or pseudo keyboards). Also, specify a much smaller number to the Small buffers? question in Task 6. In general, 600 is a good response to the Small buffers? question.

See the BUFFERS suboption of DEFAULT in the Offline Options part of this guide for more information on small buffers.

```
This monitor has a valid buffer count
```

Explanation — This message indicates that the new monitor is an acceptable size for your system.

Next the command procedure prints a table that shows how many general and FIP small buffers you currently have. In addition, the table tells you how many general and FIP small buffers you can add if you have data space and how many FIP small buffers you can add if you do not have data space.

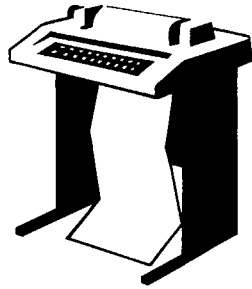


Go to Task 2.

Task 2: Update System Programs and Transfer Layered Product Updates

The installation procedure now updates the system programs and layered products according to the instructions you gave in Phase 3. The procedure can take 10 to 15 minutes, depending on the size of the update. If the Installation media contains multiple volumes, the program prompts you to change media at the appropriate time.

Terminal Session



This terminal session explains the procedures that update the system programs.

```
Restoring the xxxxxx Package from the Installation Kit
```

```
There are no updates for the xxxxxx Package
```

Explanation — The system now updates the system programs. As the system updates each system program package, it prints one of the above messages. In both messages, xxxxxx is the name of the specific software package.

```
Restoring the xxxxxx update components from the Installation Kit
```

Explanation — After the system completes the system program file transfers, it restores the layered product updates you specified in Phase 3. As the system transfers each layered product update, it prints the above message, where xxxxxx is the name of the layered product.

```
Updating software Packages
```

```
Beginning of RSTS/E Basic-Plus generation
```

```
BASIC-PLUS RTS name? <BASIC>
```

Explanation — You see this question if you are updating BASIC-PLUS. You must now answer the BASIC-PLUS questions. See Task 5A of Phase 5 in Part I for a description of the dialogue. Otherwise, continue with this task.

```
Beginning SORT/MERGE installation
```

Explanation — You see this question if you are updating SORT/MERGE. You must now answer the SORT/MERGE questions. See Task 5B of Phase 5 in Part I for a description of the dialogue. Otherwise, continue with this task.

```
To install/update layered products, please see the individual layered  
Product installation guides.
```

Explanation — You see this message only if you transferred layered product updates to your system (see Task 4 of Phase 3).

See the installation instructions that came with each layered product for a complete description of the installation procedures.

```
* End of build Phase *  
  
The RSTS/E software update procedure is complete  
  
Deleting all global symbols  
  
Deassigning system logicals  
  
dd-mm-yy  hh:mm AM/PM  
  
System tape label default set to DOS  
  
SY:[P,Pn]UPDATE.LOG is a log file of this session  
  
$
```

Explanation — You have completed the update. The command procedure prints informational messages and reminds you that the UPDATE.LOG file is a record of the installation.



Go to Phase 5.

Phase 5 Start New Monitor

This phase describes the tasks you must perform to start your new RSTS/E monitor.

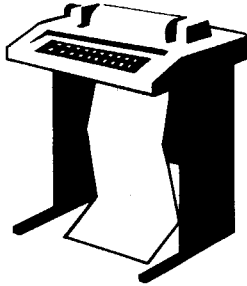
The tasks in this phase are:

- Task 1: Shut Down SYSGEN Monitor (SHUTUP)
- Task 2: Start New RSTS/E Monitor (START)

Task 1: Shut Down SYSGEN Monitor (SHUTUP)

Now that you have built an updated RSTS/E monitor, you no longer need the SYSGEN monitor. To shut down your monitor, run the SHUTUP program.

Terminal Session



This terminal explains how to use SHUTUP to shut down your SYSGEN monitor.

```
$ RUN $SHUTUP
```

Explanation — You see the DCL \$ prompt on your screen. You can now shut down the SYSGEN monitor.

Response — Type RUN \$SHUTUP to shut down the monitor.

```
SHUTUP V9.x RSTS V9.x <SYSGEN>
```

```
12:54 PM 31-May-85 ***** Set-up Dialogue Phase *****
```

```
Type '^' to any query to backup one question
```

```
Allow Print & Batch entries to complete (YES/NO) <Yes>?
```

Explanation — SHUTUP prints a header and some preliminary information. SHUTUP then asks you whether to allow print and batch entries to complete.

Response — Type YES or press RETURN to allow the entries to complete. Type NO to shut down the print and batch queues immediately.

```
Minutes until system shutdown (0-99) <5>?
```

Explanation — SHUTUP asks you to type the minutes to wait before the RSTS/E monitor shuts down. This question is useful for giving system users fair warning when shutting down the system.

Response — Type a number from 0 to 99. Or, press RETURN to accept the default of 5 minutes.

```
12:55 PM 31-May-85 ***** Warning Message Phase *****
Further LOGINs are now disabled

12:55 PM 31-May-85 ***** Initial Job Killing Phase *****

12:55 PM 31-May-85 ***** Print/Batch Shutdown Phase *****
Print/Batch Services shutdown complete at 12:55 PM.

12:55 PM 31-May-85 ***** ' EVTLOG ' Shutdown Phase *****

12:55 PM 31-May-85 ***** ' ERRCPY ' Shutdown Phase *****

12:55 PM 31-May-85 ***** Remove RTS/RES LIB Phase *****

12:55 PM 31-May-85 ***** SWAP File Removal Phase *****

12:55 PM 31-May-85 ***** Disk DISMOUNT Phase *****

12:55 PM 31-May-85 ***** Final Shutdown Phase *****

RSTS V9.x <SYSGEN> (dev:) INIT V9.x

dd-mmm-yy - hh:mm AM/PM

Start timesharing <Yes>?
```

Explanation — SHUTUP prints several messages before shutting down your system. It then returns to the Start timesharing? question. See the *RSTS/E System Manager's Guide* for more information on SHUTUP.



Go to Task 2.

Task 2: Start New RSTS/E Monitor (START)

In Task 1 you ran the SHUTUP program to shut down the SYSGEN monitor. Now you need to start your updated RSTS/E monitor. You must first decide whether to perform any of these additional preparatory tasks:

- Change monitor defaults (INIT.SYS DEFAULT option)
- Save system disk onto another disk or tape (INIT.SYS SAVRES option)

Change Monitor Defaults (DEFAULT Option)

When you start your new monitor, it will receive the standard monitor defaults.

Table 16 shows the defaults that INIT.SYS selects.

Table 16: INIT.SYS Selected Defaults

Default	Current Setting
SWAP MAX	32K words
Primary run-time system	RSX
Swap file	SWAP.SYS
Error message file	ERR.ERR
Crash dump file	CRASH.SYS, if enough space is present
Extended buffer pool memory (XBUF)	15% of USER memory is allocated to XBUF, if the total amount of system memory exceeds 128K words. Otherwise, 10% of USER memory is allocated to XBUF. USER memory is memory that is not allocated to any other entity, such as the monitor or run-time system. The minimum size of XBUF is 2K words. The maximum size is 496K words.
Small buffer pool memory	The maximum allowed for your system, over and above the minimum number you specified during system installation (see Part I, Phase 3, Task 6): 11K words for PDP-11s with I&D space; 3K words for PDP-11s without I&D space.
System clock	KW11-L Line Time Clock

If you do not plan to change any of the defaults selected by INIT.SYS, then you do not need to use the DEFAULT option before you start timesharing under your RSTS/E monitor. See the Offline Options section of this guide for a complete description of DEFAULT.

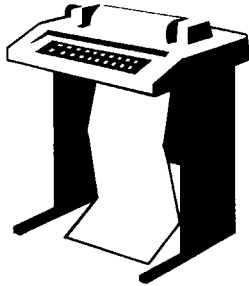
Save System Disk Onto Another Disk or Tape (SAVRES Option)

You may want to create a backup copy of your system disk at this time. If so, use the INIT.SYS SAVRES option to copy your system disk before you start your RSTS/E monitor. See the Offline Options section of this guide for a description of SAVRES.

As an alternative to using the offline SAVRES option, you can later use the online V9.0 BACKUP utility to copy your system disk. See the *RSTS/E System Manager's Guide* for more information.

If you need to perform additional preparatory tasks, go to the Offline Options section of this guide. Then continue with this task.

Terminal Session



To start your RSTS/E monitor, you must answer the START questions. This terminal session lists the questions, explains them, and gives you some possible responses. After you understand the question, type the response at your console terminal.

```
Start timesharing? <Yes> START <monitor name>
```

Explanation — You see this question at the end of Phase 4. This question asks if you are ready to start timesharing. If you answer YES to this question, INIT.SYS restarts timesharing under the currently installed monitor.

If you answer NO to this question, INIT.SYS prints its Option: prompt. You can then use the INIT.SYS offline options to perform additional preparatory tasks. Finally, when you are ready to start your RSTS/E monitor, use the INIT.SYS START option.

Response — Type START <monitor name>, where <monitor name> is the name of your new RSTS/E monitor.

If you do not specify a monitor name, START starts the monitor that was used in the previous timesharing session.

```
Memory allocation table:
```

```
0K: 00000000 - 00413777 ( 67K) : EXEC
67K: 00414000 - 03367777 ( 379K) : USER
446K: 03370000 - 03777777 ( 66K) : XBUF
512K: 04000000 - End           : NXM
```

Explanation — START prints the current memory allocation table. The sample memory allocation table is from the example installation in Part I. Then START checks that the SWAP.SYS file exists in account [0,1] on the system disk, is large enough to hold one job at the current SWAP MAX, and is contiguous. If the file does not exist, START attempts to create SWAP.SYS at the required size. If the file exists but is not contiguous or large enough, START deletes the current SWAP.SYS file and attempts to create a new SWAP.SYS file that is both contiguous and large enough (SWAP MAX * 4). If START cannot find enough free contiguous disk space to create a minimum SWAP.SYS file, it prints the following error message:

```
?Not enough contiguous disk space to create minimum SWAP.SYS file
```

START then attempts to create a SWAP.SYS file that is smaller than the one you specified yet still meets the minimum requirements. This may take up to one minute. If START finds it can create a SWAP.SYS file, it prints these messages:

```
SWAP.SYS can be created if SWAP MAX is reduced to xxK  
New SWAP MAX <xxK>?
```

Press RETURN to accept the default value, indicated by xx in the example. Or, enter CTRL/C to return to the Option: prompt. You can then use the FILE suboption of REFRESH to create more disk space.

If START cannot find enough contiguous disk space to create a minimum SWAP.SYS file, it prints these messages:

```
You must free some disk space to start timesharing.  
Option:
```

Use the FILE suboption of REFRESH to create more contiguous disk space.

```
Re-creating CRASH.SYS file with minimum size of xxx blocks
```

Explanation — START now checks that the CRASH.SYS file exists in account [0,1] on the system disk, is large enough for the RSTS/E monitor and extended buffer pool allocation, and is contiguous. If the file does not exist, START attempts to create CRASH.SYS at the required size. If the file exists but is not contiguous or large enough, START deletes the current CRASH.SYS file and attempts to create a new CRASH.SYS file that is both contiguous and large enough. If START is successful it prints the previous message. If START is unsuccessful, it prints the following error messages:

```
?Not enough contiguous disk space to create minimum CRASH.SYS file  
Crash dump automatically disabled
```

When a crash occurs, the RSTS/E monitor dumps the contents of the read/write area of monitor memory into CRASH.SYS. Because the crash dump facility preserves the state of the system at the time of the crash, CRASH.SYS contains important diagnostic information. For these reasons, DIGITAL recommends that you always have crash dump enabled during timesharing.

Therefore, if you see the error message Crash dump automatically disabled, follow these steps to enable crash dump:

1. After you begin timesharing, delete unnecessary files to create more contiguous disk space. Or, move some files to a nonsystem disk.
2. Shut down the RSTS/E monitor using the SHUTUP program.

3. Use the START option to start timesharing. If you do not see the Crash dump disabled message, you know that INIT.SYS was able to create the CRASH.SYS file.

```
*** From [1,2] on KBO: at hh:mm AM/PM dd-mmm-yy  
** RSTS/E is on the air...
```

(RET)

```
RSTS V9.x dd-mmm-yy hh:mm AM/PM  
User:
```

Explanation — You are finished with the update. You can now press RETURN to log in to the system.

Remember, if you are updating layered products, see the individual layered product documentation for instructions on completing the installation.

Phase 6 Optional Tasks

This phase describes an optional task you may want to perform to tune your RSTS/E system to your needs.

The task in this phase is:

- Task 1: Perform a Selective Update

Task 1: Perform a Selective Update

You can use the UPDATE.COM command file to perform a selective RSTS/E update, without disturbing your existing system. UPDATE.COM resides in account [0,1]. You can use it to:

- Generate an updated monitor
- Update one or more system program packages
- Update layered products (integrated layered products only)
- Copy layered product updates to your system
- Perform a full system update

Note

You cannot perform a system update on a pre-V9.0 system. You must first perform a V9.0 installation.

In order for the update to succeed, you must be logged in to an account with the following privileges: MOUNT, INSTAL, TUNE, WREAD, WWRITE, and WACNT. In addition, if you have DATES privilege, the creation date of the new files will be the date the files were placed on the Installation kit. If you do not have DATES privilege, the file creation date will be the current date.

To access UPDATE.COM, use the following command format:

@[0,1]UPDATE function [package,...]

where:

@[0,1]UPDATE	invokes the UPDATE.COM command procedure.
function	specifies the operation to perform. Legal functions are: ALL (the default), MONITOR, SYSTEM_PROGRAMS, and LAYERED_PRODUCTS.
[package,...]	specifies the software package(s) to install when performing a SYSTEM_PROGRAMS, LAYERED_PRODUCTS, or COPYUP operation (see Table 17). See Phase 4 in Part I for a complete list of RSTS/E system program packages and layered products.

UPDATE.COM Entry Points

When you use UPDATE.COM to perform an update, you enter the update process at different points depending on the command format. Table 17 lists the UPDATE.COM commands and the resulting entry points into the update process. See the appropriate Phase and Task in Part IV for details on the actual installation procedures.

When you use UPDATE.COM to perform an online installation, you first see this question:

```
Please mount the Installation media and enter the name
and unit number of the device.
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM', 'DL' or 'SY'
(a response of SY allows monitor only)
```

```
Installation device:
```

This question prompts you to mount the Installation tape or disk and specify its location. See the example later in this section if you need help answering this question.

Table 17 lists the UPDATE.COM commands and the resulting entry points into the update process.

Table 17: UPDATE.COM Entry Points

Command	Update Entry Point	Comment
@[0,1]UPDATE	Phase 3, Task 1	Performs full update (same as UPDATE ALL).
@[0,1]UPDATE ALL	Phase 3, Task 1	Performs full update (the default).
@[0,1]UPDATE SYSTEM _ PROGRAMS	Phase 3, Task 3	Begins system program update questions.
@[0,1]UPDATE SYSTEM _ PROGRAMS [pkg,...]	Phase 4, Task 2	Updates specified package.
@[0,1]UPDATE MONITOR	Phase 3, Task 1	Begins monitor update section. Skips system program and layered product sections.
@[0,1]UPDATE LAYERED _ PRODUCTS	—	This function is available only to integrated layered products. Use this function only if you are directed to do so by a specific layered product installation guide.
@[0,1]UPDATE LAYERED _ PRODUCTS [pkg,...]	—	This function is available only to integrated layered products. Use this function only if you are directed to do so by a specific layered product installation guide.
@[0,1]COPYUP	Phase 3, Task 4	Begins dialogue to transfer layered product updates from the Installation kit.
@ [0,1]COPYUP [pkg,...]	Phase 4, Task 2	Transfers specific layered product updates from the Installation kit.

Selective Update Example

This example uses UPDATE.COM to update the File Restore system program package. Before you run UPDATE.COM, you must mount the Installation media. Mount the tape or disk on a free drive. Follow the tape or disk mount instructions in Task 1 of Phase 2.

```
# @[0,1]UPDATE SYSTEM_PROGRAMS RESTOR
```

```
  * Starting dialogue phase *
```

```
Please mount the RSTS/E Installation media and enter the name  
and unit number of the device.
```

```
Valid device types are: 'MM', 'MS', 'MT', 'MU', 'DM', 'DL' or 'SY'  
(a response of SY allows monitor only)
```

```
Installation device: MS0:
```

```
Please enter the name and unit number of the disk to  
which you want to update the software. This disk  
should be physically mounted and write-enabled.
```

```
Target disk? <SY:> : (RET)
```

```
Assigning system logicals
```

```
The following will be updated:
```

```
  RESTORE
```

```
Proceed? <yes> (RET)
```

```
  * End of dialogue phase *
```

```
  * Starting build phase *
```

```
31-May-85 01:56 PM
```

```
Restoring the File Restore package from the Installation Kit
```

```
31-May-85 01:58 PM
```

```
Updating software packages
```

```
  * End of build phase *
```

```
Deleting all global symbols
```

(continued on next page)

Deassigning system logicals

31-May-85 01:59 PM

System tape label default set to DOS

SY:[1,2]UPDATE.LOG is a log file of this session

\$

You have successfully updated the File Restore package. You can now type DIR
RESTOR\$: to list the files in the directory.

Offline Options

Part V describes the offline INIT.SYS options you may need to use in the management and maintenance of your RSTS/E system.

Table 18 lists the offline INIT.SYS options and suboptions.

Table 18: INIT.SYS Options

Option	Suboption	Function
BOOT	None	Bootstrap magnetic tape and disk devices.
COPY	None	Copy installation-related files from a distribution medium to the system disk, and bootstrap the system disk.
DATE	None	Reset the current date and time; establish default date and time format.
DEFAULT	Memory Table Suboptions: LIST PARITY LOCK UNLOCK RTS RESET XBUF BUFFERS VIRTUAL	Change RSTS/E monitor defaults or allocation of memory entities.

(continued on next page)

Table 18: INIT.SYS Options (Cont.)

Option	Suboption	Function
DSKINT	None	Initialize disks.
HARDWR	LIST	Perform hardware-related tasks.
	DISABLE	
	ENABLE	
	CSR	
	VECTOR	
	RESET	
	DM	
	HERTZ	
	SWITCH	
IDENT	None	Print INIT.SYS creation date plus list of patches.
PATCH	None	Alter RSTS/E system code to correct program errors.
REFRESH	LIST	Create and list system files; add bad blocks to the bad block file.
	FILE	
	BADS	
SAVRES	SAVE	Back up and reconstruct RSTS/E disks; make an image copy of a RSTS/E disk.
	RESTORE	
	IMAGE	
	IDENTIFY	
START	None	Start a RSTS/E monitor.

The offline options are arranged in alphabetical order, and each is presented in a separate section. In most cases, the common error messages associated with an option appear at the end of the option description. If your error message does not appear there, see Appendix A.

In general, these responses have special meaning when using INIT.SYS:

Response	Description
RET	Accept the default response
?	Obtain an online explanation of the question
CTRL/C	Abort the operation and return to the Option: prompt
Option: RET	Invoke the INIT.SYS START option

BOOT — Bootstrap Devices

The BOOT option bootstraps magnetic tape and disk devices. Use the BOOT option if:

- You need to bootstrap another disk or tape.
- You need to reload INIT.SYS after you have patched it on disk.

BOOT Dialogue

Option: BOOT

Response — Type BOOT or BO to the Option: prompt.

Boot device:
Boot unit:

Explanation — BOOT asks for the device designator and unit number of the tape or disk you want to boot.

Response — Type a ? in response to the Boot device: prompt to get a list of bootable devices. Or, press RETURN to bootstrap the system disk, in which case BOOT automatically determines the system device and unit number.

RSTS V9.0 (dev) INIT V9.0-14

dd-mmm-yy - hh:mm AM/PM

Start timesharing? <Yes>

Explanation — After booting the device, INIT.SYS displays its banner, the date, and the time. INIT.SYS prints the device name within parenthesis in the banner. If you booted a tape device, INIT.SYS prompts you for the date and time instead.

INIT.SYS then returns to the Start timesharing? prompt.

Table 19 lists the BOOT error messages. If your error message does not appear there, see Appendix A.

Table 19: BOOT Error Messages

Message and Meaning
NOT A VALID BOOT DEVICE The device you named is not a valid bootable device. Type a question mark (?) for a list of devices that you can bootstrap.
SORRY, BUT THAT DEVICE DOESN'T EXIST The device name you typed is valid, but the device does not exist on your PDP-11.

COPY — Copy System Installation-Related Files to Disk

The COPY option copies files related to system installation from a booted disk or tape to a disk. COPY transfers all files with the following file types:

Type	Meaning
.SYS	Usually the INIT.SYS file, which contains options you need to generate a RSTS/E monitor.
.SIL	A file that stores monitor code.
.RTS	A file that stores a run-time system.
.ERR	A file that stores the system error messages.
.TSK	Usually the BACKUP.TSK file, which contains the programs to back up and restore files.
.COM	Usually the SYSINI.COM file, which stores the system start-up file.

COPY Dialogue

Option: COPY

Response — Type COPY or CO to the Option: prompt.

dd-mmm-yy - hh:mm AM/PM

To which disk?

Explanation — COPY prints the date and time, and then asks for the device designator of the target disk.

Response — Possible responses are: DL, DM, DP, DB, DR, or DU.

Physical unit number?

Explanation — This question asks for the unit number of the drive on which your disk is mounted.

Response — Type the unit number of the drive on which the disk is mounted.

Enabling only console, disks, and tapes.

RSTS V9.0 (dev) INIT V9.0-14

Start timesharing? <Yes>

Explanation — After you type the unit number, COPY transfers all the files to the destination disk. COPY then reboots the destination disk, which prints the Start timesharing? prompt.

If you already have a file with the same name on your destination disk, you see the message: FILE filnam.type EXISTS: SUPERSEDE?. Type Y to replace the file with

COPY

the new file of the same name; type N to retain the file on the disk; press CTRL/C to abort COPY and return to the Option: prompt.

Table 20 lists the COPY error messages. If your error message does not appear there, see Appendix A.

Table 20: COPY Error Messages

Message and Meaning
CANNOT COPY TO THE SYSTEM DISK You specified the RSTS/E Installation media, which is invalid as an output disk for the COPY option. Specify another disk.
ILLEGAL DISK NAME You typed an invalid disk name. All DF, DK, and DS disks are illegal.
INVALID UNIT NUMBER The disk unit number you specified does not exist on this system.
INVALID RESPONSE The only valid responses to the FILE FILNAM.TYP EXISTS: prompt are Y, N, or CTRL/C, and you typed something else.
SORRY, BUT THAT DISK DOESN'T EXIST The disk type you specified does not exist on this system.

DATE — Set the Date and Time Format

The DATE option sets the date and time. Use the DATE option if:

- You need to reset or display the date.
- You need to reset or display the time.

DATE Dialogue

Option: DATE

Response — Type DATE or DA to the Option: prompt.

Current date <DD-MMM-YY>?

Current time <HH:MM AM/PM>?

Explanation — DATE asks for the new date and time. It prints the default format in brackets.

Response — Type the date and time. You can enter the date in either of these formats:

- DD-MMM-YY (day, month, year)
- YY.MM.DD (year, month, day)

You can enter the time in either of these formats:

- HH:MM AM/PM (hour, minute, AM or PM)
- HH:MM (24 hour clock)

Option:

Explanation — INIT.SYS returns to the Option: prompt.

DEFAULT — Change RSTS/E Monitor Defaults

You can set the following defaults for your RSTS/E monitor with the DEFAULT option of INIT.SYS:

- **SWAP MAX** — The maximum storage space a job can occupy in memory and in the swap files. For I&D CPUs only, you can accept the default choice of 32K or choose a different size.
- **Memory for the extended buffer pool** — INIT.SYS automatically allocates memory to the extended buffer pool. You can change the amount by adjusting the memory allocation table with the XBUF suboption.
- **Memory for the small buffer pool** — INIT.SYS automatically allocates as much memory as it can to the small buffer pool, depending on the monitor size. You can change the amount by adjusting the memory allocation table with the BUFFERS suboption.
- **Memory for the virtual disk** — You allocate space by adjusting the memory allocation table with the VIRTUAL suboption.
- **System clock** — Choose the KW11-L line time clock or the KW11-P clock as the system clock.

DEFAULT Dialogue

Option: DEFAULT

Response — Type DEFAULT or DE to the INIT.SYS Option: prompt.

SWAP max <xxK>?

Explanation — DEFAULT asks if you want to change the SWAP MAX.

The RSTS/E monitor constantly moves jobs from memory to disk. For a job to move to disk, a special file must exist to store the job. This file is called a *swap file*. The **SWAP MAX** or swap maximum is the maximum amount of disk storage space that a job can occupy in a swap file when the job is swapped from memory to disk during timesharing. The size of your SWAP MAX depends on the run-time systems you plan to use, and whether you plan to write programs using Instruction and Data (I&D) space.

The current setting is shown within angle brackets as the default answer to this question.

Response — Type a number from 16K to 64K. To keep the value printed by DEFAULT, press RETURN. Note that a SWAP MAX in the range 16K to 32K will disable most DIGITAL system programs.

DEFAULT

Any memory allocation changes?

Table suboption? LIST

Memory allocation table:

```
0K: 00000000 - 00323777 ( 53K) : EXEC
53K: 00324000 - 03363777 ( 392K) : USER
445K: 03364000 - 03777777 ( 67K) : XBUF
512K: 04000000 - End           : NXM
```

Explanation — DEFAULT now prints the memory allocation table prompt. At this point you may want to adjust the memory allocation table. If so, answer YES to this question, then go to the DEFAULT suboption sections that follow. Note that DEFAULT automatically allocates memory to the Extended Buffer Pool and Small Buffer Pool, based on the size and configuration of your system. Use the XBUF suboption to change the amount of memory allocated to the Extended Buffer Pool, and the BUFFERS suboption to change size of the Small Buffer Pool.

Response — Type YES if you want to use one of the memory table suboptions to list or change the memory allocation table. Type NO to accept the current table.

If you want to list the current table, type YES to this question and then type LIST at the Table suboption? prompt. Press RETURN at the Table suboption? prompt to continue with the DEFAULT dialogue.

Preferred clock <L>?

Explanation — Your hardware configuration can include one or both of these system clocks: the KW11-L line time clock or the KW11-P programmable real-time clock. The *KW11-L line time clock* divides system time into intervals based on the AC line frequency of the power source used to run your PDP-11 computer system. AC line frequency can be either 50 Hz (the standard in many European countries) or 60 Hz (the standard in the United States).

The *KW11-P programmable real-time clock* 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. This clock is useful in areas where fluctuations in AC line frequency would adversely affect system timing.

Response — Press RETURN to accept the default. If you have both clocks and the default is not the clock you want, type L to use the KW11-L line time clock, or, type

P to use the KW11-P programmable real-time clock. If you type L, DEFAULT goes to the Option: prompt.

Interrupt frequency?

Explanation — This question appears only if you chose the KW11-P programmable real-time clock. It asks for the frequency (AC line frequency or the crystal oscillator) you will use for the time base.

Response — Type LINE to use the AC line frequency, unless you live in an area where the line frequency is not accurately maintained by the power supplier (for example, if diesel generators supply the power). In many areas, the AC line frequency is more accurate than the crystal oscillator.

Or, type a number (a multiple of 50 ranging from 50 to 1000 interrupts/second) to use the KW11-P's crystal oscillator for the time base.

Option:

Explanation — After you specify defaults for your RSTS/E monitor, DEFAULT returns to the Option: prompt.

Table 21 lists the DEFAULT error messages. If your error message does not appear there, see Appendix A.

DEFAULT

Table 21: DEFAULT and Memory Allocation Table Error Messages

Message and Meaning
EXTENDED BUFFER SPACE NOT IN A VALID RANGE The extended buffer space (XBUF) must fit entirely within the specified range. The legal ranges for locating XBUF are between 16K and 512K (words), 528K and 1024K, 1040K and 1536K, and 1542K and 2048K.
FILE NOT CONTIGUOUS The file you specified is not contiguous on disk. The primary 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 file name you specified is not one- to six-alphanumeric characters. Specify the correct file name.
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. Specify a valid suboption name.
INVALID FILE FORMAT The error message file you specified is not exactly sixteen blocks long. Make sure you copied from the correct RSTS/E Distribution Kit.
INVALID MODULE FORMAT The run-time system SIL module is too long, too short, or has an upper limit other than 177776(8). Make sure you copied from the correct RSTS/E Distribution Kit.
INVALID SIL FORMAT The run-time system file does not contain a valid SIL index. Make sure you copied from the correct RSTS/E Distribution Kit.
PART OF THAT AREA IS ALREADY IN USE The region you specified is unavailable for use. Specify another area in memory for that region or move the region currently occupying that area. (You can allocate space marked RTS to the run-time system.)
PART OF THAT AREA IS NOT LOCKED Part of the region you specified is not locked; 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 primary run-time system be a keyboard monitor (for example, DCL or RSX for the RSTS/E monitor). Make sure you copied from the correct RSTS/E Distribution Kit.
TOO MANY MODULES The run-time system SIL contains more than one module. If DIGITAL supplied the run-time system, submit a SPR.

DEFAULT Suboptions — Adjust the Memory Allocation Table

The following sections describe the memory allocation suboptions of DEFAULT. These suboptions allow you to adjust the memory allocation table of your installed monitor.

If you install a new monitor, you may need to use the memory allocation suboptions again to adjust the new monitor's memory allocation table.

The memory allocation table suboptions of DEFAULT are:

- LIST — List the Memory Allocation Table
- PARITY — List the Parity Memory Configuration
- LOCK — Lock a Portion of Memory
- UNLOCK — Unlock a Portion of Memory
- RESET — Reset the Memory Allocation Table
- XBUF — Allocate Memory to the Extended Buffer Pool
- BUFFERS — Allocate Memory to the Small Buffer Pools
- VIRTUAL — Allocate Memory to the Virtual Disk

DEFAULT

LIST — List the Memory Allocation Table

The LIST suboption of DEFAULT lists the *memory allocation table*, which shows the allocation of each block of memory.

Use the LIST suboption if:

- You want to print the most current memory allocation table.
- You want to print the table after adjusting the memory allocation table with one of the other DEFAULT suboptions.

LIST Dialogue

```
Any memory allocation changes <NO>? YES
```

Explanation — This is one of the DEFAULT dialogue questions. If you answer YES, DEFAULT prompts for the table suboption.

Response — Type YES to adjust or list the memory allocation table. Or, type NO or press RETURN to continue with the DEFAULT dialogue.

```
Table suboption? LIST
```

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? question.

Response: Type LIST or LI to see the memory allocation table. Type EXIT or press RETURN to continue with the DEFAULT dialogue.

```
Memory allocation table:
```

```
0K: 00000000 - 00323777 ( 53K) : EXEC
53K: 00324000 - 03363777 ( 392K) : USER
445K: 03364000 - 03777777 ( 67K) : XBUF
512K: 04000000 - End           : NXM
```

```
Table suboption?
```

Explanation — Your table may not show the same values as the one in the example. You read this table as follows:

- Column one contains the start range (in K words) of memory. You read this column vertically. In the example, the range starts at 0K words and ends at 512K words.
- Columns two and three contain the starting and ending octal addresses for the range of memory. In the example, 00000000 to 00323777 are the starting and ending octal addresses for the RSTS/E monitor (EXEC).

- Column four contains the amount of memory this range occupies in K words. In the first line of the example, the RSTS/E monitor (EXEC) occupies 53K words of memory.
- Column five specifies what occupies a particular range of memory:
 - EXEC — Represents the RSTS/E monitor, which always starts at 0K words.
 - USER — Represents memory available for user jobs.
 - LOCKED — Represents memory unavailable for use (appears if you use the LOCK suboption).
 - XBUF — Represents memory reserved for the extended buffer pool
 - NXM — Represents memory that does not exist on this PDP-11.
 - VIRTUAL — Represents memory reserved for the virtual disk (appears if you use the VIRTUAL suboption).

Response — After DEFAULT lists the memory allocation table, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

DEFAULT

PARITY — List the Parity Memory Configuration

The PARITY suboption of DEFAULT identifies and locates the types of parity memory. These types are parity memory and interleaved parity memory.

Use the PARITY suboption if you are a DIGITAL Field Service representative who needs to verify the memory configuration during the installation of a PDP-11.

Parity memory is memory that can detect certain errors. *Interleaved parity memory* is memory in which alternate banks respond to sequential memory addresses, as in the following:

Parity Register	Parity Register
00	02
BANK 0	BANK 1
Addresses	Addresses
000000	000002
000004	000006
000010	000012

Note that parity register 00 responds to the first address (000000), parity register 02 responds to the next address (000002), and so forth.

Core memory might have interleaved parity memory because it is a destructive read-out device. The central processor or DMA device requests data. The RSTS/E monitor reads the requested data from a memory bank located in core memory. After the central processor or DMA device receives the requested data, this memory bank remains busy until the memory hardware restores to it the original data. During this *restore cycle*, the RSTS/E monitor can perform other functions, including another read memory access in another bank.

If core memory has interleaved parity memory, the probability is low that the RSTS/E monitor will access the same bank of memory on the next memory cycle. This allows some overlap of memory read operations, resulting in faster program execution.

Some ECC MOS memory can be interleaved because on a write operation it takes time for the memory controller to determine what error-correction bits to store with the data. After the memory bank has accepted the data and the RSTS/E monitor allows the central processor or DMA device to continue, the memory bank remains busy until it has stored the data and new ECC bits. Because ECC MOS memory exhibits the same characteristics as interleaved parity memory, the probability is low that the RSTS/E monitor will access the same bank of memory on the next memory cycle. This allows some overlap of memory write operations, thus resulting in faster program execution.

Nonparity memory is not supported by the RSTS/E monitor.

PARITY Dialogue

Table suboption? PARITY

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Type PARITY or PA.

Parity register usage:

```
OK: 00000000 - 00777777 ( 128K) : 00(ECC)
128K: 01000000 - 01777777 ( 128K) : 02(ECC)
256K: 02000000 - 02777777 ( 128K) : 04(ECC)
384K: 03000000 - 03777777 ( 128K) : 06(ECC)
```

Table suboption?

Explanation — In the example, PARITY shows the memory configuration for a PDP-11/44. Your parity memory depends on the type of PDP-11 you have. After PARITY prints the parity memory configuration, it returns to the Table suboption? prompt.

The following defines the parity type codes you might see listed. The values nn and mm are the last two octal digits of the address of the parity register that controls that section of memory. Up to sixteen 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.

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.

Response — After DEFAULT lists the parity memory configuration, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

DEFAULT

LOCK — Lock a Portion of Memory

The LOCK suboption of DEFAULT locks certain portions of memory, which prevents the use of that memory during timesharing.

Use the LOCK suboption only if:

- You need to lock a portion of defective memory. If sufficient undamaged memory remains, you can start the monitor for normal timesharing.
- You want to start the RSTS/E monitor with less memory than is physically available. This could be useful for developing applications that can run on a smaller memory configuration.

Four examples of using the LOCK suboption are provided later in this section.

LOCK Dialogue

```
Table suboption? LOCK
```

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Type LOCK or LO.

```
Lock address is? 90K+1
```

Explanation — LOCK asks you to specify the address or range of addresses you want to lock.

Response — Type the address as a decimal number followed by the letter K. The decimal number must be in the range from 0 to 1919. In the example, the response is 90K+1.

Or, type 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.

Or, specify a range of addresses by typing either two addresses separated by a hyphen (for example, 45K-47K) or an address followed by a plus sign and a number that represents the size of the range (for example, 45K+3).

```
Table suboption? LIST
```

Explanation — After you specify an address, LOCK returns to the Table suboption? prompt.

Response — Type LIST or LI to list the memory allocation table and check that you have locked the correct area of memory.

Memory allocation table:

```

    0K: 00000000 - 00323777 ( 53K) : EXEC
    53K: 00324000 - 00547777 ( 37K) : USER
    90K: 00550000 - 00553777 ( 1K) : LOCK
    91K: 00554000 - 03363777 ( 354K) : USER
   445K: 03364000 - 03777777 ( 67K) : XBUF
   512K: 04000000 - End           : NXM

```

Table suboption?

Explanation — The memory allocation table shows that 1K of memory is now locked.

Response — After DEFAULT lists the memory allocation table, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

Using the LOCK Suboption

Certain types of memory failures affect only one word of memory; other types affect larger sections or even the entire hardware bank. You must carefully analyze any memory failure to determine the 1K section of memory to lock. Additionally, after you lock memory, list the memory allocation table to make sure that sufficient contiguous user memory is available to run your installation's programs.

Before you lock a portion of memory, you should be aware of the following restrictions:

- You cannot lock memory used by the monitor.
- You cannot lock memory currently reserved for the extended buffer pool (XBUF) until you relocate it to a usable area of memory.
- You cannot lock a full bank of memory, until you locate all of the 4, 8, 16, 32, 64, or 128 contiguous 1K sections that make up the hardware bank. If the bad memory is interleaved, you must lock an amount of memory equal to twice its length. On a PDP-11/70 with external interleaving, you must lock an amount of memory equal to four times its length.

If you attempt to lock any of these areas of memory, LOCK prints the message: Part of that area is already in use.

RSTS/E can continue running with certain types of memory failures. The error handling routines in the monitor log parity errors when they are detected by the hardware. The recovery procedures depend on the use of the section of memory that failed. Consider the following four cases of memory failure and recovery procedures.

Case 1: 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 facility is enabled), and reloads the system. When the system restarts, you should use the ANALYS program to extract the error log information from the CRASH.SYS file.

The ERRDIS report, which the monitor automatically appends to the ANALYS report, provides sufficient information to identify the section that should be locked out. If the error occurred in the extended buffer area of 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; thus, 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 timesharing. If possible, you should run memory diagnostics to reproduce the failure.

Case 2: A parity error occurs when a user job is running. The parity error handling routines determine whether a single user job is affected (that is, resides in the malfunctioning section) or more than one user job is affected. If more than one user job is affected, the system is reloaded as Case 1 describes. If a single user job is affected, the system aborts that user job with the error message ?Memory parity failure. The monitor logs the error, automatically locks out the section of memory from future use (for the duration of the timesharing 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.

Case 3: Multiple parity errors occur in rapid succession. RSTS/E halts at location 54 (the program counter displays 56) if a second parity error occurs while the system is processing the first parity error. A DIGITAL Field Service representative will use memory diagnostics to locate the failing memory.

Case 4: A memory cache parity error occurs. 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. It is for these reasons that RSTS/E is not supported on systems that use nonparity memory.

UNLOCK — Unlock a Portion of Memory

The UNLOCK suboption of DEFAULT unlocks certain portions of memory to make the memory available for use during timesharing by user jobs, or by the extended buffer pool (XBUF).

Use the UNLOCK suboption if you need to unlock a portion of memory you previously locked with the LOCK suboption.

UNLOCK Dialogue

Table suboption? UNLOCK

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Type UNLOCK or UN.

Unlock address is? 90K+1

Explanation — UNLOCK asks you to specify the address or range of addresses you want to unlock.

Response — Type the address as a decimal number followed by the letter K. The decimal number must be in the range from 0 to 1919. In the example, the response is 90K+1.

Or, type 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.

Or, specify a range of addresses by typing either two addresses separated by a hyphen (for example, 45K-47K) or an address followed by a plus sign and a number that represents the size of the range (for example, 45K+3).

Table suboption? LIST

Explanation — After you specify an address, UNLOCK returns to the Table suboption? prompt.

DEFAULT

Response — Type LIST or LI to list the memory allocation table and check that you have unlocked the correct area of memory.

Memory allocation table:

```
    0K: 00000000 - 00323777 (  53K) : EXEC
   53K: 00324000 - 03363777 ( 392K) : USER
  445K: 03364000 - 03777777 (  67K) : XBUF
 512K: 04000000 - End           : NXM
```

Table suboption?

Explanation — Note that UNLOCK removes the 1K area of memory that was locked in the previous example.

Response — After DEFAULT lists the memory allocation table, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

(Information deleted)

DEFAULT

(Information deleted)

RTS — Position the Primary Run-Time System

The RTS suboption positions the primary run-time system anywhere in the first 124K of memory. Normally, DEFAULT automatically positions the primary run-time system immediately after the RSTS/E monitor, in the lowest physical memory addresses.

Use the RTS suboption if:

- You need to position the primary run-time system to avoid defective memory.
- You want to position the BASIC-PLUS primary run-time system in high-speed memory, if your system has different types of memory. This is primarily used with PDP-11/45s, 11/50s, and 11/55s.

RTS Dialogue

Table suboption? LIST

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Before you position the primary run-time system, it is useful to list the memory allocation table. Type LIST or LI.

Memory allocation table:

```

    0K: 00000000 - 00323777 ( 53K) : EXEC
    53K: 00324000 - 00327777 ( 1K) : RTS (RSX)
    54K: 00330000 - 03363777 (391K) : USER
    445K: 03364000 - 03777777 ( 67K) : XBUF
    512K: 04000000 - End           : NXM

```

Table suboption? RTS

Response — Type RTS.

New Run Time System address is? 115K

Table suboption? LIST

Explanation — RTS asks you to specify the address where you want to position the primary run-time system.

Response — Type the address as a decimal number followed by the letter K. The decimal number must be in the range from 0 to 124 minus the size of the run-time system. In the example, the response is 115K.

There must be enough free contiguous space for the primary run-time system between the starting address you specify and 124K.

DEFAULT

After you specify the address, RTS returns to the Table suboption? prompt. Type LIST to list the memory allocation table again to see that the monitor positioned the primary run-time system correctly.

Memory allocation table:

0K:	00000000	-	00323777	(	53K)	:	EXEC
53K:	00324000	-	00713777	(	62K)	:	USER
115K:	00714000	-	00717777	(	1K)	:	RTS (RSX)
116K:	00720000	-	03363777	(	329K)	:	USER
445K:	03364000	-	03777777	(	67K)	:	XBUF
512K:	04000000	-	End			:	NXM

Table suboption?

Explanation — The memory allocation table shows that the primary run-time system now resides at 115K.

Response — After DEFAULT lists the memory allocation table, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

RESET — Reset the Memory Allocation Table

The RESET suboption removes any changes made to the memory allocation table; for example, locked portions of memory, reserved memory for the extended buffer pool, and nonstandard placement of the run-time system.

Use the RESET suboption only if you want to set up the memory allocation table in the following way:

- Release any memory previously allocated to the extended buffer pool (reduces the extended buffer pool to 2K words).
- Release any memory you previously locked.
- Release any memory you previously allocated to the virtual disk.

RESET Dialogue

```
Table suboption? LIST
```

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Before you reset the memory allocation table, it is useful to list the current one. Type LIST or LI.

```
Memory allocation table:
```

```
  0K: 00000000 - 00327777 (  54K) : EXEC
 54K: 00330000 - 03363777 ( 392K) : USER
445K: 03364000 - 03777777 (  67K) : XBUF
512K: 04000000 - End           : NXM
```

```
Table suboption? RESET
```

Explanation — LIST shows a memory table for an example installation. Note that the example table allocates 67K words of memory to XBUF.

Response — Type RESET or RE.

```
Table suboption? LIST
```

Explanation — DEFAULT immediately resets the memory allocation table and returns to the Table suboption? prompt.

DEFAULT

Response — It is useful to list the current memory allocation table after you use the RESET suboption. Type LIST or LI.

Memory allocation table:

```
    0K: 00000000 - 00327777 ( 54K) : EXEC
   54K: 00330000 - 03767777 ( 456K) : USER
  510K: 03770000 - 03777777 (   2K) : XBUF
  512K: 04000000 - End           : NXM
```

Table suboption?

Explanation — Note that RESET deallocated all memory previously allocated to XBUF and returned it to USER memory.

Response — After DEFAULT lists the memory allocation table, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

XBUF — Allocate Memory to the Extended Buffer Pool

The XBUF suboption reserves memory for the extended buffer pool.

INIT.SYS automatically allocates memory to the extended buffer pool during system installation. INIT.SYS determines how much memory to allocate based on the amount of USER memory available on the system. USER memory is memory that is not allocated to any other entity. It contains memory that is not locked, not allocated to the monitor, and not allocated to the run-time system.

INIT.SYS determines the size and position of XBUF based on the following guidelines:

- If the amount of USER memory exceeds 128K words, then INIT.SYS allocates 15% of that memory (rounded down to the nearest whole number) to XBUF.
- If the amount of USER memory is less than 128K words, then INIT.SYS allocates 10% of that memory (rounded down to the nearest whole number) to XBUF.
- INIT.SYS first attempts to position XBUF at the highest possible memory address. If for some reason INIT.SYS cannot allocate a sufficient amount of contiguous high memory, it positions XBUF at the lowest possible address.
- The minimum amount of memory allocated to XBUF is 2K words. The maximum is 496K words.
- The legal ranges for locating XBUF are between 16K and 512K (words), 528K and 1024K, 1040K and 1536K, and 1542K and 2048K.

If you are not familiar with the use of extended buffers on RSTS/E you should read the section, Extended Buffer Pool Background Information, before proceeding.

XBUF Dialogue

```
Table suboption? XBUF
```

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Type XBUF.

```
Enter new extended buffer address size (1K-496K) <8K>? 67K
```

Explanation — XBUF asks for the amount of memory you want to reserve for the extended buffer pool (XBUF). You do not need to specify the location of XBUF, because INIT.SYS automatically positions it according to the guidelines given at the beginning of this section.

Response — Specify the new size of XBUF, followed by K to indicate K words. In the example, the response is 67K.

DEFAULT

To release previously allocated memory for the extended buffer pool to user memory, type RESET.

Table suboption? LIST

Explanation — After DEFAULT adjusts the memory allocation table, it returns to the Table suboption? prompt.

Response — Type LIST or LI to list the memory allocation table and check that you have reserved the correct area in memory.

Memory allocation table:

```
0K: 00000000 - 00323777 ( 53K) : EXEC
53K: 00324000 - 03363777 ( 392K) : USER
445K: 03364000 - 03777777 ( 67K) : XBUF
512K: 04000000 - End           : NXM
```

Table suboption?

Explanation — The memory allocation table shows the size and location of the memory you have reserved for the extended buffer pool. For example, in this table 67K words are reserved for XBUF.

Response — After DEFAULT lists the memory allocation table, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

Extended Buffer Pool Background Information

Figure 5 shows an example RSTS/E system. It shows that memory is divided into:

- *Monitor memory (EXEC)* — an area of memory reserved for your RSTS/E monitor. Monitor memory in the example occupies 53K words.
- *User memory (USER)* — an area of memory reserved for user jobs. In the example, user memory occupies 392K words.
- *Extended buffer pool (XBUF)* — an area of user memory reserved for *extended buffers*. An extended buffer is a block of storage located in the extended buffer pool that can range in size from 32 words to the maximum size of the extended buffer pool. In the example, the size of the extended buffer pool is 67K words. The extended buffer pool occupies USER memory; thus, releasing 67K words from the extended buffer pool would increase USER memory to 459K words.

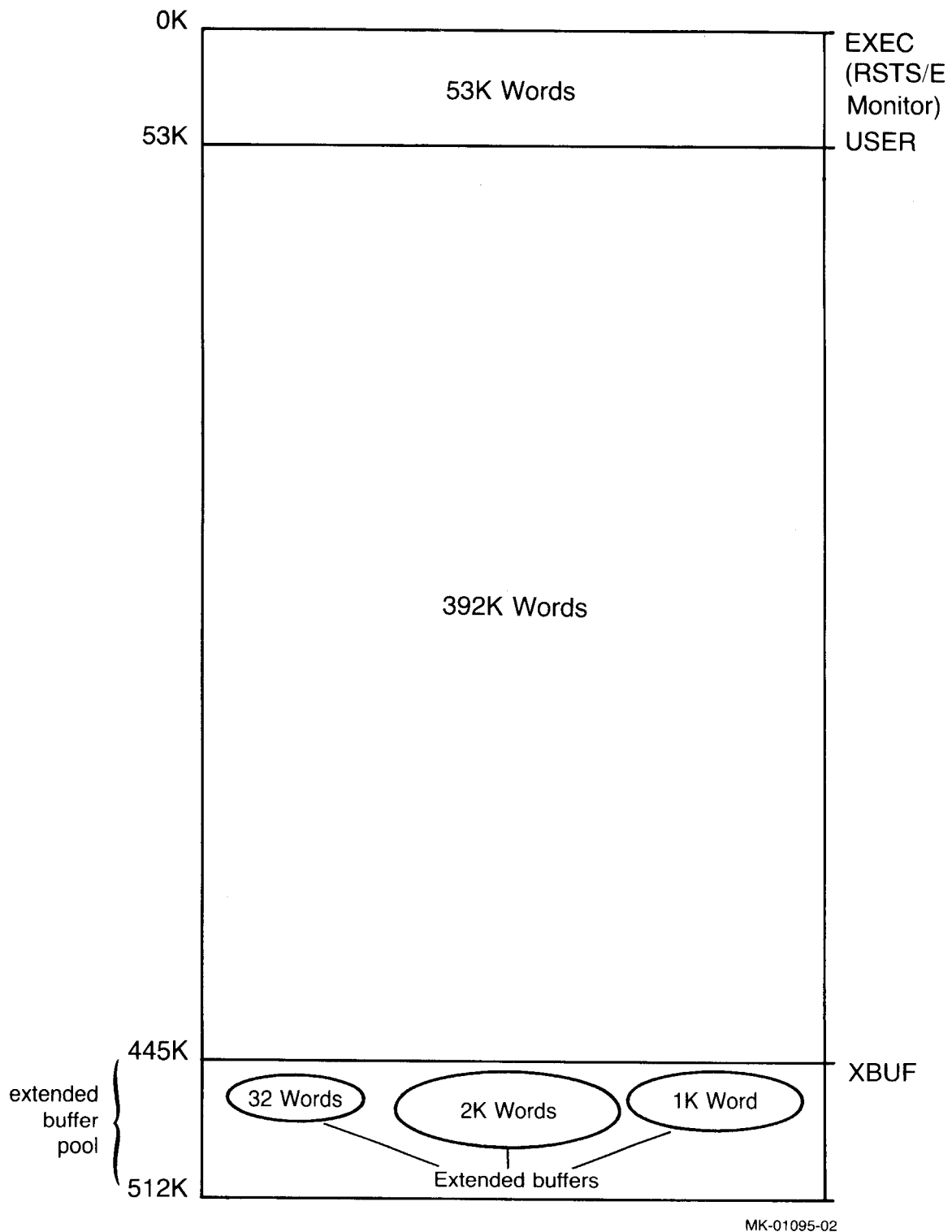


Figure 5: Extended Buffer Pool for Example RSTS/E System

DEFAULT

When the monitor needs an extended buffer to store information, it looks in the extended buffer pool. When the information stored in the extended buffer is no longer needed, the monitor returns the buffer to the extended buffer pool for reuse.

The size of the extended buffer pool depends on the type of processing and the amount of memory on your system. Allocating enough memory to the extended buffer pool increases the number of available extended buffers, which has the following advantages:

- The monitor can output more data and/or directory information. This means the monitor stores certain data and directory-related information in the extended buffers. This reduces the number of times disk input/output occurs, which results in improved system response.
- The monitor can output more line printer data (if you selected the line printer caching feature). This means the monitor stores line printer output in the extended buffers. This reduces the stalling frequency of the line printer when printing data.
- The monitor can store some kinds of information in either extended buffers or in general small buffers (see the following BUFFERS suboption). Because the number of general small buffers is limited, the monitor uses extended buffers whenever they are available to reduce the demand for general small buffers.

Keep the following memory constraints in mind when you are deciding how much memory to allocate to the extended buffer pool:

- You should be able to fit at least two jobs at SWAP MAX (or the average job size, if known) in memory. If you cannot do this, then you may have to reduce the amount of memory you allocated to the extended buffer pool.
- During start-up, INIT.SYS uses an 8K-word area of memory to complete the loading of the monitor. This 8K-word area is allocated from either RTS or USER (see the memory allocation table) and must be above the INIT.SYS image. If INIT.SYS cannot find an 8K word area of memory above the INIT.SYS image (68K words) and below 124K words, it prints the error message: Need at least 8KW nonmonitor memory below 124K to start.

•

The following sections discuss guidelines for determining the amount of user memory you should reserve for the extended buffer pool with respect to:

- Message send/receive code
- Line printers
- Data caching
- Directory caching
- Loaded indexes
- File I/O window turns
- DCL indirect command file I/O and/or terminal logging
- System logicals
- DECnet/E software
- RJ2780 software
- 2780/3780 software
- Statistics
- Quota information
- Resident overlay code

Message Send/Receive Code

The RSTS/E monitor uses extended buffers to store messages generated by programs that use the message send/receive code. You might want to use the following as a guide in determining how many messages are generated for a typical system:

- Error logger — 2 messages
- OPSER-based spooling package:
 - OPSER — 2 messages
 - QUEMAN — 2 messages
 - 1 line printer spooler — 2 messages
 - 1 batch spooler — 2 messages
- Print/Batch services package — 3 messages

Each message requires N words of extended buffers where N is the length of the message in words plus 4 words, rounded to the next multiple of 32 words. A message always uses at least 32 words of extended buffers. Each message can range from 32 to 288 words.

DEFAULT

Line Printers

The RSTS/E monitor uses extended buffers (or general small buffers) to store characters awaiting printing on a line printer. (You must have answered YES to the Extended data buffering for LP? question in Phase 3 of Part I.) You should allow 2.5K words of memory for the extended buffer pool for each line printer.

Data Caching

The monitor uses extended buffers to store the activities resulting from data caching. *Data caching* is a software feature that reduces the number of data transfers from disk to memory, thereby improving response times. (You have data caching only if you answered YES to the Data caching? question in Phase 3 of Part I.)

A general guideline is to allocate about 15% of total USER memory to the extended buffer pool to accommodate data caching. However, the monitor cannot use more than the following maximum values. If you allocate more memory than the maximum amount, it is used by LPDVR, DECnet, RJ2780, logicals, DCL command/log buffers, or others from the previous list.

Cache Cluster Size	Maximum XBUF Usage
1	130K words
2	257K words
4	496K words
8	496K words

Note

The monitor uses extended buffers (or general small buffers) for directory caching only when they are not needed for other purposes. If you also have data caching on your system, the monitor uses only extended buffers.

Directory Caching

The monitor uses extended buffers to store the activities resulting from *directory caching*, a software feature that accelerates file processing. In V9.0, you automatically have directory caching. Directory caching uses extended buffers that are 256 words in size, and at most can occupy 173K words of memory in the extended buffer pool.

If you allocate more than 8K words to the extended buffer pool, the monitor will not use general small buffers for directory caching, thereby reducing CPU overhead. A general guideline is to allocate about 10% of total USER memory to the extended buffer pool to accommodate directory caching.

Loaded Indexes

During timesharing you can optionally load the System Allocation Table (SAT) for each disk (except read only) into memory. RSTS/E systems use extended buffers (XBUF) to store these tables.

To improve system performance, you need to allocate more XBUF to store the SATs. The amount of XBUF required for each disk SAT depends on the disk size and the disk pack cluster size. Use the following formula to calculate, in K words, the XBUF required:

$$(\text{disk size}/\text{pack cluster size})/16384$$

File I/O Window Turns

The monitor uses extended buffers when processing file I/O window turns. This can improve system performance, particularly on larger memory systems that allocate large amounts of XBUF and that have moderately fragmented files.

The actual amount of XBUF used at any given time is variable. You should initially allocate 2K words for storing file I/O window turns. Later, you can adjust the amount of XBUF if required. Use the SHOW CACHE command to display the largest amount of XBUF (in K words) used for file I/O window turns since the system was started. If file I/O window turns is using more than 4K words, increase XBUF.

DCL Indirect Command File I/O and Terminal Logging

The monitor uses extended buffers to store messages generated by indirect command file I/O and terminal logging. You should allow 1/4K word per simultaneous command file I/O and/or terminal logging.

System Logicals

The monitor uses extended buffers to store system logicals. You should allow 1K word per 320 logicals.

DECnet/E Software

The monitor uses extended buffers to store messages generated by DECnet/E software. See the *DECnet/E Installation Guide* for information on how much memory to reserve for the extended buffer pool.

RJ2780 Software

The monitor uses extended buffers to store messages generated by the RJ2780 software. This software requires 1K word of memory for the extended buffer pool. See the RJ2780 documentation.

2780/3780 Software

See the 2780/3780 documentation for extended buffer pool considerations.

DEFAULT

Statistics

The monitor uses approximately 1K word per 14 disk units. If insufficient extended buffer space is available at system startup, the monitor disables statistics with no message.

Quota Information

The monitor requires 1K word of extended buffer space for every 96 different accounts for which there are open files or to which a user is logged in, on a per user basis. Note that the monitor considers a logged-in user as an open file on the system disk.

Resident Overlay Code

The monitor uses extended buffer space for resident overlay code. The amount can vary, depending on the overlay. After you load an overlay, use the SHOW CACHE command to see the extended buffer usage, and adjust XBUF accordingly.

Extended Buffer Pool Worksheet

Figure 6 summarizes the items requiring extended buffers, and the approximate amounts of memory each requires. Space is provided to enter the size needed for your system. Use this worksheet as a guide to reserving memory for the extended buffer pool. Remember, you can determine the optimal size only through experimentation. Use the SHOW CACHE command to show some of the extended buffer pool usage for your system.

Items Requiring Extended Buffers	Your Size
Contents of messages sent and waiting to be received*	_____
Line printer driver*	_____
Data caching	_____
Directory caching*	_____
File I/O window turns	_____
Loaded indexes	_____
DCL indirect command file I/O and terminal logging	_____
System logicals	_____
DECnet/E	_____
RJ2780	_____
2780/3780 software	_____
Statistics	_____
Quota information	_____
Resident overlay code	_____
Total**	_____

* The RSTS/E monitor can also use general small buffers to store these items.

** Reduce the extended buffer pool if two jobs at SWAP MAX will not fit in the USER area of memory.

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Figure 6: Extended Buffer Pool Worksheet

BUFFERS — Allocate Memory to the Small Buffer Pools

The BUFFERS suboption reserves more memory for the small buffer pools. Use the BUFFERS suboption if your RSTS/E monitor needs more small buffers to run efficiently.

Before you decide whether to change the amount of memory allocated to the small buffer pool, you should read the information in the section, Small Buffer Pool Background Information.

Consider the following when deciding when to increase the memory reserved for the small buffer pool:

- You should provide an adequate supply of small buffers for periods of heavy system use. Thus, you should assume that the system is using the maximum number of jobs, all terminals, and all printers.
- The number of small buffers a program uses depends on what it is doing. For example, a program that opens 12 files at once requires more buffers than other programs. This guide offers guidelines, which you must follow and adjust according to the needs of your installation.
- Some software features use buffers momentarily, but it is difficult to calculate how many small buffers you will need for momentary use. DIGITAL recommends that you add 100 to 150 small buffers to your final figure. Seventy-five of these buffers go towards keeping the number above 75 most of the time.

BUFFERS Dialogue

```
Table suboption? BUFFERS
```

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Type BUFFERS or BU.

```
How many K-words of extra buffer space (OK-2K) <OK>? 2K
You have 472 general + 132 FIP small buffers.
Adjusting memory table
```

```
Memory allocation table:
```

```
OK: 00000000 - 00333777 ( 55K) : EXEC
55K: 00340000 - 03363777 ( 390K) : USER
445K: 03364000 - 03777777 ( 67K) : XBUF
512K: 04000000 - End           : NXM
```

```
Table suboption?
```

DEFAULT

Explanation — BUFFERS prints the range you can specify for your system. In the example, the range is 0K words to 2K words. The default value is 0K when you answer this question for the first time. The next time you select the BUFFERS suboption, the default value is the value you selected the last time you answered the question.

The range is larger for systems with processors that have data space. If you have data space, you can use the BUFFERS suboption to increase the memory reserved for the small buffer pool to accommodate more general and FIP small buffers. If you do not have data space, you can increase the memory reserved for the small buffer pool to accommodate only FIP small buffers. (You must perform another system installation to add more general small buffers if you do not have data space.)

Response — Type the number of K words to reserve for the small buffer pool. DIGITAL recommends you specify the maximum. You can lower this later if you discover your system continually has over 250 free general small buffers.

After your response, BUFFERS prints the number of general and FIP small buffers that your system will have available for use during timesharing. Of the memory added, BUFFERS creates as many general small buffers as it can (if you have data space) and gives the remaining space to FIP small buffers. In the example, the response of 2K accommodates 132 FIP small buffers.

When you increase memory for the small buffer pool, the size of the monitor increases and the size of USER memory decreases. DEFAULT then lists the new memory allocation table.

The following should help you further in answering this question. Remember that in Task 6 of Phase 3 in Part I you answered the Small buffers? configuration question. The question printed a default response, which indicated how many general small buffers you currently had. Because the size of the RSTS/E monitor is always rounded up to a multiple of 1K word, there is usually some extra space. The RSTS/E monitor fills this extra space with FIP small buffers.

Remember also that during system installation you saw a buffer table that shows how many general and FIP small buffers you currently have. In addition, the table tells you how many you can add. Figure 7 shows a sample table. The table tells how many general and FIP small buffers you can add if you have data space and how many FIP small buffers you can add if you do not have data space. Because the PDP-11 in this example installation has data space, it can increase memory for the FIP small buffer pool to accommodate more FIP small buffers.

Resident monitor size is 51K. By increasing this size with the DEFAULT option of INIT, you can set additional small buffers. This table shows the number and type of small buffers you can get with each size change.

Additional K-words of buffer space	Number of buffers		Without Data Space	
	With Data Space General	FIP	General	FIP
0K	444	2	444	2
1K	472	36	444	66
2K	472	100	444	108
3K	620	18	---	---
4K	648	52	---	---
5K	648	116	---	---
6K	648	180	---	---
7K	648	244	---	---
8K	648	308	---	---
9K	648	372	---	---
10K	648	436	---	---
11K	648	494	---	---

If you choose to perform another installation, you may specify up to 572 small buffers for this system. Doing so will increase some of the buffer counts in the table.

Figure 7: Example Small Buffer Table Printed During System Installation

A K word is equal to 64 small buffers; however, when you select the maximum number, the last K word generally contains fewer than the 64 maximum. When selecting the amount of extra buffer space, you should determine how many buffers the last K word contains and decide if you want to allocate 1K word of memory for the number of buffers you gain. For example, if the difference between specifying 2K or 3K words of extra buffer space gives you only 10 more small buffers, it may not be worth the cost of 1K word of physical memory.

Table suboption?

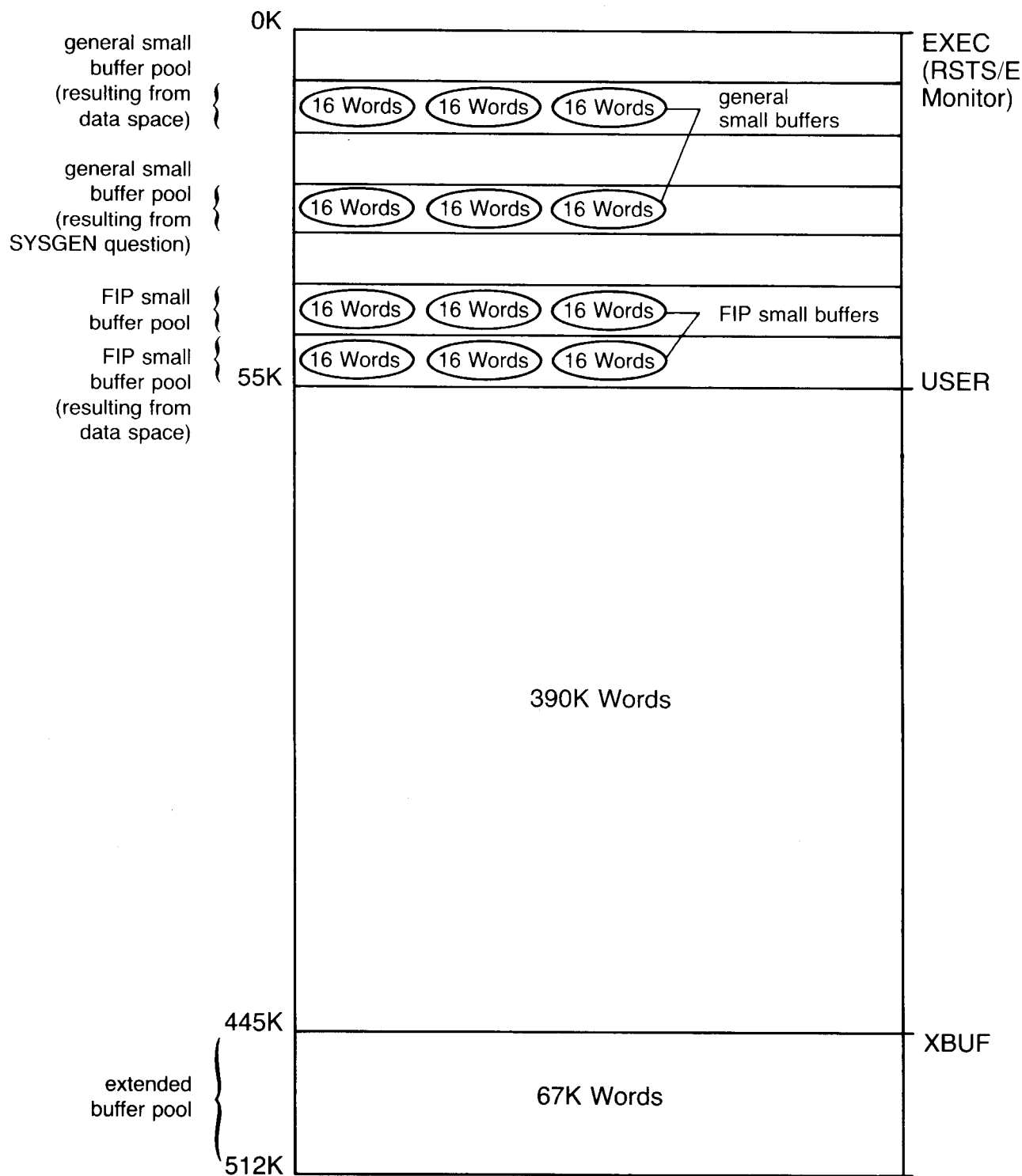
Response — After DEFAULT lists the memory allocation table, it returns to the Table suboption? prompt. Press RETURN to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

Small Buffer Pool Background Information

Figure 8 shows an example RSTS/E installation. It shows that memory is divided into:

- **Monitor memory (EXEC)** — An area of memory reserved for the RSTS/E monitor. Monitor memory in the example installation occupies 53K words. Note that the size of the monitor increases to 55K words after the example installation allocates 2K words for the FIP small buffer buffer pool. The size of your monitor may differ.

DEFAULT



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Figure 8: General and FIP Small Buffer Pools

- User memory (USER) — An area of memory reserved for user jobs. In the example installation, USER memory occupies 392K words. Note that the size of USER memory decreases to 390K words after the example installation allocates 2K words for the FIP small buffer pool. The size of your USER memory may differ.
- Extended buffer pool (XBUF) — An area of memory reserved for the extended buffer pool. In the example, XBUF memory occupies 67K words. (See the previous section for a discussion of the extended buffer pool.)

Figure 8 also shows that monitor memory contains the:

- *General small buffer pool* — an area of monitor memory that contains *general small buffers*. Note that there are two types of general small buffer pools: one that is created as a result of answering the Small buffers? configuration question in Phase 3 of Part I, and one that is created using the BUFFERS suboption. You can create this second small buffer pool only if you have a hardware feature on your CPU called *data space*. Data space is available on the PDP-11/44, 11/45, 11/50, 11/55, 11/70, 11/73, 11/83, or 11/84 and only if you do not use RJ2780 software.
- *FIP small buffer pool* — an area of monitor memory that contains *FIP small buffers*. There are also two types of FIP small buffer pools: one that you can create with the BUFFERS suboption alone, and the other you can create with the BUFFERS suboption and with data space. Figure 8 illustrates these two FIP small buffer pools.

The RSTS/E monitor uses general small buffers as a temporary storage area for such things as:

- The input and output of characters
- Data transfers
- Send/receive messages
- File processing requests
- Information on open files and DCL file information
- CCL command definitions
- Asynchronous I/O requests
- Run-time system and library descriptions

DEFAULT

In contrast to general small buffers, FIP small buffers are used only to store open files information, CCL command definitions, and DCL file information. When the monitor needs a small buffer to store open files or CCL command definitions information, it looks in the FIP small buffer pool for a FIP small buffer. This leaves the supply of general small buffers free to store other kinds of activity that the FIP small buffers cannot handle. If there are no free FIP small buffers, the monitor uses general small buffers to store the open files information and CCL command definitions. When the information stored by either small buffer is no longer needed, the monitor returns the small buffer to the appropriate small buffer pool for reuse.

The general small buffer supply is critical to your system's performance. The number of free general small buffers varies from second to second. When this number is less than 75, the following occurs:

- Jobs begin to stall, until some small buffers become available to process the jobs' requests. Thus, performance begins to suffer.
- The monitor discards error information destined for the error logger.
- The error message ?No logins appears when users try to log in. (This happens when the number of general small buffers falls below 40.)
- Batch jobs do not start. (This happens when the number of general small buffers falls below 40.)
- Programs begin to fail with the message ?No buffer space available.

The number of general small buffers should stay well above 75 for good system performance. Because FIP small buffers reduce the demand on general small buffers, the number of FIP small buffers may drop to zero without any loss to system performance.

The /F (Free) switch of the SYSTAT program displays the number of available general small buffers and FIP small buffers as well as other system statistics. The SHOW BUFFERS command gives the same display as the SYSTAT program. The *RSTS/E Utilities Reference Manual* describes SYSTAT.

The rest of this section discusses guidelines for determining how many small buffers you need with respect to:

- Jobs
- CCL command definitions
- Auxiliary run-time systems
- Resident libraries
- Open files and DCL file information
- Message receivers
- List of messages sent and waiting to be received

- Contents of messages sent and waiting to be received
- Terminals
- Line printers
- Paper tape punches
- EMT logger
- Outstanding I/O requests
- BACKUP program
- Margin of safety

Jobs

The monitor uses general small buffers to store information about each job. Allow three general and two FIP or general small buffers per job.

CCL Command Definitions

The monitor uses general or FIP small buffers to store CCL command definitions. Allow one general or FIP small buffer for each defined CCL command. See the *RSTS/E System Manager's Guide* for a description of CCL command definitions and the DCL DEFINE command, which you use to define CCL commands.

Auxiliary Run-Time Systems

The monitor uses general small buffers to store information about auxiliary run-time systems that you add with the DCL INSTALL command. Allow one general small buffer for each auxiliary run-time system.

Resident Libraries

The monitor uses general small buffers to store resident libraries. Allow one general small buffer for each resident library and each dynamic region. Allow one to four general small buffers for each program that uses libraries. Allow two buffers for programs that use RMS libraries.

Open Files and DCL File Information

The monitor uses general or FIP small buffers to store descriptions of open files. The monitor uses FIP small buffers first, if they are available. A program can open a file on more than one I/O channel, and more than one program can open the same file at the same time.

DEFAULT

For each program allow:

- One general or FIP small buffer for each open file.
- One general or FIP small buffer for each channel on which the file is open; however, you need two general or FIP small buffers for each channel on which the file is open if you use update mode. See the *RSTS/E Programming Manual* for a discussion of update mode.
- One FIP or general small buffer per open file on DCL's I/O channel.
- One FIP or general small buffer for each active command file or terminal command file.

List of Message Receivers

The monitor uses general small buffers to store a list of message receivers. Many system programs (including Print/Batch Services, QUEMAN, ERRCPY, and OPSER) receive messages through the send/receive system function calls. These system function (SYS) calls need one general small buffer for each message receiver.

Messages Sent and Waiting To Be Received

You need one general small buffer for each message sent and two general small buffers for each receiving job.

Contents of Messages Sent and Waiting to be Received

The monitor stores the contents of messages sent in general small buffers if it cannot use extended buffers. If you did not include this item when you reserved memory for the extended buffer pool, you should include it in your general small buffers calculation. The number of messages that the monitor can store in the general small buffer pool depends on the size of the messages and the speed with which the receiving job processes them.

You need N general small buffers for each message

where:

$$N = \frac{(\text{length of message in bytes} + 8)}{32}$$

For example, you might figure that the average message contains 25 to 56 bytes, which occupies two general small buffers. If your system processes many messages, you can improve system performance by allocating memory to the extended buffer pool for these messages.

Terminals

The monitor uses general small buffers to store:

- Characters written by a job and awaiting display on a terminal
- Characters typed by a user and waiting to be read by a job
- Characters written by a job and awaiting printing on a hard-copy terminal

You should allow:

- Five general small buffers for each interactive terminal, several more if you use echo control and FMS
- Ten general small buffers for each hard-copy terminal

Line Printers

The RSTS/E monitor uses general small buffers (or the extended buffer pool) to store characters awaiting printing on a line printer. (You must have answered YES to the Extended data buffering for LP? question in Phase 3 of Part I.) If you reserved memory in the extended buffer pool for line printers, you need not specify any small buffers. If you need general small buffers for this purpose, specify 20 for each line printer.

Paper Tape Reader/Punch

The monitor uses general small buffers to store characters awaiting punching or reading on a paper tape reader/punch. Allow for 10 general small buffers for the paper tape punch.

EMT Logging

The monitor uses general small buffers to store messages generated by EMT logging. (You are concerned with this only if you answered YES to the EMT logging? question in Phase 3 of Part I.) You should specify 1 general small buffer if you have EMT logging.

Outstanding I/O Requests

Each outstanding I/O request needs one small buffer plus the following driver requirements:

- Asynchronous tape drivers — one general small buffer per outstanding request
- Disk drivers — at least one general small buffer per request. The number may be higher if the request is for multiple disk blocks, depending on the fragmentation of the directory structure.

DEFAULT

BACKUP Program

BACKUP makes extensive use of asynchronous I/O and therefore general small buffers. Depending on the qualifiers used and the device speed, BACKUP can use hundreds of buffers.

Margin of Safety

After you finish calculating how many small buffers you will need, you should add 100 to 150 general small buffers to assure that the number of general small buffers remains above 75.

General and FIP Small Buffer Pool Worksheet

Figure 9 summarizes the items requiring general and/or FIP small buffers and the approximate number each requires. Space is provided to enter the number you need for your installation. Use the worksheet as a guide for calculating the number of general and FIP small buffers. You can determine the optimal number only through experimenting with your system.

Items Requiring General or FIP Small Buffers	Your Number
Jobs	_____
CCL commands	_____
Auxiliary run-time systems	_____
Resident libraries	_____
Open files and DCL file information	_____
List of message receivers	_____
List of messages sent by one job waiting to be received by another job	_____
Contents of messages sent and waiting to be received*	_____
Terminals	_____
Line printers*	_____
Paper tape reader/punch	_____
EMT logging	_____
Outstanding I/O requests	_____
BACKUP program	_____
Margin of safety	_____
 Total	 _____

* The RSTS/E monitor can also use extended buffers to store these items.

MK-01096-02

Figure 9: General and FIP Small Buffer Pool Worksheet

DEFAULT

VIRTUAL — Allocate Memory to the Virtual Disk

The VIRTUAL suboption allocates memory to the *virtual disk*, a software structure that supports the storage of temporary data within the system's memory. Even though the virtual disk is not a physical device, it contains the same structures as a physical disk device. You can use the virtual disk for file-structured or non-file-structured I/O in the same way you use any other disk device, with one exception: all data written to the virtual disk is lost when the RSTS/E system shuts down or if the system should crash. The device designator for the virtual disk is DV0:.

Use the VIRTUAL suboption if you have a system with a large amount of memory and you want to establish a region of memory for temporary data storage.

Before you decide whether to allocate memory to the virtual disk, you should read the information in the section, Virtual Disk Background Information.

VIRTUAL Dialogue

```
Table suboption? VIRTUAL
```

Explanation — You see the Table suboption? prompt after you answer YES to the Any memory allocation changes? DEFAULT question.

Response — Type VIRTUAL or VI.

```
Enter new virtual disk size <OK>?
```

Explanation — VIRTUAL asks for the amount of memory you want to reserve for the virtual disk (DV0:). You do not need to specify the location of the virtual disk, because INIT.SYS automatically positions it according to the procedures outlined in the next section.

Response — Specify the size of VIRTUAL, followed by K to indicate K words.

To release previously allocated memory for the virtual disk to USER memory, type RESET.

```
Table suboption?
```

Explanation — After you specify the virtual disk size, VIRTUAL returns to the Table suboption? prompt.

Response — Type LIST or LI to list the memory allocation table and check that you have reserved the correct area in memory. Then, press RETURN at the next Table suboption? prompt to continue with the DEFAULT dialogue. Or, type one of the other DEFAULT table suboptions.

Virtual Disk Background Information

You allocate memory to the virtual disk with the VIRTUAL (or VI) table suboption of the INIT.SYS DEFAULT option. If you do not specifically allocate any memory to the virtual disk, then INIT.SYS defaults the virtual disk to 0K words, which in fact disables the use of the virtual disk during timesharing.

You can use the virtual disk to store temporary files or any file that has a very short lifespan. Examples of temporary files are work files created by an application program like SORT/MERGE that are later deleted, or a temporary file used for entering data in applications that give the user a last chance to edit the data before updating the permanent file.

You can also place copies of read-only files that never change and are frequently accessed on the virtual disk. For example, you can place a copy of an index file that is used to access other files in virtual memory.

If you intend to use the virtual disk as a file-structured device, then you must also initialize it. Initializing the virtual disk places the system account [0,1] on the disk with the same required system files as needed for any other disk (SATT.SYS and BADB.SYS). To initialize the virtual disk, use the DCL INITIALIZE command. (You cannot use the INIT.SYS DSKINT option.) See the *RSTS/E System Manager's Guide* for information on initializing disks.

Large memory systems will find a big advantage in using the virtual disk. Because the virtual disk never requires physical I/O, it becomes the fastest disk on your system. It is even faster than data caching for these reasons:

- A file placed on the virtual disk always remains in memory. A cached file, on the other hand, remains in memory based on frequency of access.
- When you write to a file on the virtual disk, no physical I/O takes place. When you write to a cached file, physical I/O takes place. The file processor first performs a physical write, then it updates memory.

On the other hand, the virtual disk requires CPU time and takes memory away from user space. If you have a CPU bound or small memory system, you may find this detracts from overall performance. In addition, you cannot use the virtual disk for any permanent files because all data is lost when the system shuts down or if the system should crash.

Keep these facts in mind when deciding the amount of memory to allocate to the virtual disk:

- You reserve memory for the virtual disk from a minimum size of 1K word up to the amount of available memory not allocated to any other RSTS entity (EXEC, for example).
- The Memory Table suboption allows you to allocate memory in 1K-word increments. Since 1K word of memory equals 4 blocks on the virtual disk, the size of the virtual disk is always a 4 block multiple.

DEFAULT

- The minimum amount of disk space needed for directory information on any file-structured disk is 12 blocks. Therefore, if you intend to use the virtual disk as a file-structured device, you must allocate a minimum of 4K words (16 blocks) of memory to it. This provides 12 blocks for the directory information and 4 blocks for user space.
- Small memory systems such as PDP-11/34s can consider allocating 1K word to 2K words of memory for the virtual disk in non-file-structured mode. This provides user programs with a 4 to 8 block system common area.

You do not need to specify the position of the virtual disk. INIT.SYS automatically positions the virtual disk based on the size and location of other memory components. INIT.SYS follows these guidelines:

- The minimum amount of memory allocated to the virtual disk is 1K word. The maximum is the amount of free USER memory on the system.
- The legal ranges for locating the virtual disk are between the end of the EXEC portion of memory and 2048K words.
- INIT.SYS first attempts to position the virtual disk at the highest possible memory address. If for some reason INIT.SYS cannot allocate sufficient contiguous high memory (see Note), it positions the virtual disk at the lowest possible address.

Note

During start-up, INIT.SYS uses an 8K-word area of memory to complete the loading of the monitor. This 8K-word area is allocated from USER memory (see your memory allocation table) and must be above the INIT.SYS image. If INIT.SYS cannot find an 8K word area of memory above the INIT.SYS image (68K words) and below 124K words, it prints the error message Need at least 8KW nonmonitor memory below 124K to start.

DSKINT — Initialize RSTS/E Disks

The DSKINT option initializes a RSTS/E disk. DSKINT:

- Optionally formats the disk — DSKINT writes timing and sense marks on the disk and destroys any previously stored information.
- Optionally checks the disk for bad blocks — DSKINT locates bad blocks on the disk and allocates them to the *bad block file* (BADB.SYS).
- Writes a minimum RSTS/E file structure on the disk — The minimum *RSTS/E file structure* contains a pack label and three directories:
 - The Master File Directory (MFD).
 - The Group File Directory (GFD).
 - The User File Directory (UFD) for account [0,1].
- Prepares the disk to accept RSTS/E system and other files.

For the DSKINT option, these responses have special meaning:

Response	Description
(RET)	Accept the default response
?	Obtain an online explanation of the question
^	Return to the previous question
(CTRL/Z)	Restart DSKINT dialogue
(CTRL/C)	Abort DSKINT and return to the Option: prompt

DSKINT Dialogue

Option: DSKINT

Response — Type DSKINT to the INIT.SYS Option: prompt.

dd-mm-yy - hh:mm AM/PM

Disk?

Explanation — DSKINT prints the current date and time, and then asks for the device designator of your disk.

Response — Type the device designator of the drive on which your disk is mounted.

Unit?

Explanation — DSKINT asks for the unit number of the disk drive on which your disk is mounted.

DSKINT

Response — Type the device unit number.

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

```
Pack ID:           PATTIE
Pack Cluster Size: 8
Pack is currently: Private,
                  Update access date on writes,
                  Level: 1.1
```

Pack ID?

Explanation — After you type the unit number, DSKINT prints the disk's pack label information, if the disk has been initialized before. If the disk has not been initialized before, DSKINT does not print this identifying information. The pack label information lists:

- Pack ID
- Pack cluster size
- Pack status (public or private)
- Whether files are catalogued with the date they were last modified (written to) or accessed (read, opened, closed, and so forth)
- New files first information
- Whether the disk is read-only
- Format level

This private disk could be a system disk; DSKINT cannot determine whether a private disk is also a system disk. In the example, the pack ID is PATTIE, the pack cluster size is 8, the pack status is private, the files are catalogued with the date they were last written to, and the format level is RDS1.1.

This information lets you decide whether to initialize the disk. When you initialize a disk, you destroy any information stored on it.

After printing the pack label information, DSKINT asks for a pack ID. The pack ID is a system-wide logical name. You must specify this pack ID when you logically mount the disk.

Response — Type a one- to six-character alphanumeric pack ID.

Pack cluster size <4>?

Explanation — A cluster is a fixed number of 512-byte blocks of storage area allocated contiguously on a disk. The pack cluster size is the minimum number of blocks that your RSTS/E monitor can allocate to a file on the disk.

Your answer to this question depends on the type of processing and the disk requirements of your system. The pack cluster size affects disk space and speed of file creation and access. A large pack cluster size improves access time to programs and user files because the monitor allocates space for data in cluster units. For example, if the pack cluster size is 16, the monitor allocates 16 blocks at a time. However, if the pack cluster size is two, the monitor allocates only two blocks at a time. Thus, more disk accesses are needed to allocate the same amount of space.

On the other hand, a large pack cluster size may waste disk space. For example, if you assign a pack cluster size of 16, the monitor allocates one cluster of 16 contiguous blocks (8,192 bytes) to a file that contains only one block (512 bytes) of information. Fifteen blocks (7,680 bytes) are wasted. Likewise, the monitor allocates one cluster of 16 contiguous blocks to a 15-block (7,680 bytes) file. In this case, only one block (512 bytes) is wasted.

Response — Type one of the disk pack cluster sizes shown in Table 22. Or, press RETURN to accept the default value (4, in this example).

Table 22: Disk Pack Cluster Sizes

Disk Type	Pack Cluster Size
RX50*	1, 2, 4, 8, 16
RC25	1, 2, 4, 8, 16
RD51	1, 2, 4, 8, 16
RD52	1, 2, 4, 8, 16
RD53	4, 8, 16
RK05*	1, 2, 4, 8, 16
RK05F*	1, 2, 4, 8, 16
RL01	1, 2, 4, 8, 16
RL02	1, 2, 4, 8, 16
RK06	1, 2, 4, 8, 16
RK07	1, 2, 4, 8, 16
RP02	2, 4, 8, 16
RP03	2, 4, 8, 16
RM02	4, 8, 16
RM03	4, 8, 16
RP04	4, 8, 16
RP05	4, 8, 16
RA80	4, 8, 16
RM80	4, 8, 16

(continued on next page)

Table 22: Disk Pack Cluster Sizes (Cont.)

Disk Type	Pack Cluster Size
RP06	8, 16
RA60	8, 16
RM05	8, 16
RA81	16
* You cannot use these disks as system disks.	

MFD cluster size <16>?

Explanation — The master file directory (MFD) stores information about all groups on a disk. The monitor accesses the MFD each time you add or delete accounts and rarely when you add or delete files from the disk.

This question asks for the MFD cluster size, which is the maximum number of 512-byte blocks that each cluster allocated to the MFD can contain. The MFD can have a maximum of seven clusters (if you answer YES to the Pre-extend directories? question later), and each directory is the size that you specify here.

The MFD cluster size must be greater than or equal to the pack cluster size and must not be greater than 16. Legal values for the MFD cluster size are 4, 8, or 16.

Response — Press RETURN to accept the default response, (16, in this example). Or, specify the value 4, 8, or 16.

SATT.SYS base <13543>?

Explanation — The *SATT.SYS* file controls the use of storage space on a disk through a storage allocation table (SAT). The monitor accesses this file each time you extend or delete files. This question asks where you want to position this file on the disk. It is advantageous to position the *SATT.SYS* file near the center of the disk to reduce average seek times for the disk heads. On the other hand, if you use only the first half of a disk or need to create large contiguous files, you may want to locate *SATT.SYS* in a place other than the center. This reduces fragmentation of the disk.

The number that appears within brackets is the center of the disk as calculated by DSKINT (13543, in this example). The device cluster number can range from 1 to the total device size divided by the device cluster size. See Table 23 for a list of device cluster sizes and total device sizes.

Response — Press RETURN to have DSKINT position the file near the center of the disk.

Or, type the device cluster number where you want the file placed.

Table 23: Device Cluster Sizes and Total Device Sizes

Disk Type	Device Cluster Size	Total Available Blocks **
RX50*	1	799
RC25	1	50901 per unit; 2 units per spindle
RD51	1	21599
RD52	1	60479
RK05*	1	4800
RK05F*	1	4800 per unit; 2 units per drive
RL01	1	10220
RL02	1	20460
RK06	1	27104
RK07	1	53768
RC25	1	50901
RP02	2	39998
RD51	1	21599
RP03	2	79998
RD52	1	60479
RM02	4	131648
RD53	4	138668
RM03	4	131648
RP04	4	171796
RP05	4	171796
RA80	4	237208
RM80	4	242572
RP06	8	340664
RA60	8	400168
RM05	8	500352
RA81	16	891056
* You cannot use these disks as system disks.		
** Total available blocks represent the number of blocks when the disk is initialized at the device cluster size.		

Pre-extend directories <NO>?

Explanation — This question asks if you want DSKINT to automatically allocate a maximum of seven clusters to the system account [0,1], the LB: library account [1,1], the system library account [1,2], and the MFD and GFDs for groups 0 and 1. The number of blocks each of these seven clusters contain depends on how you answered the cluster size questions for each of these accounts. For example, if you

DSKINT

specify 16 as the cluster size for account [1,2] and answer YES to this question, DSKINT allocates the maximum of seven clusters to this account. Each cluster is 8,192 bytes (16 times 512 bytes).

Response — Type YES to have DSKINT automatically allocate a maximum of seven adjacent clusters to these accounts. Or, type NO or press RETURN if you want DSKINT to allocate only the minimum of 0 or 1 clusters.

PUB, PRI, or SYS <PRI>?

Explanation — This question asks you to designate the disk you are initializing as either public, private, or system. The system disk is the disk on which the RSTS/E monitor resides. It always contains account [1,2].

Response — Type PUB, PRI, or SYS.

Create [1,1] account <NO>?

Explanation — This question appears only if you type PUB or PRI to the previous question. It asks if you want to create account [1,1]. DSKINT automatically creates account [1,1] if you typed SYS to the previous question.

Response — Type YES to create this account. DSKINT then prints the next question.

Or, type NO or press RETURN if you do not want to create account [1,1] at this time. DSKINT then skips the next question. You can also use the CREATE/ACCOUNT command to create, pre-extend, and position account [1,1] on line during timesharing.

[1,1] cluster size <16>?

Explanation — This question asks for the cluster size of the User File Directory (UFD) for account [1,1]. The UFD is an area on the disk that stores information about the files created under a particular user account number. The cluster size for account [1,1] is the maximum number of 512-byte blocks that each cluster allocated to this account can contain.

Response — Press RETURN to accept the default response of 16.

Or, type the cluster size for account [1,1]: 1, 2, 4, 8, or 16. It must be greater than or equal to the pack cluster size and must not be greater than 16. DIGITAL recommends a cluster size of 16 to improve disk access time.

Create [1,2] account <NO>?

Explanation — This question appears only if you type PUB or PRI to the PUB, PRI, or SYS? question. It asks if you want to create account [1,2]. DSKINT automatically creates account [1,2] if you typed SYS to the PUB, PRI, or SYS? question.

Response — Type YES to create this account. DSKINT then prints the next question.

Or, type NO or press RETURN if you do not want to create account [1,2] at this time. DSKINT then skips the next question. You can also use the CREATE/ACCOUNT command to create, pre-extend, and position account [1,2] on line during timesharing.

[1,2] cluster size <16>?

Explanation — This question asks for the cluster size of the UFD for account [1,2]. The cluster size for account [1,2] is the maximum number of 512-byte blocks that each cluster allocated to this account can contain.

Response — Type the cluster size for account [1,2]: 1, 2, 4, 8, or 16. It must be greater than or equal to the pack cluster size and must not be greater than 16. DIGITAL recommends a cluster size of 16 to improve disk access time. Or, press RETURN to accept the default response (16, in the example).

[1,1] and [1,2] account base <13541>?

Explanation — This question asks whether you want to place accounts [1,1] and [1,2] near the center of the disk or in some other place. The number that appears within brackets is the position of SATT.SYS, that is, the number you specified to the SATT.SYS base? question, or the middle of the disk as calculated by DSKINT if you specified RETURN to that question (13541, in the example). DSKINT may show a different number for your disk.

Response — Press RETURN to place these accounts near the center of the disk.

Or, type the device cluster number where you want these files placed. The device cluster number can range from 1 to the total device size divided by the device cluster size. See Table 23 for a list of device cluster sizes and total device sizes.

Date last modified <YES>?

Explanation — This question asks whether you want to retain the date on which files were last modified (written to) or last accessed (written to, opened, read from, closed, and so forth).

Response — Type YES or press RETURN to retain the date on which files were last modified. This response is useful if you plan to use the BACKUP system program to back up files that have changed since the last backup. This response also decreases disk activity because the RSTS/E monitor updates the date only if the files are written to.

Or, type NO to retain the date on which files were last accessed. This response is useful for reordering the files, so the most frequently accessed files can be placed at the beginning of the directory. This response increases disk activity because the RSTS/E monitor updates the date no matter how the file is accessed for reads or writes.

New files first <NO>?

Explanation — This question asks if you want newly created files placed at the beginning or end of the directory of the account in which they are created.

Response — DIGITAL recommends that you type NO or press RETURN to place newly created files at the end of the directory, giving you overall faster access time.

Or, type YES to place newly created files at the beginning of the directory. This response is useful when you have a private disk on which the files you most frequently access are new files.

Read-only <NO>?

Explanation — This question asks if you want this disk to be by default a read-only or a read/write device when it is logically mounted. You can write to a read-only disk when you logically mount it with the /WRITE qualifier.

Response — Press RETURN to make the disk read/write.

Use previous bad block info <YES>?

Explanation — This question does not appear if you are initializing a new disk. The question asks if you want DSKINT to create a new bad block file (BADB.SYS) in system account [0,1] by using information from the existing bad block file. DSKINT checks each block on the disk (if you answer 1, 2, or 3 to the Patterns? question that comes later). If DSKINT finds unreliable blocks, it allocates the pack cluster in which the block resides to the BADB.SYS file.

Response — DIGITAL recommends that you type YES or press RETURN to create the new bad block file, using information from the existing bad block file.

Or, type NO to have DSKINT ignore the current bad block file when creating the new one. For example, you may want to answer NO if you are reinitializing a disk to decrease the pack cluster size. In this case, you will also obtain new bad block information using 3 patterns as explained in the Patterns? question later.

Format <NO>?

Explanation — This question asks if you need to format your disk. Formatting a disk means that DSKINT writes timing and sense marks onto the disk and destroys any information that previously existed on the disk. You must format the following disks if you are initializing them for the first time: RK05, RK05F, RP02, RP03, RP04, RP05, RP06.

You can optionally reformat these disks: RK06, RK07, RM02, RM03, RM05.

You cannot format or reformat (in which case this question would not appear) these disks: RL01, RL02, RA60, RA80, RA81, RC25, RM80, RD51, RD52, RD53, and RX50.

Note

If you are formatting a disk, DIGITAL recommends that you mount the disk on the drive and leave it spinning for at least 20-30 minutes before initializing it. This ensures that the disk temperature is stable and uniform during the formatting. Failure to do this may cause unreliable data storage on the disk.

Response — Type YES to format the disk. Or, type NO or press RETURN if you do not need to format the disk.

Patterns <3>?

Explanation — This question asks for the number of patterns DSKINT should use in checking for bad blocks. DSKINT writes a pattern to the disk, and then reads it to check that the data was written correctly. The time DSKINT takes to run these pattern checks for bad blocks depends on the disk you are initializing. Type a ? to have DSKINT print the time (in minutes) required for the different disks to complete one format check for bad blocks.

Response — Type the number of patterns, from 0 to 3. DIGITAL recommends you run 3. Any bad blocks discovered during pattern checking are added to the bad block file (BADB.SYS) so that data will not be written to these blocks. If you specify 0, DSKINT then asks the next question.

Erase disk <YES>?

Explanation — This question, which appears only if you answered 0 to the Patterns? question, asks if you want to erase the disk. If you answer YES, DSKINT wipes out all data on the disk: this is usually done for security purposes.

If you answer NO, DSKINT writes only the basic RSTS/E file structure on the disk. Use the NO response under the following conditions:

- You are initializing a disk that has been initialized before.
- You answered YES to the Use previous bad block info? question.
- You are confident no additional bad blocks are on the disk.
- You are not concerned about the security of old data that could still be accessed.

Response — Type YES or press RETURN to erase the disk. Or, type NO to write only the basic RSTS/E file structure on the disk.

Proceed (Y or N)?

Explanation — This question allows you to check your responses to the dialogue questions and abort the initialization if you have made any errors.

DSKINT

Response — Type Y to proceed with the disk initialization.

Or, type N to abort the initialization and return to the Option: prompt.

Note

When you are formatting RP02 or RP03 disks, DSKINT prints two requests after the Starting and Ending format pass messages:

SET FORMAT ENABLE SWITCH, THEN TYPE <RET>:

Set the RP11 controller FORMAT ENABLE/NORMAL switch to ENABLE, then press RETURN.

SET FORMAT SWITCH TO NORMAL, THEN TYPE <RET>:

Set the RP11 controller FORMAT ENABLE/NORMAL switch to NORMAL, then press RETURN.

Option:

Explanation — INIT.SYS completes the disk initialization. Then it prints the Option: prompt.

Table 24 lists the DSKINT error messages. If your error message does not appear there, see Appendix A.

Table 24: DSKINT 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 make the drive ready and press RETURN to proceed, or you can press 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. Enter a valid name.
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 system.

HARDWR — Adjust the Hardware Configuration

The HARDWR option performs tasks related to the hardware your RSTS/E monitor supports. The following sections describe the HARDWR suboptions. These suboptions affect your system disk, not your installed monitor. Thus, if you add or remove non-standard hardware, you may need to use these suboptions again. However, if you only install a different monitor, you do not need to use these suboptions again.

The HARDWR suboptions are:

- HARDWR LIST – List the Hardware Configuration Table
- HARDWR DISABLE – Disable a Device Controller
- HARDWR ENABLE – Enable a Device Controller
- HARDWR CSR – Declare a Nonstandard Controller Address
- HARDWR VECTOR – Declare a Nonstandard Vector Assignment
- HARDWR RESET – Set All Controller Addresses and Vector Assignments to the Standard, and Enable All Devices
- HARDWR DM – Declare DM11-BB and DH11 Associations
- HARDWR UNITS – Associate an RK05 Disk Type With a Controller
- HARDWR HERTZ – Specify AC Line Frequency
- HARDWR SWITCH – Specify CPU Switch Register Characteristics

Table 25 lists the error messages for the various HARDWR suboptions. If your error message does not appear there, see Appendix A.

Table 25: HARDWR 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.

HARDWR LIST — List the Hardware Configuration Table

The LIST suboption lists the *hardware configuration table*. This table shows the current hardware configuration and allows you to verify any changes you have made.

Use the LIST suboption if:

- You want to list the current hardware configuration table.
- You need to list the table to see what changes you have made to your hardware configuration.

LIST Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? LIST

Response — Type LIST or LI to list the hardware configuration table.

Name	Address	Vector	Comments
TTO:	177560	060	
RK:	177400	220	RK05F units: none
RL:	174400	160	Units: 0(RLO2)
RM:	177440	210	Units: 2(RK07)
RR:	176700	254	Units: 0(RM02 DP)
RU0:	172150	2340	UDA50 Units: 2(RA80)
TU:	172440	224	Units: 0(TU16 @TM02 #0)
LP0:	177514	200	
D10:	160050	300	
XM0:	160100	310	
DZ0:	160120	320	
DZ1:	160130	330	
KW11L	177546	100	
SR	177570		
DR	177570		

Hertz = 60.

Other: FPU, CIS, 22-Bit, Data space, Cache

HARDWR suboption?

Explanation — In this example, taken from a PDP-11/44, LIST prints the hardware configuration. (Note that LIST prints only a partial list of the hardware configuration table if you have not installed a monitor.)

If you have changed any of the configured hardware, LIST prints the number of changes that HARDWR will make when you exit from the option. When you exit from the HARDWR suboption? prompt, INIT.SYS scans the entire hardware

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configuration and reboots the disk. Because there are no changes pending in the example, LIST does not print anything.

The hardware configuration table 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 nonstandard 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 disabled or nonexistent.

Each line has four columns:

Name	The name and number of the device controller
Address	The address of the controller's CSR set
Vector	The controller's vector address. If the device has two vectors, HARDWR prints the lower address; an asterisk (*) precedes a nonstandard CSR or vector address. A lowercase "p" precedes a programmable vector, which indicates that the initialization code assigned the vector address.
Comments	Information about the controller or devices on that controller. Table 26 summarizes the comments that may be in the listing for each controller.

In a parenthetical change line, the Address column contains either a nonstandard address or the word SYSTEM. SYSTEM means that INIT.SYS will find the CSR set according to the standard fixed and floating address rules when it bootstraps the system disk. (See Appendix B for a discussion of fixed and floating address rules.) The Vector column in a change line is blank or contains the nonstandard vector address that you specified.

Following the hardware configuration table, LIST prints several lines of information. The information reported depends on what hardware your system supports. Table 27 summarizes what you might see on your hardware configuration table.

Response — Type EXIT or press RETURN to return to the Option: prompt.

Table 26 lists the comments that you may see in a controller listing.

Table 26: Hardware Comments Table

Device	Comment and Meaning
ALL	Disabled Device is (or will be) disabled.
ALL	Not found Device was not found.
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). The disk type appears in parentheses after each unit number.
RM	units: m(RK07)... t(RK07) m through t are unit numbers of drives that exist on the controller (8 are possible). The disk type appears in parentheses after each unit number.
RP	RP03 units: m...t m through t are unit numbers of RP03 disks that exist on the controller (8 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, RM03, RM05, RM80, RP04, RP05, RP06)... t(RM02, RM03, RM05, RM80, RP04, RP05, RP06) m through t are unit numbers of drives that exist on the controller (8 are possible). The disk type appears in parentheses after each unit number. Following the disk type is DP, if that unit is a dual-ported disk.
RU	UDA50A units: m (RA60, RA80, RA81)... t(RA60, RA80, RA81) RC25 units: m(RCF25, RC25)... t(RCF25, RC25) RQDX unit: m(RD51, RD52, RD53, RX50) m through t are unit numbers of drives that exist on the controller (4 are possible). The disk type appears in parentheses after each unit number.
MU	TK50 unit: m(TK50) m is the unit number of the drive that exists on the controller. The disk type appears in parentheses after each unit number.
TS	units: m(TS11, TK25, TS05, TU80)... m is the unit number of the drive that exists on the controller. The tape type appears in parenthesis after the drive type.

(continued on next page)

Table 26: Hardware Comments Table (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). The tape type, formatter type, and the formatter number appear in parentheses after each unit 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.

Table 27 lists what you may see on your hardware configuration table.

Table 27: Summary Hardware Configuration Table

Mnemonic	Line and Meaning
KW11-L	177546 100 Reports the address and vector of the KW11-L line clock.
KW11-P	172540 104 If the system has a KW11-P clock, reports its address and vector.
SR	177570 VOLATILE DISABLED If the CPU has a switch register, reports its address. If you have used the SWITCH suboption to specify that the switch register is VOLATILE or DISABLED, it reports that choice.
SR	VOLATILE DISABLED The CPU does not have a switch register, but you have used the SWITCH suboption to ENABLE or DISABLE it.
(SR	DISABLED) ENABLED VOLATILE There is a pending change from the SWITCH suboption.
DR	177570 If the CPU has a display register, its address is reported.

(continued on next page)

Table 27: Summary Hardware Configuration Table (Cont.)

Mnemonic	Line and Meaning
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 (CIS) option.
FPU with FPA	The CPU has the Floating Point Processor (FPP) option. FPA indicates that the CPU also includes the Floating Point Accelerator. You only see the with FPA on J11 or F11 CPUs.
FIS	The CPU has the Floating Instruction Set (FIS) option (PDP-11/35 and 11/40 only).
SL	The CPU has a stack limit register.
MED	The CPU has the Maintenance Examine/Deposit instruction (PDP-11/60 only).
CACHE	The CPU has main memory cache.
CACHE W/ADDRESS	The CPU retains address information on a memory fault.
22-BIT	The CPU supports more than 124KW of memory.
SYSTEM ID = nnnnn	The contents of the CPU identification register are reported, if the register exists.
F11 CPU	The processor type is F11 (PDP-11/23 or 11/24).
J11 CPU	The processor type is J11 (PDP-11/73, 11/83, or 11/84).
11/44 CPU	The processor type is a PDP-11/44.

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HARDWR DISABLE — Disable a Device Controller

The DISABLE suboption disables a device controller; that is, makes it unavailable for use. For example, the RM controller controls all RK06 and all RK07 disk drives. If you disable the RM controller, you disable all RK06 and RK07 disk drives.

Use the DISABLE suboption if:

- You need to disable a controller that needs repairs.
- You need to disable an erroneously detected controller. For example, you may have installed a TS11 magnetic tape drive at a nonstandard CSR address of 177170. However, INIT.SYS expects to find the RX01/RX02 flexible diskette controller at this address. If you do not use the CSR suboption to declare the TS11 as having a nonstandard CSR, then you must disable the device by disabling the RX (really TS11) controller.

In some cases, INIT.SYS interprets a nonstandard device (a device not supported by RSTS) as a normal PDP-11 device. This means INIT.SYS enables the nonexistent PDP-11 device.

DISABLE Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the the INIT.SYS Option: prompt.

HARDWR suboption? DISABLE

Response — Type DISABLE or DI to disable a controller.

Controller to disable? ?

Explanation — DISABLE asks for the name of the controller to disable. Before you do that, however, it may be useful to list the valid controller names.

Response — Type a ? to list the valid controller names.

Name	Max no	Description
TT	1	Console terminal
RK	1	RK05/RK05F disk
RL	1	RL01/RL02 disk
RM	1	RK06/RK07 disk
RP	1	RP02/RP03 disk
RB	1	RP04/RP05/RP06 disk
RR	1	RM02/RM03/RM05/RM80 disk
RU	2	MSCP class disks
TC	1	TC11 DECTape
TS	4	TS11/TSV05/TK25/TU80 magtape
TM	1	TU10/TE10/TS03 magtape
TU	1	TU16/TE16/TU45/TU77 magtape

(continued on next page)

PR	8	PaPer tape reader
PP	8	PaPer tape Punch
LP	8	Line Printer
RX	4	RX11 flexible diskette
CR	8	CR11/CM11 card reader
CD	8	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 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
DI	16	DUP11 single-line synchronous interface
XM	16	DMC11/DMR11 interProcessor link
DZ	16	DZ11/DZV11 8 line multiplexer
XK	16	KMC-11 microProcessor
XD	16	DMP11/DMV11 interProcessor link
XN	16	DN11 automatic calling unit interface
XE	16	DEUNA Ethernet controller
VH	16	DHV11/DHU11 8/16 line multiplexer

Controller to disable?

Explanation — The first column of this list contains the name of the controller. The second column shows the maximum number of each type of controller that a RSTS/E monitor can support. The third column describes the devices controlled by the controller.

After DISABLE prints the list of valid controllers, it asks for the name of the controller to disable.

Response — Type the two-character name and unit number of the controller you need to disable. Controllers are numbered from 0 to the maximum number possible, minus 1. You can omit the controller number only if the maximum number of that controller is 1. For example, you could type RL to this question rather than RL0 because the maximum number of RL controllers that a RSTS/E monitor can support is 1. On the other hand, if you need to disable the line printer controller, you have to include the number because the RSTS/E monitor can support more than one line printer controller.

Press CTRL/Z or the RETURN key to exit from this suboption without specifying a controller name.

HARDWR suboption?

Explanation — HARDWR does not immediately disable the controller specified in the previous question, but returns to the HARDWR suboption? prompt. This lets you check your responses by listing the current hardware configuration table.

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Response — Type LIST or LI. Type EXIT or press RETURN to return to the Option: prompt. Press CTRL/C to cancel any changes and return to the Option: prompt.

HARDWR makes the indicated changes, bootstraps your system disk, and prints one of three messages:

- **Option:**

The Option: prompt indicates you have made no hardware changes or that INIT.SYS has previously completed a scan of the hardware configuration.

- `nn changes being made
Rebooting...`

The value nn represents the number of changes that INIT.SYS will make after it bootstraps the system disk. INIT.SYS scans the entire hardware configuration as it reboots the system disk.

- `Enabling all devices,
nn changes pending
Rebooting...`

This message indicates that INIT.SYS previously completed only a partial scan of the hardware configuration. The value nn represents the number of changes you have indicated (or it means you have used the RESET suboption). INIT.SYS makes the changes and scans the entire hardware configuration as it reboots the system disk.

HARDWR ENABLE — Enable a Device Controller

The ENABLE suboption of HARDWR enables a device controller; that is, makes it available for use. For example, the RM controller controls all RK06 and RK07 disk drives. If you enable the RM controller, you enable all RK06 and RK07 disk drives.

This suboption is related to the HARDWR DISABLE suboption. Just as you use the ENABLE suboption to enable a controller, you use the DISABLE suboption to disable a controller.

Use the ENABLE suboption if:

- You need to enable a controller that was previously disabled.
- You need to enable a controller automatically disabled by INIT.SYS.

ENABLE Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? ENABLE

Response — Type ENABLE or EN to enable a controller.

Controller to enable?

Explanation — ENABLE asks for the name of the controller to enable. Before you do that, however, it may be useful to list the valid controller names by typing a question mark (?). The list you receive contains the name of the controller, the maximum number of each type that the RSTS/E monitor can support, and a description of the controller. See the previous section for an example of this list, or print it on your console terminal.

Response — Type the two-character name of the controller you need to enable. Controllers are numbered from 0 to the maximum number possible, minus 1. You can omit a controller number only if the maximum number supported by the RSTS/E monitor is 1. For example, you could type RL to this question rather than RL0 because the maximum number of RL controllers that a RSTS/E monitor can support is 1. On the other hand, if you need to enable the line printer controller, you have to include the number because the RSTS/E monitor can support more than 1 line printer controller.

Or, press CTRL/Z to exit from this suboption without specifying a controller name.

HARDWR suboption?

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Explanation — HARDWR does not immediately enable the controller, but returns to the HARDWR suboption? prompt. This lets you check your responses by listing the current hardware configuration table.

Response — Type LIST or LI to see the current hardware configuration table. Type EXIT or press RETURN to return to the Option: prompt. Press CTRL/C to cancel any changes and return to the Option: prompt.

After you type EXIT or press RETURN, HARDWR makes the specified changes, bootstraps your system disk, and prints one of three messages (see the previous section, Disable a Device Controller).

HARDWR CSR — Declare a Nonstandard Controller Address

The CSR suboption of HARDWR sets a nonstandard controller address for a device controller's *Control Status Register (CSR)* set. The CSR set is the unique set of addresses on the UNIBUS associated with a particular device controller.

When you bootstrap the INIT.SYS program, it checks the number of each type of controller on the system by applying standard rules for locating the CSR set. See Appendix B for a discussion of the checks performed by INIT.SYS.

Use the CSR suboption only if:

- You need to install a controller at another address because you have nonstandard hardware.
- You need to rearrange device controller addresses.

However, in general it is not a good idea to assign controllers nonstandard addresses. Perform this task only as a temporary measure until you have the address assignment corrected.

CSR Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? CSR

Response — Type CSR to specify a nonstandard address for a device controller.

Controller with non-standard address?

Explanation — This question asks for the name of the controller that requires a nonstandard CSR address.

Response — Type the two-character controller name and its number. Controllers are numbered from 0 to the maximum possible number of controllers, minus 1. You can omit the controller number only if the maximum number of that controller is 1. For example, you could type RL to this question rather than RL0 because the maximum number of RL controllers that the RSTS/E monitor can support is 1.

You can also type a ? to have HARDWR print a list of valid controller names. This list contains the name of the controller, the maximum number of each type that the RSTS/E monitor can support, and a description of the devices controlled by the controller. (See the section, Disable a Device Controller, for an example of this list, or print it on your console terminal.)

New controller address?

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Explanation — This question asks for the nonstandard CSR address for the controller you specified in the previous question.

Response — 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.

Or, type REMOVE or RE to remove the nonstandard address (if you have used this option before) and return to the standard setting.

Press CTRL/Z to return to the HARDWR suboption? prompt without specifying a new CSR address.

HARDWR suboption?

Explanation — HARDWR does not immediately assign the address you specified to the nonstandard controller, but returns to the HARDWR suboption? prompt. This lets you check your responses by listing the current hardware configuration table.

Response — Type LIST or LI to list the current hardware configuration table. Type EXIT or press RETURN to return to the Option: prompt.

After you type EXIT or press RETURN, HARDWR makes the specified changes, bootstraps your system disk, and prints one of three messages (see the previous section, Disable a Device Controller).

HARDWR VECTOR — Declare a Nonstandard Vector Assignment

The VECTOR suboption of HARDWR specifies a nonstandard vector address for a device controller.

Note

This task is for DIGITAL Field Service representatives who might have to perform it during hardware installation.

Use the VECTOR suboption only if:

- You need to specify a nonstandard vector address for a device controller because INIT.SYS cannot determine its vector.
- The hardware configuration includes more than one card reader.
- The hardware configuration includes a card reader that has a nonstandard vector.

In all other circumstances, INIT.SYS attempts to find the correct interrupt vector for the device and uses what it finds.

For controllers that contain a programmable vector register (MSCP and TMSCP class controllers), INIT.SYS assigns the first unused vector in the floating vector range to that controller.

A controller's vector address directs the central processor to the proper routines when that controller requests an interrupt. When you bootstrap the system, INIT.SYS checks each device controller's vector address assignment by forcing each device to interrupt. INIT.SYS checks these addresses against a table of reserved locations. If a device does not respond, INIT.SYS prints a message at your console terminal and disables the device.

INIT.SYS also checks whether more than one device has the same vector address. If so, INIT.SYS prints a message:

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

where vvv represents the octal address of the incorrect vector.

Table 28 lists the locations reserved for hardware. You cannot use these locations as device vector assignments.

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Table 28: Reserved Hardware Locations

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 Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? VECTOR

Response — Type VECTOR or VEC.

Controller with non-standard vector?

Explanation — This question asks for the name of the controller that requires a nonstandard vector address.

Response — Type the two-character controller name and its number. Controllers are numbered from 0 to the maximum possible number of controllers, minus 1. You can omit the controller number only if the maximum number of that kind of controller is 1. For example, you could type RL to this question rather than RL0 because the RSTS/E monitor supports only 1 RL controller.

You can also type a ? to have HARDWR print a list of valid controller names. This list contains the name of the controller, the maximum number of each type that the RSTS/E monitor can support, and a description of the controller. See the section, Disable a Device Controller, for an example of this list, or print it on your console terminal.

New vector address?

Explanation — This question asks for the nonstandard vector address for the controller you specified in the previous question.

Response — Type the nonstandard vector address, which is the 3-digit octal address of the lowest vector for the device controller. The address must be an even number. See Table 28 for the reserved addresses.

Or, type REMOVE or RE to remove a nonstandard vector address and return to the standard address.

Press CTRL/Z to return to the HARDWR suboption? prompt without specifying a new vector address.

HARDWR suboption?

Explanation — HARDWR does not immediately assign the nonstandard vector address to the controller, but returns to the HARDWR suboption? prompt. This lets you check your responses by listing the current configuration table.

Response — Type LIST or LI to list the current hardware configuration table. Type EXIT or press RETURN to return to the Option: prompt.

After you type EXIT or press RETURN, HARDWR makes the specified changes, bootstraps your system disk, and prints one of three messages (see the section, Disable a Device Controller).

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HARDWR RESET — Set All Vector and CSR Addresses to the Standard, and Enable All Devices

The RESET suboption of HARDWR causes INIT.SYS to reboot your system disk and perform a complete hardware scan. Thus, INIT.SYS returns all CSR and vector addresses to their standard addresses, enables all devices, and associates each DM11-BB unit with the DH11 multiplexer that has the same unit number.

Use the RESET suboption only if you have made no changes to your hardware; that is, you have not assigned any nonstandard CSR or vector addresses.

RESET Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? LIST

Explanation — Before using RESET, always list the current hardware configuration to see if there are any CSR or VECTOR changes. See the section, HARDWR LIST, for an example of the hardware configuration table.

Response — Type LIST or LI. Or, type EXIT or press RETURN to return to the Option: prompt.

HARDWR suboption? RESET

Explanation — After LIST prints the current hardware configuration, it returns to the HARDWR suboption? prompt.

Response — Type RESET or RE.

HARDWR suboption?

Explanation — RESET returns all device characteristics to the standard CSR and VECTOR addresses. Then it returns to the HARDWR suboption? prompt.

Response — Type LIST or LI to list the current hardware configuration table. See the section, HARDWR LIST, for an example of the hardware configuration table. After you list the hardware configuration table, type EXIT or press RETURN to return to the Option: prompt.

HARDWR DM — Declare DM11-BB and DH11 Associations

The DM suboption of HARDWR associates each DM11-BB modem controller with the correct DH11 multiplexer.

Use the DM suboption if the DM11-BB modem controllers are not associated with the correct DH11 multiplexers.

The DH11 multiplexer allows you to connect from 1 to 16 terminals to your PDP-11. In other words, the DH11 multiplexer has 16 lines, numbered from 0 to 15.

The DM11-BB modem controller allows you to connect a dial-up telephone to the DH11 multiplexer. A DM11-BB modem controller also has 16 lines. A one-to-one relationship exists between these two pieces of hardware; thus, a PDP-11 can have only as many DM11-BB modem controllers as there are DH11 multiplexers. Therefore, a PDP-11 can support a maximum of 16 DH11 multiplexers.

DM11-BB modem controllers and DH11 multiplexers must meet the following conditions:

- A DM11-BB controller's lines can be connected to modem lines on only one DH11 multiplexer. For example, you could not connect the DM11-BB controller lines to DH11 units 0 and 1.
- A DM11-BB controller's line numbers must be the same as the line numbers of its associated DH11 multiplexer. For example, DM11-BB line number 4 can be connected only to DH11 line number 4.

The RSTS/E monitor cannot determine which DM11-BB modem controller is associated with a specific DH11 multiplexer (assuming of course that there is more than one DH11 multiplexer). Therefore, the RSTS/E monitor assumes that DM11-BB unit number 0 is associated with DH11 multiplexer unit 0. The RSTS/E monitor does not require that DM11-BB and DH11 unit numbers be the same. For example, you could connect DM11-BB unit number 2 to DH11 unit number 4.

DM Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? DM

Response — Type DM.

DH for DM0 (0, NX)?

Explanation — This question asks for the unit number of the DH11 multiplexer you want to associate with DM11-BB unit 0. NX means that the unit is nonexistent. The DM suboption 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

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DH11 unit number with a DM11-BB unit that is not on the system, but is expected in the future.

Response — Type the unit number or press RETURN to accept the default.

Or, press CTRL/Z to return to the HARDWR suboption? prompt without declaring any DM11-BB and DH11 associations.

HARDWR suboption?

Explanation — DM does not immediately assign the unit numbers of any DH11 multiplexers to their associated DM11-BB modem controllers, but returns to the HARDWR suboption? prompt. It is useful to list the hardware configuration table to verify that these changes will occur.

Response — Type LIST or LI to list the current hardware configuration table. (The hardware configuration table is not repeated in here.) After you list the hardware configuration table, type EXIT or press RETURN to have DM make the changes and return to the Option: prompt.

HARDWR HERTZ — Specify AC Line Frequency

The HERTZ suboption of HARDWR specifies AC line frequency for your system.

Use the HERTZ suboption only if you need to specify the correct AC line frequency for your system.

HERTZ Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? LIST

Explanation — HARDWR prints the HARDWR suboption? prompt. Before using HERTZ, always list the current hardware configuration to see if the AC line frequency is correct for your installation. (See the section, HARDWR LIST, for an example of the hardware configuration table.)

Response — Type LIST or LI. Or, type EXIT or press RETURN to return to the Option: prompt.

HARDWR suboption? HERTZ

Explanation — If the table shows an incorrect AC line frequency for your installation, then you must correct it. The AC line frequency is the basis for all system timing.

Response — Type HERTZ or HE.

New AC line hertz?

Explanation — The question asks for the AC line frequency for your installation.

Response: Type 50 if your AC line frequency is 50 Hz (commonly used in Europe); type 60 if your AC line frequency is 60 Hz (commonly used in the United States). The line frequency always defaults to 60 Hz when you install a new monitor. If your installation requires an AC line frequency of 50 Hz, then every time you install a new monitor, you need to use the HERTZ suboption to change the frequency from 60 to 50 Hz.

If you have both a KW11L and KW11P clock, INIT.SYS properly determines the frequency of your power.

HARDWR suboption?

Explanation — After you indicate the AC line frequency, you should list the hardware configuration table, to verify that the change will occur.

Response — Type LIST or LI to list the hardware configuration table. Type EXIT or press RETURN to return to the Option: prompt.

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HARDWR SWITCH — Specify CPU Switch Register Characteristics

The SWITCH suboption of HARDWR specifies the characteristics of your CPU's console switch register. The console switch register controls:

- The automatic restart feature of RSTS/E during system crashes
- The RSTS/E statistics package

When the monitor crashes, except for power failures, it looks at the switch register. If bit 0 is set to 1, the system performs an autorestart. If bit 0 is not set to 1, (regardless of the setting of the other switches), the system does not start automatically because it looks at the contents of bit 0.

Statistics gathering in the monitor, which you select by answering Y to the Monitor statistics? configuration question, depends on bits 15 and 14 in the switch register (values 100000 and 040000, respectively). These bits have the following meaning:

Bit 15 = 1 Statistics are gathered. Bit 14 is ignored.

Bit 15 = 0 Statistics are not gathered. Bit 14 is not ignored but instead affects the contents of the statistics counters. If bit 15 equals 0 and bit 14 equals 1, the system leaves the values of the current statistics counters untouched (frozen). If bit 15 equals 0 and bit 14 equals 0, the system resets all statistical counters to zero.

Use the SWITCH suboption only if you want to specify the characteristics of your CPU's console switch register.

SWITCH Dialogue

Option: HARDWR

Response — Type HARDWR or HA to the INIT.SYS Option: prompt.

HARDWR suboption? SWITCH

Response — Type SWITCH or SW.

Switch register?

Explanation — Because some CPUs do not have switch registers or have switch registers that cannot retain the original register contents after a power failure, SWITCH lets you put the switch register contents in one of three logical positions: ENABLE, DISABLE, or VOLATILE.

The response you select and your console switch register setting determine how your system recovers after a system crash. Systems that crash due to power failure have restart capabilities only if they are configured with both *nonvolatile memory* — memory that is not destroyed during power failure — and a nonvolatile switch register.

Response — Type DISABLE, ENABLE, or VOLATILE:

- **DISABLE** means RSTS/E does not look at the switch register. This means your system, by default, automatically restarts and continues to gather statistics as well. (Note that you must answer Y to the Monitor statistics? configuration question in Task 6 of Phase 3 in Part I if you want this feature.)
- **ENABLE** means statistics gathering during timesharing responds to the setting of bits 14 and 15 in the switch register. This means that when the system crashes, RSTS/E looks at the switch register after the crash to see if it should restart.
- **VOLATILE** means statistics gathering during timesharing responds to the setting of bits 14 and 15 in the switch register. VOLATILE has the same meaning as ENABLE except that when power fails, RSTS/E always tries to restart automatically. The ability to restart a RSTS/E system after a power failure depends on the hardware memory configured on your system. Systems with volatile memory cannot perform autorestart, regardless of the switch contents. By specifying VOLATILE, systems with a volatile switch register but with nonvolatile memory can perform restarts after power failure.

HARDWR suboption?

Explanation — After you specify the switch register characteristics, you should list the hardware configuration table to verify that the change will occur.

Response — Type LIST or LI to list the hardware configuration table. Type EXIT or press RETURN to return to the Option: prompt.

IDENT — List the Version Number and Patch Information

The IDENT option lists the INIT.SYS version number and information about the patches installed on your system. Use the IDENT option if you are submitting an SPR to DIGITAL and need to obtain this information.

IDENT Dialogue

Option: IDENT

Response — Type IDENT or ID to the INIT.SYS Option: prompt.

INIT V9.0-14 [Built DD-MMM-YY]

Option:

Explanation — IDENT prints the INIT.SYS version number, then returns to the Option: prompt.

PATCH — Install a Patch

The PATCH option provides a method for altering RSTS/E system code. Use the PATCH option if you need to correct errors in the system code. Use the PATCH option only as directed by DIGITAL.

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.

DIGITAL publishes mandatory corrections 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*. The following procedures describe the PATCH option in detail. In general, however, published patches include the necessary instructions.

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 install 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, you should install all required patches immediately after installing your RSTS/E monitor.

Table 30 lists the PATCH error messages. If your error message does not appear there, see Appendix A.

PATCH Dialogue

Option: PATCH

Response — Type PATCH or PA to the INIT.SYS Option: prompt.

File to patch?

Explanation — PATCH asks for the file to patch. You can patch any file in account [0,1]. This directory includes the initialization code (INIT.SYS) and any .SIL, .RTS, or .LIB file.

PATCH

Response — Type the name and extension of the file that requires patching. Or, press RETURN to patch the installed monitor SIL. In some cases you may need to append the /N qualifier to the name of any file that is not a SIL.

File found in account [P,Pn]

Explanation — PATCH prints this message if it finds the file.

Module name?

Explanation — The module name designates the SIL module to be patched. You can obtain a list of SIL modules by typing a ? in response to this question.

Response — Type the module name you want to patch.

Base address?

Explanation — 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.

Response — Type the base address of the file you want to patch. Responses can be numbers or expressions. Valid octal numbers are 0 to 177777, and leading zeros 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 may be part of the SIL file. If the symbol table exists, 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. To refer to a global symbol in another module of the current SIL, type the symbol name followed by the commercial at sign (@) and the name of the module in which the symbol is defined. For example, DISK@ERR refers to the symbol DISK in the module ERR.

An expression consists of one or more numbers or global symbols, separated by arithmetic operators (+, -, *, and /). You can use parentheses to group portions of an expression.

Offset address?

Explanation — The offset address is the first location to be patched relative to the specified base. For instance, a PRINT USING patch may begin at offset of 100 octal bytes from the beginning of PRINT USING.

Response — Type the offset address of the file you want to patch. See the previous response for a description of legal values.

Base	Offset	Old	New?
126466	001010	000034	?

Explanation — 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 may have made an error. Remove any changes you have already made and try again.

Response — Table 29 summarizes the possible responses to this prompt.

Table 29: 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.
(RET)	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 RETURN 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 patch procedures correctly and the old contents do not match the published patch, consult your software support representative.

126466 001012 010523 ? (CTRL/C)

Patch complete

Option:

Explanation — You terminate a PATCH operation by entering CTRL/C. PATCH then finishes all patching and returns to the Option: prompt.

If you patch the initialization code, you must reboot the system. Rebooting loads the changed version of the initialization code into memory. To perform the bootstrap procedure, follow the instructions in the published patch and use the INIT.SYS BOOT option.

Response — Type CTRL/C when you have finished the PATCH operation.

Table 30 lists the PATCH error messages. If your error message does not appear there, see Appendix A.

PATCH

Table 30: PATCH 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 file name you typed is in an incorrect format. Or, you pressed RETURN and 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 qualifier to the file name.
MODULE NOT FOUND IN SIL The module you specified is not in the SIL. Type a ? 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.

REFRESH — Perform File-Related Tasks

The REFRESH option performs tasks associated with system files. System files are files that are of particular use to the system itself. They reside in account [0,1]. The following sections describe the REFRESH suboptions.

The REFRESH suboptions are:

- REFRESH LIST — List File Status Table
- REFRESH FILE — Change Account [0,1] File Characteristics
- REFRESH BADS — Expand the Bad Block File

Table 31 lists the REFRESH error messages. If your error message does not appear there, see Appendix A.

Table 31: REFRESH Error Messages

Message and Meaning
CANNOT REFRESH THIS DISK Rerun DSKINT and then try REFRESH again.
CANNOT CHANGE OR MOVE .RTS OR .SIL WITH REFRESH You cannot move or change any files with a .RTS or .SIL file type.
ILLEGAL DISK NAME The response you typed is not a valid disk name. Valid disk names are DK, DL, DM, DP, DR, DB, and DU. Press RETURN to use the system disk.
ILLEGAL SUBOPTION The response you typed is 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.
THAT FILE IS THE CURRENTLY INSTALLED SIL AND CANNOT BE MOVED OR DELETED You cannot move or delete the installed monitor SIL.
TOO MANY BAD BLOCKS There can be no more than 161 clusters in the bad block file.

System File Background Information

System files need contiguous space on the disk. It is better to create system files during system installation when there is sufficient contiguous space on the disk. If you initialized a nonsystem disk, you can create some of these files on the nonsystem disk, freeing space on the system disk.

REFRESH

This section explains the system files. It groups the files into two sets: those files that are automatically created during system installation, and those optional files that you can create according to the needs of your installation.

Automatically created during installation

- SWAP.SYS
- SWAP1.SYS
- BUFF.SYS
- CRASH.SYS

Optional

- SWAP0.SYS
- SWAP3.SYS
- OVR.SYS
- ERR.SYS

Use the `INSTALL FILE/SYSTEM` command (see the *RSTS/E System Manager's Guide*) if you need to recreate some files at different sizes, or create optional files according to the needs of your particular installation.

Table 32 shows the system files, whether they are automatically created or optional, their optimal location, and a formula for calculating the size. The following sections explain this table in more detail.

Table 32: Summary of System File Creation

System File	Status	Location	Size
Automatically Created Files			
SWAP.SYS	INIT.SYS creates this file at the minimum size. (See Task 2 of Phase 7 in Part I.)	First available location, starting from beginning of disk.	1 job * SWAP MAX * 4
SWAP1.SYS	INSTAL.COM creates this file at a size large enough to hold all the jobs on your system. (See Task 1 of Phase 5 in Part I.)	Near SATT.SYS file, usually center of system disk.	(# of jobs - 1) * SWAP MAX * 4
BUFF.SYS	Required for TU56 DECTape. INSTAL.COM creates this file, if needed. (See Task 1 of Phase 5 in Part I.)	Near SATT.SYS file, usually center of system disk.	4 blocks * # of TU56 DECTapes
CRASH.SYS	INIT.SYS creates this file. (See Task 2 of Phase 7 in Part I.)	First available location on system disk.	Sum of low core data region, XBUF pool, FIP buffer pool, MSCP region (cannot be calculated)
Optional Files			
SWAP0.SYS	Optional	Center of nonsystem disk.	# of highly interactive jobs * SWAP MAX * 4
SWAP3.SYS	Optional	Center of nonsystem disk.	# of event-driven jobs * SWAP MAX * 4
OVR.SYS	Optional	Center of system or nonsystem disk.	Maximum of 128 blocks
ERR.SYS	Optional	Center of system or nonsystem disk.	Same size as ERR.ERR (16 blocks)

The SWAP.SYS File

Definition — The *SWAP.SYS* file is one of four available swap files, which stores jobs transferred out of memory.

REFRESH

Status — The SWAP.SYS file is required. Without this file, the monitor cannot swap jobs out of memory; your system will not work. INIT.SYS automatically creates a minimum SWAP.SYS file during system installation at a size large enough to hold 1 job. (See Task 2 of Phase 7 in Part I.)

Location — INIT.SYS positions the SWAP.SYS file on the system disk at the first available location, starting at the beginning of the disk.

Size — The size of the SWAP.SYS file is:

$1 \text{ job} * \text{SWAP MAX} * 4$

The SWAP1.SYS File

Definition — The SWAP1.SYS swap file performs the same function as SWAP.SYS. The monitor uses this file to store *highly interactive jobs* — jobs that get transferred in and out of memory frequently.

Status — The INSTAL.COM command file automatically creates a SWAP1.SYS file during system installation (see Task 1 of Phase 5 in Part I).

Location — INSTAL.COM places this file as close to the SATT.SYS file as possible, usually the center of the system disk.

Size — INSTAL.COM creates the SWAP1.SYS file at a size large enough to hold all the jobs on your system, according to this formula:

$(\# \text{ of jobs} - 1) * \text{SWAP MAX} * 4$

Reasons for Creating — This file provides enough swap file space to accommodate all the jobs on your system. When the monitor transfers a highly interactive job out of memory, it places the highly interactive job in the first available space in a swap file, starting with SWAP0.SYS. If it does not find any space (or SWAP0.SYS does not exist), the monitor looks for space on SWAP1.SYS, then SWAP.SYS, then SWAP3.SYS.

The BUFF.SYS File

Definition — The BUFF.SYS file stores the DECtape directory buffers.

Status — You must have this file for your RSTS/E monitor to support one or more TU56 DECtapes. The INSTAL.COM command file automatically creates BUFF.SYS during system installation, if it is needed. (See Task 1 of Phase 5 in Part I.)

Location — INSTAL.COM creates BUFF.SYS as close to the SATT.SYS file as possible, usually the center of your system disk.

Size — The size of this file depends on how many TU56 DECtapes you plan to support. INSTAL.COM allocates four blocks for each TU56 DECtape.

The CRASH.SYS File

Definition — The *CRASH.SYS* file stores information about the read/write area of the monitor and the extended buffer pool (often called XBUF) when a system crash occurs.

Status — You must have *CRASH.SYS* to enable the crash dump feature. This feature causes the read/write area of the monitor and the extended buffer pool to be dumped into *CRASH.SYS* when a system crash occurs. *INIT.SYS* automatically creates this file during system startup. (See Task 2 of Phase 7.)

Location — *INIT.SYS* positions the *CRASH.SYS* file at the first available location on the system disk.

Size — *INIT.SYS* creates *CRASH.SYS* at a size equal to the sum of these four regions:

- Low core data region of the monitor
- FIP buffer pool
- XBUF pool
- MSCP region, if it exists on the system

Planning the SWAP0.SYS File

Definition — The *SWAP0.SYS* swap file performs the same function as *SWAP1.SYS*. The monitor uses this file to store highly interactive jobs.

Status — *SWAP0.SYS* is an optional system file.

Location — This file is usually located at the center of a nonsystem disk.

Reasons for Creating — Create this file if you have a system and a nonsystem disk, and you want more swap file space. There is no point in having this file on the system disk. When the monitor transfers a highly interactive job out of memory, it places the highly interactive job in the first available space in a swap file, starting with *SWAP0.SYS*. If it does not find any space (or *SWAP0.SYS* does not exist), the monitor looks for space on *SWAP1.SYS*, then *SWAP.SYS*, then *SWAP3.SYS*.

Thus, you can increase the speed of swapping highly interactive jobs by creating *SWAP0.SYS* at the center of the nonsystem disk. The *SWAP1.SYS* file would then not need to exist on your system disk, freeing valuable space and balancing the I/O load on your disks.

Size — Estimated # of highly interactive jobs * SWAP MAX * 4

Planning the SWAP3.SYS File

Definition — *SWAP3.SYS* is a swap file that performs the same function as *SWAP.SYS*. The monitor uses this file to store *event-driven jobs* – jobs that do not get transferred in and out of memory frequently. Examples of event-driven jobs are QUEMAN, ERRCPY, OPSER, and SPOOL.

REFRESH

Status — The SWAP3.SYS file is an optional system file.

Location — This file is usually located at the center of a nonsystem disk.

Reasons for Creating — Create SWAP3.SYS if you have a system and a nonsystem disk, and you want more swap file space. There is no point in creating this file on the system disk. The monitor uses a different method to swap event-driven jobs than it does for highly interactive jobs. Instead of starting with SWAP0.SYS, the monitor places the event-driven job in the first available space starting with SWAP3.SYS. If it does not find any space, the monitor looks for space on SWAP.SYS, then SWAP1.SYS, then SWAP0.SYS.

Thus, you can speed up the swapping of event-driven jobs by creating SWAP3.SYS at the center of the nonsystem disk. The SWAP1.SYS file would then not need to exist on your system disk, freeing valuable space and balancing the I/O load on your disks.

Size — Estimated # of event-driven jobs * SWAP MAX * 4

Table 33 shows the approximate amount of time in seconds needed to transfer different size job images for different disks. Use this information to create swap files on the disks that you feel will give you optimum performance.

Table 33: Swap Times

Disk	Job Size (in words)			
	16K	28K	32K	64K
RL01/02	.13	.18	.19	.32
RK05	.25	.38	.43	.78
RK06/07	.11	.15	.17	.29
RP02/03	.16	.24	.27	.50
RP04	.08	.11	.12	.20
RP05/06	.08	.11	.12	.20
RM02	.08	.11	.12	.20
RM03/05	.06	.08	.09	.14
RM80	.06	.08	.09	.14
RA60	.07	.08	.08	.11
RA80	.06	.08	.09	.14
RA81	.05	.06	.07	.10
RC25	.06	.07	.08	.13
RD51	.14	.17	.19	.29
RD52	.10	.14	.15	.26

The swap times for each disk were calculated using the formula:

$$\text{Swap time} = \text{Avg access time} + \frac{\text{Job size} * 2}{\text{Transfer speed}}$$

where:

Average access time measured in seconds, is defined as the sum of the average seek time and the average latency time.

Transfer speed is measured in kilo-bytes per second (KB/S).

Job size is measured in kilo-words (KW).

See the appropriate Peripherals Handbook for the average access time and transfer speed of a particular disk.

REFRESH

Planning the OVR.SYS File

Definition — The *OVR.SYS* file can store a copy of certain parts of the currently installed monitor save image library (SIL).

Status — You do not need to create *OVR.SYS*. It is an optional system file.

Location — You can create *OVR.SYS* on either the system or nonsystem disk. You should locate *OVR.SYS* as close as possible to the center of the disk, so that the monitor can access it quickly.

Reasons for Creating *OVR.SYS* — *OVR.SYS* stores part of the monitor code that is located in the installed monitor SIL. Since your RSTS SIL is now located at the center of the disk, the *OVR.SYS* file is no longer useful. Create it only if you position the RSTS SIL at the beginning of the disk, or create it in the center of a nonsystem disk to balance the I/O load.

Size — The maximum size of the *OVR.SYS* file is 182 blocks.

Planning the ERR.SYS File

Definition — The *ERR.SYS* file stores a copy of the system error messages, which are located in the *ERR.ERR* file. You copied *ERR.ERR* to your system disk in Phase 2 of Part I.

Status — You do not need to create *ERR.SYS*; it is an optional system file.

Location — Create *ERR.SYS* on a nonsystem disk if you have one. Otherwise, create *ERR.SYS* on the system disk. Locate *ERR.SYS* as close as possible to the center of the system or nonsystem disk to improve access and response time for error messages.

Reasons for Creating *ERR.SYS* — *ERR.SYS* is merely a copy of *ERR.ERR*, but *ERR.ERR* may be located at the beginning of the disk rather than at the center. Files are more quickly accessed when they are located in the center of the disk. You cannot move *ERR.ERR*, but you can locate *ERR.SYS* as close to the center of the disk as possible. Thus, when the monitor needs to access system error messages, it will access *ERR.SYS* instead of *ERR.ERR*, thereby increasing system performance.

If you are not worried about error messages taking a few milliseconds longer, then you do not need to create *ERR.SYS*.

Size — *ERR.SYS* should be the same size as *ERR.ERR*. Use the LIST suboption of REFRESH to see the size of *ERR.ERR* (16 blocks).

Figure 10 provides a system file creation worksheet that allows you to write the sizes and locations of the system files you need to create or change. Note that the formula for calculating the center of the disk for these files is based on the assumption that you placed the *SATT.SYS* file at the center of your disk during disk initialization.

FORMULA FOR LOCATION:

$$(\text{STARTING LBN FOR SATT.SYS}) - \frac{(\text{X TOTAL BLOCKS})}{2} = \text{STARTING LOCATION OF FILES}$$

where:

STARTING LBN
FOR SATT.SYS

is the starting logical block number for the SATT.SYS file. You can find this by looking at the file status table in the LBN column.

X TOTAL
BLOCKS

is the total number of blocks for the system files you want to create on that disk.

System File	Size (in blocks)	Location
SWAP.SYS	_____	_____
SWAP0.SYS	_____	_____
SWAP1.SYS	_____	_____
SWAP3.SYS	_____	_____
OVR.SYS	_____	_____
ERR.SYS	_____	_____
BUFF.SYS	_____	_____
CRASH.SYS	_____	_____

MK-01094-00

Figure 10: System File Creation Worksheet

REFRESH

REFRESH LIST — List File Status Table

The LIST suboption of REFRESH lists the file status table. The *file status table* lists all the files that can reside in account [0,1] of your system and nonsystem disk. You should list the file status table before and after creating or changing any system files.

LIST Dialogue

Option: REFRESH

Response — Type REFRESH or RE to the INIT.SYS Option: prompt.

dd-mm-yy - hh:mm AM/PM

Disk?

Explanation — REFRESH prints the current date and time, then asks for the device designator of your disk.

Response — Possible responses for your disk are: DK, DL, DM, DP, DR, DB, or DU.

Unit?

Explanation — This question asks for the number of the drive on which your system disk is mounted.

Response — Type the unit number of the drive on which your disk is mounted.

Rebuild?

Explanation — This question asks if you want to force a rebuild of a disk that you think might be corrupt. The *rebuild* feature of REFRESH rebuilds the SATT.SYS file and checks the consistency of directories. Normally, you rebuild a disk if it was dismounted improperly.

Response — Type YES to force a rebuild of the disk; type NO if you do not want to force a rebuild of the disk. Even if you type NO, REFRESH rebuilds the disk if it is necessary.

REFRESH suboption? LIST

Explanation — You are now finished with the questions asked by REFRESH and are at the REFRESH suboption? prompt. Now you can list the file status table for the system disk.

Response — Type LIST or LI.

File Name	Required?	File Flags	Status	Current Size	Minimum Size	Start LBN
System files:						
SWAP .SYS	YES	NOD CTG	OK	128	128	1409
SWAP0 .SYS	NO		OK			
SWAP1 .SYS	NO	CTG	OK	4992		4865
SWAP3 .SYS	NO		OK			
QVR .SYS	NO		OK		85	
ERR .SYS	NO		OK		16	
BUFF .SYS	NO		OK			
CRASH .SYS	NO	NOD CTG	OK	313	86	1537
Others:						
BADB .SYS		NOD		20		
SATT .SYS		NOD CTG		4		26873
ERR .ERR		NOD CTG		16		49
BACKUP.TSK		CTG		100		
INIT .SYS		NOD CTG		554		165
SYSGEN.SIL		CTG		557		721
DCL .RTS		CTG		128		1281
UPDATE.COM		CTG		2		
RT11 .RTS		CTG		20		1873
RSX .RTS		NOD CTG		6		1893
ODT .SYS		CTG		14		
INSTAL.COM		CTG		24		1917
SYSINI.COM		CTG		3		
RSTS90.SIL		NOD CTG		574		12417
START .COM		CTG		13		4061
ANALYS.COM		CTG		1		2101
LOGIN .COM		CTG		4		
BASIC .RTS		CTG		73		11201

REFRESH suboption? (RET)

Option:

Explanation — LIST prints the file status table, which has seven columns:

- **File Name** — This column lists all of the files that can or currently reside in account [0,1]. The table lists the files in two categories: System Files and Others.
- **Required?** — This column has two possible entries: YES, which means the files are required for the operation of the current monitor; NO, which means the files are not required for the operation of the current monitor. This column is always blank for nonsystem files, which are listed under the Others column. The System File Background section explains how to determine what system files you need to create.
- **File Flags** — This column has two possible entries: NOD, which means you cannot delete the file during timesharing; CTG, which means the file is contiguous on the disk.

REFRESH

- **Status** — This column has three possible entries: OK, which means you do not have to change the file's characteristics; CRE, which means you must create the file; D/C, which means you must delete and then recreate the file.
- **Current Size** — This column shows the current file size in blocks. If the column is blank, it means the file has not been created. The column also shows the current size of the nonsystem files.
- **Minimum Size** — This column shows the minimum sizes, in blocks, of the system files.
- **Start LBN** — This column shows the logical block number n at which each contiguous file starts. Disk logical blocks are numbered from 0 to the disk size minus 1. If the column is blank, it means either the file is not contiguous, or if it is contiguous, it might be extended and become noncontiguous.

Response — After LIST prints the file status table, it returns to the REFRESH suboption? prompt. Type EXIT or press RETURN to return to the Option: prompt.

REFRESH FILE — Change Account [0,1] File Characteristics

The FILE suboption of REFRESH creates, deletes, or marks as deletable (or nondeletable) the files that reside in account [0,1].

Use the FILE suboption if:

- You need to delete obsolete run-time system files (files with file types of RTS).
- You need to mark other files (usually application files that you create) as deletable or nondeletable. You can also do this on line with the /DELETABLE and /NODELETABLE qualifiers of the SET FILE command.

Note

You can never modify the characteristics of the INIT.SYS, ERR.ERR, and installed monitor SIL files, which are located on the system disk.

FILE Dialogue

```
Option: REFRESH
dd-mmm-yy - hh:mm AM/PM
Disk?
Unit?
Rebuild?
```

```
REFRESH suboption? FILE
```

Explanation — Answer the preliminary REFRESH questions. You then see the REFRESH suboption? prompt.

Response — Type FILE or FI.

```
File name?
File exists. Delete it?
```

Explanation — The next question asks for the name of the file whose characteristics you want to change.

Response — Respond with a file name and type. If the file exists in account [0,1], FILE asks if you want to delete it. Type YES or NO. If your response is NO, FILE asks the next question.

```
Size?
```

Response — To retain the current size, type OLD or press RETURN. Note that if you type any other response to this question, REFRESH may reallocate the file and you will lose the data.

```
Base?
```

REFRESH

Response — To retain the current location, type OLD or press RETURN. Note that if you type any other response to this question, REFRESH may reallocate the file and you will lose the data.

Deletable?

Explanation — This question asks if you want to mark a file as deletable or non-deletable. This feature is useful for installations that need to create other files. For example, you may want to mark some important accounting files as nondeletable.

During day-to-day system management you use the SET FILE/DELETABLE and SET FILE/NODELETABLE commands to mark files. See the *RSTS/E System Manager's Guide* for details.

Response — Type NO if you want to mark the file as nondeletable; type YES if you want to mark the file as deletable. Or, type OLD or press RETURN to retain the current status.

File name? (RET)

REFRESH suboption?

Response — Type another file name or press RETURN to return to the REFRESH suboption? prompt. Press RETURN once more to return to the Option: prompt. Or, specify another REFRESH suboption.

REFRESH BADS — Expand the Bad Block File

The BADS suboption of REFRESH lists the bad blocks currently in the bad block file (BADB.SYS) and adds bad blocks to this file.

Use the BADS suboption if you need to remove blocks from service because they have gone bad.

Do not use the BADS suboption for any DU class disk, except RX50 floppies. In DU disks, the hardware automatically handles bad blocks and transparently replaces them with good blocks.

BADS Dialogue

```
Option: REFRESH
dd-mmm-yy - hh:mm AM/PM
Disk?
Unit?
Rebuild?
```

```
REFRESH suboption? BADS
```

Explanation — Answer the preliminary REFRESH questions. You then see the REFRESH suboption? prompt.

Response — Type BADS, BAD, or BA.

```
Bads? LIST
```

Explanation — This question asks if you want to list the bad blocks or add bad blocks to the bad block file.

Response — To list the current contents of BADB.SYS, type LIST. BADS prints the contents or a message declaring that there are no bad blocks on the disk.

```
Bads?
```

Explanation — BADS returns to the Bads? question.

Response — Type ADD to add bad blocks to BADB.SYS.

```
Block number?
```

Response — BADS then asks for the bad block number. Type the logical block number (in decimal) of the bad block. This number can range from 2 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.

```
Really add logical block XXXX to BADB.SYS?
```

Response — This question asks if the number you specified is the one you want added to BADB.SYS. Type YES to add it. If your response is YES, BADS allocates

REFRESH

the pack cluster in which the block resides to BADB.SYS. Use caution, because the allocation of a cluster to BADB.SYS is irrevocable.

Type NO if you do not want to add it to this file. If you type NO, BADS repeats the Block numbers? question.

Bads? (RET)

Disk is being rebuilt - wait ...

REFRESH suboption?

Response — Press RETURN to exit the BADS suboption. Press RETURN again to return to the Option: prompt. If you added any bad blocks, REFRESH rebuilds the disk. The rebuilding operation allows you to delete all files that contain bad blocks.

SAVRES — Back Up and Copy Disks

The SAVRES option is a disk backup and copy utility. SAVRES has four operational functions:

- **SAVE** — Back up a disk to tape or disk
- **RESTORE** — Recreate a disk from tape or disk
- **IMAGE** — Make a copy of a disk
- **IDENTIFY** — Extract label information from a SAVRES volume or RSTS/E disk.

SAVRES provides a nonselective, fast-volume restore and copy capability that requires few operator responses during the operational dialogue. Unlike the DCL BACKUP utility, SAVRES processes entire volumes only and does not allow selective file transfers. When SAVRES encounters bad blocks, it requires no operator intervention. For these reasons, use SAVRES when you need to:

- Create a fast, reliable copy of an entire RSTS/E disk.
- Make a fast copy to a disk containing bad blocks that may not be reflected in the BADB.SYS file.
- Make a recovery medium (bootable) for a system disk in case of catastrophic errors. You can also use BACKUP for this task (see the *RSTS/E Release Notes*).

To understand SAVRES, you should know these terms:

SAVE format	The format of the output written by a SAVE operation and read by a RESTORE operation.
SAVE set	The set of magnetic tapes or disks created by a SAVE operation. A SAVE set must be composed entirely of disks or tapes; it cannot be a combination of the two device types. However, you can mix different drive types within one set, for example, two RK05's and one RK06.
SAVE volume	One of the magnetic tapes or disks of a SAVE set.
SAVE set name	One- to six-alphanumeric characters used to identify a SAVE set. By default, the SAVE set name is the same as the pack ID from which it was created. However, you can specify another name for the SAVE set.

SAVRES

Like disks

Like disks are units of the same device size (that is, the same number of data blocks). SAVRES considers the following devices alike:

- Two RP06 disks
- An RM02 and an RM03
- An RP04 and an RP05
- An RK05 (RK05J) and one unit of an RK05F

Therefore, if you copied an RM02 to a SAVE set, the SAVE set can later be restored either to an RM03 or another RM02.

Normally, you use the SAVRES program off line while running INIT.SYS. You can also use SAVRES on line, during timesharing. See the *RSTS/E System Manager's Guide* for more information about running SAVRES on line.

Note

You must run SAVRES off line to copy (SAVE or IMAGE) or restore (RESTORE) the system disk with which you are currently running on line. To restore the system disk, you must boot the save set or image copy and select the SAVRES option.

SAVRES prints messages on your terminal during an operation to tell you its status. Some messages are for information only; other messages are error conditions that may require your attention during the dialogue, mount, transfer, or verification phases of SAVRES.

When the program encounters an error during a dialogue or mount operation, it asks you to correct the problem and to retype the appropriate command. Such errors never affect the integrity of the data being transferred.

Errors that occur while SAVRES is transferring or verifying data can, however, jeopardize data. In this case, SAVRES resolves the problem, aborts the run, or asks you to continue or to abort the program. The program gives you information to help you protect your data by printing informational messages and error messages on your terminal.

When SAVRES completes a SAVE, RESTORE, or IMAGE operation, it prints an optional summary report. This report describes:

- The operation performed
- Device information
- Start date and time statistics
- Run total statistics

The run statistics include the number of errors encountered during the operation.

If you are not familiar with SAVRES or want more detailed information about it, see the *RSTS/E System Manager's Guide*.

SAVRES

SAVE — Back Up a Disk to Tape or Disk

The SAVE function backs up an entire RSTS/E formatted disk to either tape or disk. The output volumes created by this operation are collectively called the SAVE set and are written by SAVRES in the SAVE format. You can recreate the original disk only by using the RESTORE operation. You cannot use other RSTS/E software, such as BACKUP or PIP.SAV, to restore a SAVE set. Note that you must use SAVE if the output medium is different from the input medium.

When SAVRES creates a SAVE set, it includes on the output volume an extra set of directory blocks in case some directory blocks are found to be bad during a RESTORE operation. These additional blocks are reflected in the total block count for a SAVE Summary Report. Because the extra blocks are needed only when bad blocks are encountered during a RESTORE operation, it is unnecessary for SAVRES to transfer these blocks to the restored volume.

Thus, you will notice a discrepancy between the number of blocks transferred for a SAVE operation and the number transferred during a RESTORE. Furthermore, because the extra directory blocks are not transferred to the restored volume, under certain circumstances you may restore your data to one less volume than existed in the SAVE set.

The following example illustrates the backup of an RM03 disk to tape. The RM03 source disk is mounted on drive DR1:, write-locked. The destination tape is mounted on drive MM1: write-enabled.

SAVE Dialogue

```
Option: SAVRES
```

Response — Type SAVRES to the INIT.SYS Option: prompt.

```
31-May-85 - 08:13 AM
```

```
SAV/RES Function: SAVE
```

Explanation — SAVRES prints the current date and time, then asks for the particular function you want to use.

Response — Type SAVE to begin the SAVE operation. The example plans to perform a backup operation of an RM03 disk.

```
From RSTS disk? DR1:
```

```
*** Pack ID/default SAVE Set Name is TOMBAR
```

Explanation — SAVE asks for the disk you want to back up. SAVE then reads the pack ID from the input medium and displays it.

Response — Specify the device name and unit number of the source disk. If you include a pack ID in the device specification, SAVE checks it against the name already on the disk. If the names do not match, SAVE issues a warning message informing you of the discrepancy. In the example, the response is DR1:.

To Device? MM1:SAVSET

*** SAVE Set Name is SAVSET

Explanation — You specify the medium to which SAVE copies the input data. You can also include a SAVE set name in the device specification, rather than allow SAVE to give the SAVE set the same name as the input disk. If you assign the input and output media separate names, you can better differentiate their identity (with IDENTIFY) at a future date.

Response — Type the device name, unit number, and Save set name of your output media (if you want to change the name). In the example, the response is MM1:SAVSET because it is saving the data onto magnetic tape mounted on drive MM1:. The new Save set name is SAVSET.

Expiration Date <1-Jun-86>? (RET)

Explanation — SAVE creates a default expiration date equal to the current date plus one year. This represents the date after which you can write over the data without receiving a warning message and a confirmation prompt.

Response — Press RETURN to accept the default expiration date (1-Jun-86 in the example.) Or, type a new date. In the example, the response is RETURN.

Verify (Yes or No) <NO>? (RET)

Explanation — A YES or Y response to this question causes SAVE to perform a verify pass after it completes the data transfer process. In the verify pass, SAVE compares the input data with the data it transfers to the output medium. As an alternative, if you know that you need to verify the transferred data, you can attach the /VERIFY switch to your response to the SAV/RES Function: prompt and thus suppress the Verify (Yes or No) question.

Response — Type YES to have SAVRES verify the transfer. Type NO or press RETURN to skip the verification. In the example, the response is RETURN.

Proceed (Yes or No)? YES

*** Initializing first SAVE volume

*** Begin SAVE from DR1: to MM1: at 08:20 AM

Explanation — SAVE asks if you are ready to proceed. Type YES to proceed with the SAVE operation. SAVE then notifies you that it is initializing the first SAVE volume. Only the first volume of the SAVE set is initialized. When that operation is complete, SAVE prints a message indicating that the transfer process has begun, which devices are involved, and the time the operation began.

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Response — Type YES to proceed with the SAVE operation. Or, type NO to cancel the operation and return to the SAV/RES Function: prompt.

```
Dismount Device:  MM1:
                  Set Name:  SAVSET
                  Seq #:    1
                  Creation date:  Friday, 31-May-85
                  Expiration date:  Sunday, 1-Jun-86
```

Please label this volume!

Mount volume # 2 of SAVE Set SAVSET

Explanation — The dismount report summarizes the label information found on the initial SAVE set volume. If SAVRES requires another volume, it asks you to mount the next volume in the SAVE set after the first volume is exhausted.

Device ? MM2:

Explanation — You see this question if the SAVE operation requires multiple volumes to complete the data transfer.

Response — Type the device name and unit number of the second SAVE set volume. In the example, the second tape is mounted on drive MM2:

Proceed (Yes or No)? YES

*** Begin SAVE from DR1: to MM2: at 08:25 AM

```
Dismount Device:  MM2:
                  Set Name:  SAVSET
                  Seq #:    2
                  Creation date:  Friday, 31-May-85
                  Expiration date:  Sunday, 1-Jun-86
```

Please label this volume!

--- SAVE operation completed at 08:30 AM

Explanation — Again, you have the option to proceed or to abort the operation. If you type YES, SAVE then notifies you, as it did for the first volume, that the SAVE operation has begun, that the data is being transferred, and that 08:25 was the time the SAVE operation began. As soon as SAVE finishes the transfer, it issues the dismount message for the second volume of the SAVE set, and prompts you for the next volume.

This example shows only the first two magnetic tapes; however, an actual SAVE operation may require several more tapes. When SAVE is finished, it informs you that the SAVE operation is complete, and prints the time it finished.

Response — Type YES to proceed. Or, type NO to cancel the SAVE operation and return to the SAV/RES Function: prompt.

Summary Report

SAVE of DR1:TOMBAR to SAVE Set SAVSET

Input Device:	DR1:
Pack Clustersize:	8
Creation date:	Friday, 31-May-85
Output device:	Mastape
Set Name:	SAVSET
# of volumes:	2
Density:	800
Creation date:	Friday, 31-May-85
Expiration date:	Sunday, 1-Jun-86

SAVE started on Friday, 31-May-85, at 08:20 AM

Explanation — The Summary Report prints information for both the input and output medium, in addition to the date and time of the SAVE operation.

Run Statistics

Transfer Totals:

Total of 54184 blocks transferred

Error Totals:

Total of 0 new bad blocks encountered on destination.
0 files structurally altered.

Timing Totals:

Total elapsed time:	0 hrs.,	9 mins.,	36 secs.
Total wait time:	0 hrs.,	0 mins.,	16 secs.
Total process time:	0 hrs.,	9 mins.,	20 secs.

SAV/RES Function: (RET)

Option:

Explanation — The Run Statistics Report prints the number of blocks transferred, the number of bad blocks encountered, and the times required to perform various operations. RESTORE returns to the SAV/RES Function: prompt when the operation has ended.

Response — Press RETURN or CTRL/Z to return to the INIT.SYS Option: prompt.

SAVRES

RESTORE — Recreate a Disk From Tape or Disk

The RESTORE function recreates a RSTS/E file-structured disk from a SAVE set. Because SAVRES writes the SAVE set in the SAVE format, no other RSTS/E software can perform this rebuild process. Before transferring any data, SAVRES tries to extract bad block information from the destination disk and, if it finds any bad blocks, incorporates them into the new BADB.SYS file.

The SAVRES program may encounter bad blocks during a RESTORE run. If it does, it scans the SATT.SYS file to determine if there is a place where the block corresponding to a bad block can be relocated. If a large enough area exists on the destination disk, the program simply moves the data to the new location and modifies the directory information accordingly.

The relocation of blocks may require RESTORE to change a file's characteristics. This can occur, for example, if the program encounters a bad cluster while transferring a contiguous file. To relocate the cluster that falls on the bad block, RESTORE must make the file noncontiguous. Changes of this type can cause a few problems, but RESTORE preserves the data and informs you of these adjustments.

The operation ends if there is no way RESTORE can relocate the data cluster. This can occur if:

- No unallocated pack cluster remains on the disk.
- The file cluster size is larger than the pack cluster size and there is not an equivalent number of contiguous pack clusters left on the disk.

When SAVRES creates a SAVE set, it includes on the output volume an extra set of directory blocks in case some directory blocks are found to be bad during a RESTORE operation. These additional blocks are reflected in the total block count for a SAVE Summary Report. Because the extra blocks are needed only when bad blocks are encountered during a RESTORE operation, it is unnecessary for SAVRES to transfer these blocks to the restored volume.

Thus, you will notice a discrepancy between the number of blocks transferred for a SAVE operation and the number transferred during a RESTORE. Furthermore, because the extra directory blocks are not transferred to the restored volume, under certain circumstances you may restore your data to one less volume than existed in the SAVE set.

The following example illustrates the restoration of an RM03 disk from the tape SAVE set created in the previous example. The two SAVE set volumes are mounted on drives MM1: and MM2:, write-locked. The destination disk is mounted on drive DR1:, write-enabled.

RESTORE Dialogue

Option: SAVRES

Response — Type SAVRES to the INIT.SYS Option: prompt.

SAV/RES Function: RESTORE

Explanation — SAVRES asks for the particular function you want to use.

Response — Type RESTORE to begin the RESTORE operation. The example plans to recreate an RM03 disk from a tape SAVE set.

From device? MM1:

Explanation — RESTORE prints the From device? question. Specify the device name and the unit number of the SAVE set medium. If you include a SAVE set name in the device specification, RESTORE checks it against the name already on the set. If they do not match, RESTORE issues a warning message informing you of the discrepancy.

Response — Type the device name and unit number of the input medium. In the example, the response is MM1: because the input medium is tape mounted on drive 1.

*** SAVE Set Name/default Pack ID is SAVSET

Explanation — RESTORE reads the SAVE set name from the input medium and displays it. Normally, RESTORE uses the name of the input SAVE set as the Pack ID of the output volume. If you want to use a different pack ID, you can include a new pack ID in your answer to the next question.

To RSTS Disk? DR1:TSTPAK

Explanation — RESTORE asks for the output disk of the RESTORE operation. DR indicates the device mnemonic of the RM03 disk.

Response — Type the device name, unit number, and pack ID of your output disk (if you want to change the pack ID name). In the example, the response is DR1:TSTPAK because it is recreating an RM03 disk mounted on drive 1. The new pack ID is TSTPAK.

*** The volume on DR1: is a RSTS disk

*** Pack ID is MYPAK

*** Pack will be reinitialized

Mount it anyway <NO>? Y

*** Pack ID is TSTPAK

Explanation — RESTORE checks the pack ID of the output disk. It then prints a message showing you that the disk is a RSTS/E disk, has a Pack ID of MYPAK, and that RESTORE will reinitialize it. RESTORE issues a mount question that gives you the option to mount the disk or not.

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Response — Type Y to mount the disk and reinitialize it. Type N or press RETURN to cancel the instruction. RESTORE then returns to the To RSTS Disk? question. In the example, the response is Y because the data on the disk is no longer valuable. RESTORE then initializes the disk and prints a message showing the new pack ID.

```
Verify (Yes or No) <NO>? (RET)
```

Explanation — RESTORE asks if you want to verify the accuracy of the data transfer. When RESTORE verifies the transferred data, it performs two operations rather than one. That is, the program performs two passes on the data: once for the transfer and once for the comparison.

Response — Type N or press RETURN to skip the verify pass. Or, type Y to perform the data verification. In the example, the response is RETURN because the comparison of the input data to the data already transferred to the destination disk is not essential during this particular run.

```
Proceed (Yes or No)? Y
```

Explanation — RESTORE asks if you are ready to proceed.

Response — Type Y to proceed. Or, type N to cancel the operation and return to the SAV/RES Function: prompt. In the example, the response is Y.

```
*** Begin RESTORE from MM1: to DR1: at 08:28 PM
```

```
Dismount Device:      MM1:
      Set Name:        SAVSET
      Seq #:           1
      Density:         800
      Creation date:    Friday, 31-May-85
      Expiration date:  Sunday, 1-Jun-86
```

```
Mount volume # 2 of SAVE Set SAVSET
```

```
Device ? MM2:
```

```
Proceed (Yes or No)? Y
```

```
*** Begin RESTORE from MM2: to DR1: at 08:32 PM
```

```
Dismount Device:      MM2:
      Set Name:        SAVSET
      Seq #:           2
      Density:         800
      Creation date:    Friday, 31-May-85
      Expiration date:  Sunday, 1-Jun-86
```

```
Dismount Device:      DR1:
      Pack ID:         TSTPAK
      Pack Clustersize: 8
      Creation date:    Friday, 31-May-85
```

```
      Please label this volume!
```

```
--- RESTORE operation completed at 08:37 PM
```

Explanation — RESTORE displays a message to indicate it has begun the transfer. If the transfer involves multiple volumes, RESTORE transfers the first volume, prints input medium information and prompts you for the next volume. After you mount the next volume, specify its device location, and type Y at the Proceed? prompt, RESTORE continues with the data transfer. RESTORE continues in this manner for each SAVE set volume. When RESTORE finishes the final volume, it prints an output dismount message and informs you that the operation is completed.

Response — Mount the additional Save set volumes when prompted. Type the device location and unit number of the drive on which the next volume is mounted. Type Y to the Proceed? prompt when you are ready to continue.

In the example, volume 2 of SAVE set SAVSET is mounted on tape drive MM2:. Volume two is the final volume in the SAVE set.

Summary Report

RESTORE of SAVE Set SAVSET to DR1:TSTPAK

Input Device:	Mastape
Set Name:	SAVSET
# of volumes:	2
Density:	800
Creation date:	Friday, 31-May-85
Expiration date:	Sunday, 1-Jun-86
Output Device:	DR1:
Pack ID:	TSTPAK
Pack Clustersize:	8
Creation date:	Friday, 31-May-85

RESTORE started on Friday, 31-May-85, at 08:28 PM

Explanation — The Summary Report prints the SAVE set name, the pack ID, and label information for both the input and output medium, in addition to the date and time of the RESTORE operation.

Run Statistics

Transfer Totals:

Total of 54184 blocks transferred

Error Totals:

Total of 0 new bad blocks encountered on destination.

0 files structurally altered.

Timing Totals:

Total elapsed time: 0 hrs., 9 mins., 36 secs.

Total wait time: 0 hrs., 0 mins., 16 secs.

Total process time: 0 hrs., 9 mins., 20 secs.

SAV/RES Function: (RET)

Option:

SAVRES

Explanation — The Run Statistics Report prints the number of blocks transferred, the number of bad blocks encountered, and the times required to perform various operations. RESTORE returns to the SAV/RES Function: prompt when the operation has ended.

Response — Press RETURN or CTRL/Z to return to the INIT.SYS Option: prompt.

Note

If you are using the output of a RESTORE operation as a system disk, you must use the INIT.SYS START option to reinstall the desired monitor Save Image Library (SIL). Before you use START, you must also redo any necessary HARDWR suboptions (such as changing Hertz) because the START option clears various items set up by the HARDWR suboptions. This procedure is necessary because a disk can be saved with SAVE from one system disk and restored with RESTORE on a system with a different hardware configuration.

IDENTIFY — Extract Label Information

The IDENTIFY function obtains label information from a SAVE set volume or a RSTS/E file-structured disk.

The following example lists the label characteristics of both a SAVE set and a RSTS/E disk. The SAVE set volume is mounted on drive MM1:, write-locked. The RSTS/E disk is mounted on drive DR1:, write-locked.

IDENTIFY Dialogue

Option: SAVRES

Response — Type SAVRES to the INIT.SYS Option: prompt.

SAV/RES Function: IDENTIFY

Explanation — SAVRES asks for the particular function you want to use.

Response — Type IDENTIFY or ID to begin the IDENTIFY operation. The example plans to identify a SAVE set volume mounted on drive MM1:.

From device? MM1:

Explanation — IDENTIFY prints the From device? question. Specify the device name and the unit number of the SAVE set you want to identify. If you include a SAVE set name or pack ID in the device specification, IDENTIFY checks it against the name already on the set. If the names do not match, RESTORE issues a warning message informing you of the discrepancy and then prints the From device? question again.

Response — Type the device name and unit number of the medium you want to identify. In the example, the response is MM1:, because the input medium is tape, mounted on drive number 1.

Device:	MM1:
Set Name:	SAVSET
Seq #:	1
Density:	1600
Creation date:	Friday, 31-May-85
Expiration date:	Sunday, 1-Jun-86

Explanation — IDENTIFY prints label information for the tape SAVE set.

SAV/RES Function: IDENTIFY DR1:

Explanation — IDENTIFY returns to the SAV/RES Function: prompt.

Response — Type the name of the next medium to identify. You can also include the device name and unit number of the medium in your response. IDENTIFY then skips the From Device? question.

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If you do not need to identify any more media, press RETURN to return to the INIT.SYS Option: prompt.

In the example, the response is IDENTIFY DR1:. This requests SAVRES to identify the disk pack mounted on DR1:.

Device:	DR1:
Pack ID:	TSTPAK
Pack Clustersize:	8
Creation date:	Friday, 31-May-85

SAV/RES Function: (RET)

Option:

Explanation — IDENTIFY prints the label information of the disk pack mounted on DR1:. IDENTIFY returns to the SAV/RES Function: prompt when the operation has ended.

Response — If you do not need to identify any more media, press RETURN or CTRL/Z to return to the INIT.SYS Option: prompt.

IMAGE — Make a Copy of a Disk

The IMAGE function makes an equivalent copy of a RSTS/E file-structured disk; however, only transfers from disk to like disk are legal when using the IMAGE operation. Like disks are units that have exactly the same device size. The SAVRES program handles bad block recovery during an IMAGE operation in the same way as RESTORE.

Note

If you are using the output of a RESTORE operation as a system disk, you must use the INIT.SYS START option to reinstall the desired monitor Save Image Library (SIL). Before you use START, you must also redo any necessary HARDWR suboptions (such as changing Hertz) because the START option clears various items set up by the HARDWR suboptions. This procedure is necessary because a disk can be saved with SAVE from one system disk and restored with RESTORE on a system with a different hardware configuration.

The following example shows an IMAGE operation that copies an RP04 disk to an RP04 disk and verifies the transfer in the same pass. The source disk is mounted on drive DB0:, write-locked. The destination disk is mounted on drive DB1:, write-enabled.

IMAGE Dialogue

Option: SAVRES

Response — Type SAVRES to the INIT.SYS Option: prompt.

SAV/RES Function: IMAGE/NOERROR

Explanation — SAVRES asks for the particular function you want to use.

Response — Type IMAGE to begin the IMAGE operation. The /NOERROR switch causes SAVRES to end the operation whenever the program encounters a run-time error. Before the program aborts, it prints an error message indicating the source of the problem.

From RSTS disk? DB0:

Explanation — IMAGE prints the From RSTS disk? question. Specify the disk from which you want to copy the data. If you include a pack ID in the device specification, SAVRES checks to see if it matches the actual pack ID on the disk. If the pack IDs do not match, SAVRES issues a warning message and prints the From RSTS Disk? question again.

Response — Type the device name and unit number of the disk you want to copy. In the example, the response is DB0: because the source disk is mounted on drive DB0:.

```
*** Input Pack ID/default Output Pack ID is SOURCE
```

Explanation — IMAGE reads the pack ID from the input disk and displays it on your terminal.

```
To RSTS DB: Disk? DB1:NICOLA
```

Explanation — IMAGE requests the device name and unit number of the output disk. DB indicates the device mnemonic of the RP04 disk.

Response — Type the device name, unit number, and pack ID of your output disk (if you want to change the pack ID name). In the example, the response is DB1:NICOLA because it is copying to an RP04 disk mounted on drive 1. The new pack ID is NICOLA.

```
*** The volume on DB1: is a RSTS disk
*** Pack ID is OUTPUT
```

```
*** Pack will be reinitialized
Mount it anyway <NO>? Y
```

```
*** Output Pack ID is NICOLA
```

Explanation — IMAGE checks the pack ID of the output disk. It then prints a message showing you that the disk is a RSTS/E disk, has a pack ID of OUTPUT and that IMAGE will reinitialize it. IMAGE issues a mount question that gives you the option to mount the disk or not.

Response — Type Y to mount the disk and reinitialize it. Type N or press RETURN to cancel the instruction. IMAGE then returns to the To RSTS DB: Disk? question. In the example, the response is Y because the data on the disk is no longer valuable. IMAGE then initializes the disk and prints a message showing the new pack ID.

```
Verify (Yes or No) <NO>? Y
```

Explanation — IMAGE asks if you want to verify the accuracy of the data transfer. When IMAGE verifies the transferred data, it performs two operations rather than one. That is, the program performs two passes on the data, once for the transfer and once for the comparison.

Response — Type N or press RETURN to skip the verify pass. Or, type Y to perform the data verification. In the example, the response is Y.

```
Proceed (Yes or No)? Y
```

Explanation — IMAGE asks if you are ready to proceed.

Response — Type Y to proceed. Or, type N to cancel the operation and return to the SAV/RES Function: prompt. In the example, the response is Y.

Begin IMAGE copy from DB0: to DB1: at 11:02 AM

Begin VERIFY pass from DB0: to DB1: at 11:04 AM

0 differences found

Dismount Device:	DB1:
Set Name:	NICOLA
Pack clustersize:	8
Creation date:	Friday, 31-May-85

Please label this volume!

--- IMAGE copy operation completed at 11:07 AM

Explanation — IMAGE displays a message when it begins to transfer data and when it begins the verify pass. After completing the data comparison, IMAGE prints the number of differences found between the two devices. It then issues the output device dismount message. Immediately after IMAGE prints the dismount request, it prints a message to show you the copy operation ended successfully.

Summary Report

IMAGE copy of DB0:SOURCE to DB1:NICOLA

Input Device:	DB0:
Set Name:	SOURCE
Pack clustersize:	8
Creation date:	Friday, 31-May-85

Output Device:	DB1:
Pack ID:	NICOLA
Pack Clustersize:	8
Creation date:	Friday, 31-May-85

RESTORE started on Friday, 31-May-85, at 11:02 AM

SAVRES

Explanation — IMAGE prints the Summary Report unless you suppress it by using the /NOSTATS switch. The report includes the pack ID and label information of each disk, in addition to the date and time that the IMAGE operation was run.

Run Statistics

Transfer Totals:

Total of 24400 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.

0 files structurally altered.

Timing Totals:

Total elapsed time: 0 hrs., 5 mins., 22 secs.

Total wait time: 0 hrs., 0 mins., 0 secs.

Total process time: 0 hrs., 5 mins., 22 secs.

SAV/RES Function:

Option:

Explanation — The Run Statistics Report prints the number of blocks transferred, the number of bad blocks encountered, and the times required to perform various operations. IMAGE returns to the SAV/RES Function: prompt when the operation has ended.

Response — Press RETURN or CTRL/Z to return to the INIT.SYS Option: prompt.

START — Start a RSTS/E Monitor

The START option activates a RSTS/E monitor. Use the START option if you need to start timesharing.

START Dialogue

Option: START

Response — Type START or START <monitor name> to the INIT.SYS Option: prompt.

If you do not specify a monitor name or press RETURN to the Option: prompt, START starts the monitor that was used in the previous timesharing session. START then prints a series of questions that let you override SWAP MAX and memory allocation defaults for one time-sharing session. You can make permanent changes to these defaults only by using the DEFAULT option.

If you are starting timesharing for the first time on this system disk, INIT.SYS searches the list of monitors, which are stored in account [0,1] with the file type of .SIL. SIL stands for save image library, which is a file that stores the monitor code.

If INIT.SYS finds only one SIL, it installs that SIL and prints the message:

```
Starting xxxxxx monitor
```

If INIT.SYS finds more than one SIL, it prompts for the monitor name instead:

```
Monitor name to START <xxxxxx>?
```

Type the name of the monitor you want to install.

```
SWAP max <32K>?
```

Explanation — You see this question only if your system has I&D space. START asks if you want to make any SWAP MAX changes. You can specify a size up to 64K.

Response — Type YES if you need to change the SWAP MAX. Type NO or press RETURN if you do not want to make any changes.

START now checks that the SWAP.SYS file exists in account [0,1] on the system disk, is large enough to hold one job at the current SWAP MAX, and is contiguous. If the file does not exist, START attempts to create SWAP.SYS at the required size. If the file exists but is not contiguous or large enough, START deletes the current SWAP.SYS file and attempts to create a new SWAP.SYS file that is both contiguous and large enough (SWAP MAX * 4). If START cannot find enough free contiguous disk space to create a minimum SWAP.SYS file, it prints the following error message:

```
?Not enough contiguous disk space to create minimum SWAP.SYS file
```

START

START then attempts to create a SWAP.SYS file that is smaller than the one you specified yet still meets the minimum requirements. This may take up to one minute. If START finds it can create a SWAP.SYS file, it prints these messages:

```
SWAP.SYS can be created if SWAP MAX is reduced to xxK  
New SWAP MAX <xxK>?
```

Press RETURN to accept the default value, indicated by xx in the example. Or type CTRL/C to return to the Option: prompt. You can then use the FILE suboption of REFRESH to create more disk space.

If START cannot find enough contiguous disk space to create a minimum SWAP.SYS file, it prints these messages:

```
You must free some disk space to start timesharing.  
Option:
```

Use the FILE suboption of REFRESH to create more contiguous disk space.

```
Any memory allocation changes?
```

Explanation — START asks if you want to make changes to the memory allocation table for this timesharing session.

Response — Type YES to make changes to the memory allocation table. (See the section, DEFAULT Option.) Type NO or press RETURN if you do not want any changes.

START now checks that the CRASH.SYS file exists in account [0,1] on the system disk, is large enough for the installed RSTS/E monitor and extended buffer pool allocation, and is contiguous. If the file does not exist, START attempts to create CRASH.SYS at the required size. If the file exists but is not contiguous or large enough, START deletes the current CRASH.SYS file and attempts to create a new CRASH.SYS file that is both contiguous and large enough. If START is unsuccessful it prints these error messages:

```
?Not enough contiguous disk space to create minimum CRASH.SYS file  
Crash dump automatically disabled
```

When a crash occurs, the RSTS/E monitor dumps the contents of the read/write area of monitor memory into CRASH.SYS. Because the crash dump facility preserves the state of the system at the time of the crash, CRASH.SYS contains important diagnostic information. For these reasons, DIGITAL recommends that you always have crash dump enabled during timesharing.

Therefore, if you see the Crash dump automatically disabled message, follow these steps to enable crash dump:

1. After you begin timesharing, delete unnecessary files to create more contiguous disk space. Or, move some files to a nonsystem disk.
2. Shut down the RSTS/E monitor using the SHUTUP program.
3. Use the START option to start timesharing. If you do not see the Crash dump disabled message, you know that INIT.SYS was able to create the CRASH.SYS file.

dd-mmm-yy hh:mm AM/PM

Explanation — START prints the current date and time. Then it pauses for several seconds to prepare the system for timesharing. START performs many preparatory tasks, among the more important being:

- Verify that all configured hardware exists and that it responds properly.
- Disable any device it cannot find or that you have disabled with the HARDWR option. If this is the case, START prints the devices it disables.
- Enable all configured terminal controllers and disable any that do not respond.
- Set up monitor, cache, and device tables.
- Load the installed monitor into memory.

START then transfers control to the SYSINI.COM command file, which executes the START.COM command file. See the *RSTS/E System Manager's Guide* for details about START.COM.

System Installation Error Messages



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.
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.typ IS NOT ON A PACK CLUSTER BOUNDARY REBUILD asks whether to delete the file, then confirms your response.
[P,PN] CLUSTER MAP IN UFD DISAGREES WITH MFD REBUILD asks whether to zero the account and confirms your response.
DEVICE xx: DOES NOT INTERRUPT — DEVICE DISABLED Use HARDWR to set the correct vector address for xx. Or the device may be broken. Call your DIGITAL Field Service engineer. If the disk is an RC25, a cable may be disconnected.
DEVICE CONTROLLER TABLE (DDCTBL) DECLARES TOO MANY UNITS FOR CONTROLLER SIL CANNOT BE INSTALLED Submit an SPR with a copy of the SIL and INIT.SYS.
DEVICE CONTROLLER TABLE (DDCTBL) HAS AN ILLEGAL FORMAT SIL CANNOT BE INSTALLED Submit an SPR with a copy of the SIL and INIT.SYS. You may have a corrupt Distribution Kit.
DEVICE ERROR WHEN TRYING TO BOOTSTRAP DEVICE Make sure that the device is on line and ready. If the error recurs, try a different device.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
DEVICE HUNG OR WRITE-LOCKED Make sure that the device is on line and ready. If the error recurs, try a different device.
DEVICE XD0: CSR MUST BE DECLARED WITH HARDWR, CSR SUB-OPTION — DEVICE DISABLED Use the CSR suboption of HARDWR to set the correct CSR address for XDn:. The XD device is not located at a DIGITAL standard CSR assignment.
DEVICE XD0: TIMED-OUT ON INTERNAL MICRO-DIAGNOSTIC CHECK — DEVICE DISABLED Call your DIGITAL Field Service engineer. The error message indicates that INIT encountered a device time-out error.
DIRECTORY ENTRY FOR [P,PN] filnam.typ CONTAINS PACK CLUSTER NUMBER WHICH IS TOO BIG REBUILD 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.
[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 Make sure that the device is on line and ready. If the error recurs, try a different device.
DISK STRUCTURE CANNOT BE REBUILT Reinitialize the disk.
DOUBLY ALLOCATED BLOCK FOUND AT DEVICE CLUSTER nn. THE BLOCK IS ALLOCATED TO [p,pn] filnam.typ AND [p,pn] filnam.typ REBUILD lets you choose the file to delete, then confirms your response.
DRIVE NOT READY: Make sure that the disk drive is on line and READY. Press RETURN 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.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure	
ERR FILE INVALID	Copy the file ERR.ERR from the distribution medium to the system disk.
ERR FILE NOT FOUND	Copy the file ERR.ERR from the distribution medium to the system disk.
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.
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	Make sure 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 or ERR. The initialization code did not find a file when trying to make it deletable.
[P,PN] filnam.typ HAS A BAD BLOCK	REBUILD asks whether to delete the file and confirms your response.
[P,PN] filnam.typ HAS FIRST DCN OUT OF RANGE	REBUILD asks whether to zero the account and confirms your response.
[P,PN] filnam.typ HAS INVALID ACCOUNTING ENTRY LINK	REBUILD asks whether to delete the file and confirms your response.
filnam.typ 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 installation process created the file.
FORMATTING FAILURE:	Press RETURN to retry. Type anything else to abort the DSKINT and return to the Option: prompt. Make sure that the disk drive is write enabled. This error may indicate a bad disk pack or a bad disk drive.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
[P,PN] HAS A BAD BLOCK REBUILD asks whether to delete the account and confirms your response.
[P,PN] HAS HOLES IN CLUSTER MAP REBUILD asks whether to zero the account and confirms your response.
[P,PN] HAS INCONSISTENT CLUSTER MAPS REBUILD asks whether to zero the account and confirms your response.
[P,PN] HAS INVALID CLUSTER SIZE REBUILD asks whether to delete the account and confirms your response.
ILLEGAL INTERFACE INDEX nn Regenerate your monitor. If the error recurs, submit an SPR.
INIT BUG — BAD DISK INDEX Submit an SPR and a copy of INIT.SYS.
INIT BUG — CAN'T ALLOCATE FILE 2ND TIME Submit an SPR and a copy of INIT.SYS.
INIT BUG — CAN'T CHECK PARITY Submit an SPR and a copy of INIT.SYS.
INIT BUG — CAN'T FIND [0,1] AGAIN Submit an SPR and a copy of INIT.SYS.
INIT BUG — CAN'T FIND FILE TO DELETE Submit an SPR and a copy of INIT.SYS.
INIT BUG — REBUILD FAILED TO FIND ALLOCATION ERROR Submit an SPR and a copy of INIT.SYS.
INIT BUG — DIDN'T GET SAME CLUSTER 2ND TIME Submit an SPR and a copy of INIT.SYS.
INIT BUG — DIDN'T GET SAME FILE CLUSTER 2ND TIME Submit an SPR and a copy of INIT.SYS.
INIT BUG — DON'T KNOW HOW TO START Submit an SPR and a copy of INIT.SYS.
INIT BUG — FAILED TO CREATE FILE Submit an SPR and a copy of INIT.SYS.
INIT BUG — FAILED TO FIND FILE AGAIN Submit an SPR and a copy of INIT.SYS.
INIT BUG — FAILED TO FIND FILE JUST CREATED Submit an SPR and a copy of INIT.SYS.
INIT BUG — FILE EXISTS WHEN TRYING TO CREATE Submit an SPR and a copy of INIT.SYS.
INIT BUG — xxx — file type FILE NOT FOUND 2ND TIME Submit an SPR and a copy of INIT.SYS.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
INIT BUG — xxx — FILE NOT FOUND WHEN REMOVING IT Submit an SPR and a copy of INIT.SYS. INIT BUG — FILE SIZE COMPUTED WRONG Make sure that the system device you are using contains valid system files from the distribution medium. If so, submit an SPR and a copy of INIT.SYS. INIT BUG — FLOAT TABLE ERROR Submit an SPR and a copy of INIT.SYS. INIT BUG — INSTALL NOT SYNCHRONIZED at xxxxxx Submit an SPR and a copy of INIT.SYS. INIT BUG — NO SATT.SYS AT WIPEOUT TIME Submit an SPR and a copy of INIT.SYS. INIT BUG — NO UFD FOUND IN CREATE Submit an SPR and a copy of INIT.SYS. INIT BUG — RNB TO WRONG DISK Submit an SPR and a copy of INIT.SYS. INIT BUG — SATT.SYS NONEXISTENT AT TIME OF WOMP Submit an SPR and a copy of INIT.SYS. INIT BUG — SET NEW TABLE TOO SMALL Submit an SPR and a copy of INIT.SYS. INIT BUG — UNKNOWN BAE DEVICE Submit an SPR and a copy of INIT.SYS. INIT BUG — START LINKED TOO LOW Submit an SPR and a copy of INIT.SYS. 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 START 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.typ — FIXED BY REBUILD	Warning message. REBUILD truncates the file.
INVALID SIL FORMAT — INIT AND MONITOR ARE DIFFERENT VERSIONS	Start a SIL that has the correct RSTS/E version number.
I/O TO UNOPENED FILE	Submit an SPR.
[P,PN] IS NOT A VALID ACCOUNT NUMBER	REBUILD asks whether to delete the account and confirms your response.
MEMORY ADDRESSING PROBLEM	Either the memory subsystem or the memory management hardware failed.
MFD NAME ENTRY CONTAINS A BAD LINK. REBUILD WILL DELETE ALL [1,1] FILES AND ALL ACCOUNTS BEYOND [p,pn] filnam.typ	REBUILD confirms your response.
MONITOR SIL CHANGED — REINSTALL IT	Use the START option to install the monitor SIL.
MONITOR SIL NOT FOUND	Use the START option again to install the SIL. If the error recurs, submit an SPR.
MT, MS, MM ERROR OR INVALID FORMAT ON TAPE	Make sure 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, or create account [1,2] on the disk.
NO ROOM FOR DIRECTORY ON OUTPUT DISK	Delete files, 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, reinitialize the disk to create sufficient contiguous space on the disk for the new file, or use a different disk.
??? NO VALID V9.X MONITOR FILES IN [0,1]	Copy the required SIL to the system disk from the installation media.
NOT ENOUGH ROOM IN LOW MEMORY FOR MONITOR	Generate a smaller monitor. INIT cannot find enough contiguous, physical memory to place the monitor in low memory. Before printing this message, INIT attempts to position the monitor in the memory table, tries to reset the table, and prints the message ADJUSTING MEMORY TABLE at your terminal. When INIT cannot find enough space for the monitor, it prints the "NOT ENOUGH ROOM" message and returns to the Option: prompt. You can then begin to generate a smaller monitor.

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Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
NOT EVERYTHING FITS IN MEMORY WITH THIS MEMORY TABLE. RESETTING MEMORY TABLE AND ELIMINATING EXTRA BUFFERS This message can occur after you select a bigger primary run-time system, allocate extra small buffers, or install a monitor patch that increases monitor size.
ONE OR MORE SYSTEM FILES MISSING Reinitialize the disk.
OPTION ATTEMPTED DURING BOOTSTRAP PHASE Reboot 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 rebuild 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 and a copy of the SIL.
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 your DIGITAL Field Service engineer.
PARITY CSR CONTROLS MORE THAN 31K Call your 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 (PR_n) 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 rebuilding, start the system by typing START or pressing RETURN, thereby rebuilding the disk. If any other problem occurs, submit an SPR.
REQUESTED DISK DRIVE NOT FOUND Request a disk that is on the system.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
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.
RL DISK MUST BE STRAPPED FOR 22-BIT ADDRESSING The Q-BUS system has more than 256KB of memory, thus requiring 22-bit addressing. The system also contains an RL disk controller, but the controller is not set up for 22-bit addressing. The controller must be an RLV12, and it must be strapped for 22-bit addressing.
RSTS/E REQUIRES AT LEAST 96K 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 and a copy of the disk. Otherwise, reinitialize the disk.
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.

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Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
filnam.SIL NOT FOUND — PLEASE INSTALL A SIL The SIL that you previously installed is not on the disk. Use the START option to install a monitor SIL.
SYMBOL xxxxxx NOT FOUND IN MONITOR SYMBOL TABLE Regenerate the monitor. If the problem recurs, submit an SPR.
TOO MANY BAE DEVICES Submit an SPR.
TOO MANY BLOCKS IN DEVICE CONFIGURATION TABLE Regenerate the monitor.
TOO MANY xx: CONTROLLERS GENERATED Make sure 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: Make sure that any edits to CONFIG.MAC are correct. If there are no editing errors, regenerate the system. This message is a warning if the monitor generated for DHU (16 lines) or DZ11 (8 lines) is started on a QBUS system (DHU has only 8 lines and DZ11 has only 4 lines).
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 or fewer words of memory, submit an SPR.
TOO MUCH MODIFICATION TO MONITOR REQUIRED Regenerate to produce a monitor that is more closely configured to your system hardware.
TWO MAGTAPE UNITS HAVE THE SAME UNIT NUMBERS Examine unit switches on magnetic tape drives and make sure that no two have the same unit number.
UFD HAS SIZE TOO LARGE FOR FILE [P,PN] filnam.typ — FIXED BY REBUILD Warning message only. REBUILD corrects the condition.
UFD HAS SIZE TOO SMALL FOR FILE [P,PN] filnam.typ — FIXED BY REBUILD Warning message only. REBUILD corrects the condition.
[0,1] UFD NOT FOUND Reinitialize the disk.
UNABLE TO CREATE REQUESTED FILE(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.

(continued on next page)

Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
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: Make sure 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.
USING KW11L CLOCK Warning message only. The installed SIL's defaults indicate 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's defaults indicate a KW11L clock is preferred, 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.
VECTOR TABLE FULL Submit an SPR.
WARNING — BAD BLOCK DOUBLY ALLOCATED TO BADB.SYS Warning message only.
WARNING — BOOTED DEVICE IS AT A NON-STANDARD CSR ADDRESS The initialization code successfully bootstrapped the device. The device is at a non-standard CSR address, but the device has not been declared at the non-standard CSR address. Before starting your RSTS/E monitor, use CSR (a HARDWR suboption) to declare this device at the non-standard address.
WARNING — DCN IN BADB.SYS TOO BIG Warning message only. The file structure on the disk being rebuilt appears invalid.
WARNING — DBn: IS DUAL PORTED 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 primary run-time system or error message file that is not present. Use the DEFAULT option to specify a valid file.

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Table A-1: Initialization Code Error Messages (Cont.)

Message and Recovery Procedure
WARNING — FILE filnam.typ 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.
WARNING — NO SET UP FOR DEVICE xx Submit an SPR. You may have either a corrupt distribution kit or incompatible versions of INIT.SYS and the monitor .SIL.
WARNING — SUBLINES FOR xx: ARE OUT OF SEQUENCE Warning message only, but the system may crash. Regenerate the monitor.
XDn: DISABLED — LINE EXCEEDS CONTROLLER (XDn:) MAXIMUM This is an informational message only. No action is necessary. With the XD controller, it is possible to generate a monitor with DMPs and run the monitor on a system that has DMVs instead of DMPs. While the DMV physically supports a maximum of 12 lines, any RSTS/E system that was generated with DMPs could exceed this maximum. This error message tells you that the limit was exceeded.

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 file name or an illegal file name 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 cannot be restarted.
?OVR CORE? The program is too large to fit into memory.

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.

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 nonstandard address and vector assignments, DIGITAL recommends that you follow the standard configuration rules 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.

Floating Addresses

Currently the floating address devices include the devices listed in Table B-1. The following ground rules apply to these devices and future floating address devices:

- Only new devices will be assigned floating addresses. Devices now in production will keep their old addresses.
- Future devices may float both their address and interrupt vectors.
- The floating address space starts at 760010(8) and proceeds upward to 764000(8).
- A gap in the address space (no SLAVE SYNC) implies that a device does not exist.

- The first address of a new device type will always be on a 2^N word boundary, where N is the first integer greater than or equal to $\text{LOG}_2 M$ 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	XXXXX00,XXXXX20,XXXXX40,XXXXX60
9 thru 16	XXXXX00,XXXXX40

- 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 DJ11s are assigned addresses modulo 10 (base 8) immediately following the first DJ11 (for example, 760010, 760020, and so forth). The modulo 10 (base 8) address following the last DJ11 is left empty and is known as the DJ11 gap. If there are no DJ11s, 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. DH11s 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 DJ11s (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 DH11s 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 through DMV11-AD addresses and the required gaps can be assigned in sequence by their rank. Addresses for any future floating address devices will be assigned in a similar manner.

Floating Address Worksheet

The algorithm for assignment of floating addresses is confusing for a configuration that consists of several types of floating address devices. The floating address worksheet is a graphic aid that allows you to assign floating addresses to a device quickly, without referring to the formal rules.

The floating address worksheet consists of 33 columns. The first column contains the floating addresses, from 760010 to 762000. The worksheet continues on for four pages, to accommodate all of the addresses. Note that the last address on the worksheet also appears as the first address of the worksheet on the following page. For example, the last address of the first worksheet is 760400. The first address of the worksheet on the next page is 760400. This allows you to carry over the information from the previous page.

Note

The floating address area continues to address 764000. If your configuration continues to this address, you can create an addition to the worksheet by adding 2000 to the last address listed on the worksheet, which is 762000.

Columns 2 through 33 contain the floating address device names. To the right of the worksheet is a List of Devices. Here you can enter the number of devices in your configuration. Below the List of Devices is a Record of Floating Addresses. Here you can record the device, the unit number, and the floating address.

You can also produce the information contained in this worksheet by running the FLOAT program. The FLOAT program is contained in the Unsupp system program package (see Phase 4 in Part I).

To use the worksheet:

1. In the spaces provided in the List of Devices, record the quantity of each type of floating address device in your configuration. For example, if you have two DJ11 and two DH11 devices, enter 2 in the spaces provided adjacent to the DJ11 and the DH11 in the List of Devices.
2. Begin at address 760010 of the worksheet under the DJ11 column and record the unit number for all DJ11s in your configuration. Begin with unit 0 and end with unit n-1, where n represents the number of DJ11s in your configuration. For example, if you have two DJ11 devices, enter a device unit of 0 in the unshaded box to the right of address 760010. Enter a device unit of 1 in the unshaded box to the right of address 760020. Use only the unshaded boxes when you enter the device unit number. The shaded boxes represent illegal addresses for a particular device unit.

Note

Where you begin in the worksheet depends upon what devices you have in your configuration. Suppose you have LPP11 and DWR70 devices. In this case you would start at address 760130 under the first unshaded box under the LPP11 column.

3. Immediately below the last device unit, mark an X for the required address gap. For example, the last DJ11 unit in the previous example is at address 760020. You would mark an X in the unshaded box to the right of address 760030. Use only the unshaded boxes when you mark the address gap. The shaded boxes also indicate an illegal address gap.
4. To the immediate right of the address gap, mark a Y. For example, you would enter Y in the shaded box to the right of the X at address 760300. When you mark a Y to the right of an address gap, use either the shaded or the unshaded boxes, depending on which is to the right of the address gap. If there are no units of a particular device type, enter an X to indicate the gap addresses; then enter a Y to the right of this. For example, if you have no DJ11 devices, you mark an X in the unshaded box to the right of address 760010. You would then mark a Y to the right of this. The Y is a marker that tells you which address to start at for the next device.
5. Continue below the Y in the previous column and enter the unit number of the next device in your configuration. Start with unit 0 and continue to unit n-1. (The first MSCP controller has a fixed address. This means you should fill in floating addresses starting with controller 1, not controller 0.) 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. Then mark a Y to the right of the address gap.
6. Continue with the remaining floating address devices. In each case, number the 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 a Y in the box immediately to the right of the last unit.
7. After you complete the worksheet, you can record the device, the unit number, and its associated floating address in the spaces provided in the Record of Floating Addresses.

DEVICE																																	
ADDRESS	D J 1 1	D H 1 1	D O 1 1	①	D U P 1 1	L K 1 1	D M C 1 1	②	K M C 1 1	L P P 1 1	V M V 2 1	V M V 3 1	D W R 7 0	R L 1 1	L P A 1 1	K W 1 1	R S r v d	R X 1 1	D R 1 1 W	D R 1 1 B	D M P 1 1	D P V 1 1	I S B 1 1	D M V 1 1	U N A	③	D M F 3 2	K M S 1 1	V S 1 0 0	④	K M V 1 1	⑤	
760400																																	
760404																																	
760410																																	
760414																																	
760420																																	
760424																																	
760430																																	
760434																																	
760440																																	
760444																																	
760450																																	
760454																																	
760460																																	
760464																																	
760470																																	
760474																																	
760500																																	
760504																																	
760510																																	
760514																																	
760520																																	
760524																																	
760530																																	
760534																																	
760540																																	
760544																																	
760550																																	
760554																																	
760560																																	
760564																																	
760570																																	
760574																																	
760600																																	
760604																																	
760610																																	
760614																																	
760620																																	
760624																																	
760630																																	
760634																																	
760640																																	
760644																																	
760650																																	
760654																																	
760660																																	
760664																																	
760670																																	
760674																																	
760700																																	
760704																																	
760710																																	
760714																																	
760720																																	
760724																																	
760730																																	
760734																																	
760740																																	
760744																																	
760750																																	
760754																																	
760760																																	
760764																																	
760770																																	
760774																																	
761000																																	
ADDRESS	D J 1 1	D H 1 1	D O 1 1	①	D U P 1 1	L K 1 1	D M C 1 1	②	K M C 1 1	L P P 1 1	V M V 2 1	V M V 3 1	D W R 7 0	R L 1 1	L P A 1 1	K W 1 1	R S r v d	R X 1 1	D R 1 1 W	D R 1 1 B	D M P 1 1	D P V 1 1	I S B 1 1	D M V 1 1	U N A	③	D M F 3 2	K M S 1 1	V S 1 0 0	④	K M V 1 1	⑤	

- ① = DU11, DUV11
 ② = DZ11, DZV11, DZO11
 ③ = MSCP devices
 ④ = TMSCP devices
 ⑤ = DHU11, DHV11

RECORD OF FLOATING ADDRESSES

DEVICE	UNIT	ADDRESS
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

DEVICE	UNIT	ADDRESS
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Figure B-1: Floating Address Worksheet (Cont.)

ADDRESS	D J 1 1	D H 1 1	D O 1 1	①	D U P 1 1	L K 1 1	D M C 1 1	②	K M C 1 1	L P P 1 1	V M V 2 1	V M V 3 1	D W R 7 0	R L 1 1	L P A 1 1	K W 1 1	R S r v d	R X 1 1	D R 1 1 W	D R 1 1 B	D M P 1 1	D P V 1 1	I S B 1 1	D M V 1 1	U N A	③	D M F 3 2	K M S 1 1	V S 1 0 0	④	K M V 1 1	⑤
761000																																
761004																																
761010																																
761014																																
761020																																
761024																																
761030																																
761034																																
761040																																
761044																																
761050																																
761054																																
761060																																
761064																																
761070																																
761074																																
761100																																
761104																																
761110																																
761114																																
761120																																
761124																																
761130																																
761134																																
761140																																
761144																																
761150																																
761154																																
761160																																
761164																																
761170																																
761174																																
761200																																
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761274																																
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761334																																
761340																																
761344																																
761350																																
761354																																
761361																																
761364																																
761370																																
761374																																
761400																																
	D J 1 1	D H 1 1	D O 1 1	①	D U P 1 1	L K 1 1	D M C 1 1	②	K M C 1 1	L P P 1 1	V M V 2 1	V M V 3 1	D W R 7 0	R L 1 1	L P A 1 1	K W 1 1	R S r v d	R X 1 1	D R 1 1 W	D R 1 1 B	D M P 1 1	D P V 1 1	I S B 1 1	D M V 1 1	U N A	③	D M F 3 2	K M S 1 1	V S 1 0 0	④	K M V 1 1	⑤

- ① = DU11, DUV11
- ② = DZ11, DZV11, DZQ11
- ③ = MSCP devices
- ④ = TMSCP devices
- ⑤ = DHU11, DHV11

RECORD OF FLOATING ADDRESSES

DEVICE	UNIT	ADDRESS
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

DEVICE	UNIT	ADDRESS
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Figure B-1: Floating Address Worksheet (Cont.)

DEVICE																																	
ADDRESS	D J 1 1	D H 1 1	D Q 1 1	①	D U P 1 1	L K 1 1	D M C 1 1	②	K M C 1 1	L P P 1 1	V M V 2 1	V M V 3 1	D W R 7 0	R L 1 1	L P A 1 1	K W 1 1	R s r v d	R X 1 1	D R 1 1 W	D R 1 1 B	D M P 1 1	D P V 1 1	I S B 1 1	D M V 1 1	U N A	③	D M F 3 2	K M S 1 1	V S 1 0 0	④	K M V 1 1	⑤	
761400																																	
761404																																	
761410																																	
761414																																	
761420																																	
761424																																	
761430																																	
761434																																	
761440																																	
761444																																	
761450																																	
761454																																	
761460																																	
761464																																	
761470																																	
761474																																	
761500																																	
761504																																	
761510																																	
761514																																	
761520																																	
761524																																	
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761570																																	
761574																																	
761600																																	
761604																																	
761610																																	
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761734																																	
761740																																	
761744																																	
761750																																	
761754																																	
761761																																	
761764																																	
761770																																	
761774																																	
762000																																	
	D J 1 1	D H 1 1	D Q 1 1	①	D U P 1 1	L K 1 1	D M C 1 1	②	K M C 1 1	L P P 1 1	V M V 2 1	V M V 3 1	D W R 7 0	R L 1 1	L P A 1 1	K W 1 1	R s r v d	R X 1 1	D R 1 1 W	D R 1 1 B	D M P 1 1	D P V 1 1	I S B 1 1	D M V 1 1	U N A	③	D M F 3 2	K M S 1 1	V S 1 0 0	④	K M V 1 1	⑤	

- ① - DU11, DUV11
- ② - DZ11, DZV11, DZQ11
- ③ - MSCP devices
- ④ - TMSCP devices
- ⑤ - DHU11, DHV11

RECORD OF FLOATING ADDRESSES

DEVICE	UNIT	ADDRESS
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

DEVICE	UNIT	ADDRESS
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Figure B-1: Floating Address Worksheet

MK-01604-00

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.

Table B-1 lists the vector assignment sequence for current devices.

Table B-1: Device Vector Assignments

Device	First Address	Next Addr.	Vector Size	Max# Units	BR Level	RSTS/E Notes
DC11	174000	+ 10	10	32	BR5	Not supported
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	BR5	Not supported
DM11BB	170500	+ 10	#4	16	BR4	DH11 modem control
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
LPD11			10			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*		BR5	Not supported
VSV11	172000	+ 10	20			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, HP2780, 3271
DV11	175000	+ 40	20*	4	BR5,6	Not supported

(continued on next page)

Table B-1: Device Vector Assignments (Cont.)

Device	First Address	Next Addr.	Vector Size	Max# Units	BR Level	RSTS/E Notes
LK11	FLOAT	+10	10*	1	BR4	Not supported
DMC11	FLOAT	+10	10*	16	BR5	
DMR11	FLOAT	+10	10	16	BR5	
DZ11	FLOAT	+10	10*	8	BR5	
DZV11 or DZQ11	FLOAT	+10	10*	4	BR5	
KMC11	FLOAT	+10	10*	16	BR5	
LPP11	FLOAT	+10	10			Not supported
VMV21	FLOAT	+10	10			Not supported
VMV31	FLOAT	+20	10			Not supported
VTV01	172600		10	2		Not supported
DWR70	FLOAT	+10	10			Not supported
RL11	FLOAT	+10	4		BR5	Not supported after 1st
TS11	172520	+4	4	4	BR5	
LPA11-K	170460		10	1		
IP11	171000		4	2		Not supported
KW11-C	FLOAT	+10				Not supported
RX11, RX211, RXV11	FLOAT	+10	4	4	BR5	After 1st only
DR11-W	FLOAT	+10	4			Not supported
DR11-B	FLOAT	+10	4			Not supported
DMP11	FLOAT	+10	10	16	BR5	DECnet/E only
DPV11	FLOAT	+10	10		BR5	Not supported
ML11	176400		4	1		Not supported
ISB11	FLOAT	+10	10			Not supported
DMV11	FLOAT	+20	10	16	BR5	DECnet/E only
DHV11/DHU11	FLOAT	+20	10	16	BR5	
* The first vector for the first device of this type must always be on a 10(8) boundary.						
** Also supported at BR6 under RSTS/2780.						

Fixed Addresses and Vectors

Table B-2 lists the devices supported under RSTS/E that have fixed addresses and vectors.

Table B-2: Devices with Fixed Addresses and Vectors

Device	Address	Vector	BR Level	RSTS/E Notes
MSCP	172150	*	BR5	1st controller only
TMSCP	174500	*	BR5	1st unit only
RF11	177460	204	BR5	Not supported
RS03/RS04	172040	204	BR5	Not supported
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
Second RH11/70 RM02/RM03/RM05/RM80 RP04/RP05/RP06	176300	150	BR5	Up to 8 drives
First RH11/70 RP04/RP05/RP06 RM02/RM03/RM05/RM80	176700	254	BR5	Up to 8 drives
RX01/RX02	177170	264	BR5	First only
DECtape	177340	214	BR6	Up to 8 drives
TU10/TE10/TS03/TS11	172520	224	BR5	First TS11 drive only
TU16/TE16/TU45/TU77†	172440	224	BR5	Up to 8 drives
LP11 (LP0)	177514	200	BR4	
(LP1)	164004	170	BR4	
(LP2)	164014	174	BR4	
(LP3)	164024	270	BR4	
(LP4)	164034	274	BR4	
(LP5)	164044	774	BR4	
(LP6)	164054	770	BR4	
(LP7)	164064	764	BR4	
* These controllers have programmable vectors; INIT.SYS finds an available vector address and assigns it to them. ** Each RK05F must be counted as two drives. † Maximum of 4 TU77's				

(continued on next page)

Table B-2: Devicec with Fixed Addresses and Vectors (Cont.)

Device	Address	Vector	BR Level	RSTS/E Notes
CR11,CM11	177160	230	BR5	
CD11	177160	230	BR4	
KW11L	177546	100	BR6	
KW11P	172540	104	BR6	
KG11	170700	NONE	NONE	2780 only
DL11A,DL11B	177560	60	BR4	Console interface
DEQNA XH0	774440	*	BR5	Not supported
XH1	774460	*	BR5	Not supported
DEUNA XE0	774510	120		
* These controllers have programmable vectors; INIT.SYS finds an available vector address and assigns it to them. ** Each RK05F must be counted as two drives. † Maximum of 4 TU77's				

RH70 BAE and CS3 Addresses

Table B-3 lists the four possible RH70 High Speed I/O Controller addresses, their Bus Address Extension (BAE) and Control addresses, their BAE Control Status 3 (CS3) addresses, and their uses.

Table B-3: RH70 BAE and CS3 Addresses

Device	Address	BAE	CS3
RS03/RS04 (Not supported)	172040	172070	172072
TU16/TE16/TU45/TU77	172440	172474	172476
Mixed/nonstandard	176300	176350	176352
RP04/RP05/RP06 or RM02/RM03/RM05/RM80	176700	176750	176752

RSTS/E System Files



This appendix shows a directory listing of the RSTS/E system programs. The directory listing for your installation may differ, depending on the packages you selected.

Account [0,1]

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,1]
BADB	.SYS	5	P < 63>	SATT	.SYS	14CP	< 63>	
ERR	.ERR	16CP	< 40>	SYSGEN	.SIL	636C	< 60>	
DCL	.RTS	132C	<232>	RSX	.RTS	6CP	< 60>	
BACKUP	.TSK	102	<124>	INIT	.SYS	558CP	< 60>	
SWAP	.SYS	128CP	< 63>	RT11	.RTS	20C	< 60>	
ODT	.SYS	14	< 60>	CSPLIB	.LIB	41C	< 60>	
INSTAL	.COM	3C	<104>	UPDATE	.COM	3C	<104>	
COPYUP	.COM	2C	<104>	MAIN	.COM	12C	<104>	
CSPHLP	.COM	9C	<104>	LPRES	.COM	10C	<104>	
LISTER	.COM	3C	<104>	CHECK	.COM	3C	<104>	
MONITR	.COM	16C	<104>	CSPLNG	.COM	21C	<104>	
ASSLOG	.COM	16C	<104>	MONBLD	.COM	8C	<104>	
INSPKG	.COM	11C	<104>	DECNT1	.COM	14C	<104>	
DECNT2	.COM	7C	<104>	FLAG	.COM	3C	<104>	
DELLOG	.COM	4C	<104>	SYSINI	.COM	6C	<104>	
RECOVR	.COM	7C	<104>	CSP	.HLP	2C	<104>	
LP	.HLP	2C	<104>	CSPLST	.DAT	1C	<104>	
CSPRES	.COM	18C	<104>	LP	.COM	17C	<104>	
CSP	.COM	25C	<104>	SETPAS	.COM	1C	<104>	
BEGIN	.COM	16C	<104>	SWAP1	.SYS	4992CPL	< 60>	
RSTS90	.SIL	632CPL	< 60>	START	.COM	14C	<104>	
LOGIN	.COM	4	< 40>	BASIC	.RTS	73C	< 60>	
CRASH	.SYS	380CP	< 63>					

Total of 8007 blocks in 45 files in SY0:[0,1]

Help Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,2]
HELP	.TSK	29C	<232>	DCCCL	.HLP	3	< 40>	
DCCLOS	.HLP	2	< 40>	DCCLLG	.HLP	2	< 40>	
DCCLQU	.HLP	2	< 40>	DCCREA	.HLP	6	< 40>	
DCCRAC	.HLP	16	< 40>	DCDEAL	.HLP	2	< 40>	
DCDEAS	.HLP	3	< 40>	DCDSQU	.HLP	3	< 40>	
DCDSSY	.HLP	1	< 40>	DCDEFI	.HLP	1	< 40>	
DCDFCM	.HLP	1	< 40>	DCDFCS	.HLP	8	< 40>	
DCDLAC	.HLP	8	< 40>	DCDLCM	.HLP	1	< 40>	
DCDLCS	.HLP	2	< 40>	DCDLEN	.HLP	3	< 40>	
DCDLQU	.HLP	1	< 40>	DCDLSV	.HLP	2	< 40>	
DCDLSB	.HLP	3	< 40>	DCDETA	.HLP	5	< 40>	
DCDIBO	.HLP	2	< 40>	DCDIFF	.HLP	5	< 40>	
DCDIRE	.HLP	8	< 40>	DCDISM	.HLP	1	< 40>	
DCDMDK	.HLP	3	< 40>	DCDMMT	.HLP	3	< 40>	
DCDUMP	.HLP	1	< 40>	DCDPSY	.HLP	2	< 40>	
DCEDIT	.HLP	9	< 40>	DCEOD	.HLP	3	< 40>	
DCEXIT	.HLP	3	< 40>	DCGOTO	.HLP	3	< 40>	
DCHANG	.HLP	2	< 40>	DCHelp	.HLP	5	< 40>	
DCIF	.HLP	4	< 40>	DCINIT	.HLP	2	< 40>	
DCINDK	.HLP	15	< 40>	DCINMT	.HLP	5	< 40>	
DCINIQU	.HLP	22	< 40>	DCINSV	.HLP	13	< 40>	
DCINQU	.HLP	8	< 40>	DCINER	.HLP	3	< 40>	
DCINSW	.HLP	5	< 40>	DCLOAD	.HLP	1	< 40>	
DCLOOV	.HLP	3	< 40>	DCLOGI	.HLP	6	< 40>	
DCLOGO	.HLP	5	< 40>	DCMACR	.HLP	2	< 40>	
DCMOUN	.HLP	1	< 40>	DCMTDK	.HLP	10	< 40>	
DCMTMT	.HLP	4	< 40>	DCON	.HLP	9	< 40>	
DCONCC	.HLP	5	< 40>	DCOPEN	.HLP	10	< 40>	
DCOPLG	.HLP	10	< 40>	DCOPQU	.HLP	2	< 40>	
DCPRIN	.HLP	19	< 40>	DCREAD	.HLP	4	< 40>	
DCREMO	.HLP	2	< 40>	DCREER	.HLP	1	< 40>	
DCRELI	.HLP	2	< 40>	DCRERU	.HLP	2	< 40>	
DCRESW	.HLP	1	< 40>	DCRENA	.HLP	8	< 40>	
DCREQU	.HLP	1	< 40>	DCREST	.HLP	29	< 40>	
DCRUN	.HLP	4	< 40>	DCSET	.HLP	3	< 40>	
DCSECA	.HLP	8	< 40>	DCSECO	.HLP	1	< 40>	
DCSENC	.HLP	1	< 40>	DCSEDA	.HLP	2	< 40>	
DCSEND	.HLP	3	< 40>	DCSEDT	.HLP	2	< 40>	
DCSEDV	.HLP	2	< 40>	DCSEEC	.HLP	2	< 40>	
DCSENE	.HLP	3	< 40>	DCSEHO	.HLP	3	< 40>	
DCSELG	.HLP	2	< 40>	DCSEON	.HLP	1	< 40>	
DCSENO	.HLP	1	< 40>	DCSEPT	.HLP	3	< 40>	
DCSEPN	.HLP	7	< 40>	DCSETI	.HLP	2	< 40>	
DCSEVE	.HLP	2	< 40>	DCSENV	.HLP	2	< 40>	
DCSHCM	.HLP	1	< 40>	DCSHCS	.HLP	1	< 40>	
DCSHDT	.HLP	1	< 40>	DCSHDA	.HLP	1	< 40>	
DCSHDK	.HLP	1	< 40>	DCSHFS	.HLP	5	< 40>	
DCSHPV	.HLP	1	< 40>	DCSHLB	.HLP	1	< 40>	
DCSHLO	.HLP	1	< 40>	DCSHLS	.HLP	1	< 40>	
DCSHMY	.HLP	1	< 40>	DCSHNT	.HLP	1	< 40>	
DCSHPR	.HLP	1	< 40>	DCSHQU	.HLP	11	< 40>	
DCSHRV	.HLP	1	< 40>	DCSHRT	.HLP	1	< 40>	
DCSHSB	.HLP	2	< 40>	DCSHSY	.HLP	1	< 40>	
DCSHTI	.HLP	1	< 40>	DCSTAR	.HLP	1	< 40>	
DCSTQU	.HLP	2	< 40>	DCSTQM	.HLP	7	< 40>	
DCSTSV	.HLP	8	< 40>	DCSTOP	.HLP	2	< 40>	

DCSPQU .HLP	3	< 40>	DCSPQM .HLP	4	< 40>
DCSPSV .HLP	7	< 40>	DCSUBM .HLP	15	< 40>
DCTYPE .HLP	6	< 40>	DCUNLO .HLP	1	< 40>
DCUNOV .HLP	3	< 40>	DCUNRU .HLP	2	< 40>
DCWRIT .HLP	6	< 40>	ACCNTS .HLP	30	< 40>
ADVANC .HLP	20	< 40>	BPCHLP .HLP	4	< 40>
BPCOMM .HLP	12	< 40>	BPFUNC .HLP	14	< 40>
BPHELP .HLP	2	< 40>	BPSTAT .HLP	19	< 40>
DATES .HLP	7	< 40>	DCL .HLP	2	< 40>
DCMAIL .HLP	3	< 40>	DISKS .HLP	13	< 40>
ENTRYS .HLP	11	< 40>	EXPRES .HLP	6	< 40>
FORMS .HLP	18	< 40>	FUNCTN .HLP	28	< 40>
KEYS .HLP	5	< 40>	CTRLT .HLP	6	< 40>
LABELS .HLP	3	< 40>	MAGTAP .HLP	10	< 40>
OPERAT .HLP	7	< 40>	PASSWD .HLP	10	< 40>
PRIVS .HLP	12	< 40>	PROGRM .HLP	2	< 40>
COPHLP .HLP	4	< 40>	DIRHLP .HLP	4	< 40>
ERRHLP .HLP	7	< 40>	FITHLP .HLP	11	< 40>
PIPHLP .HLP	29	< 40>	PIPDIR .HLP	3	< 40>
PLEHLP .HLP	6	< 40>	PLEBAT .HLP	4	< 40>
PLEQUE .HLP	4	< 40>	PLESPL .HLP	6	< 40>
QUEHLP .HLP	8	< 40>	SYSHLP .HLP	22	< 40>
TECHLP .HLP	5	< 40>	TECOMD .HLP	12	< 40>
TECOFL .HLP	6	< 40>	TYPHLP .HLP	3	< 40>
VTEHLP .HLP	3	< 40>	VTEDKP .HLP	6	< 40>
UTLHLP .HLP	12	< 40>	QUEUES .HLP	20	< 40>
QUOTAS .HLP	11	< 40>	RSX .HLP	3	< 40>
RT11 .HLP	13	< 40>	RUNTIM .HLP	9	< 40>
SERVRS .HLP	7	< 40>	SYMBOL .HLP	14	< 40>
TERMINL .HLP	4	< 40>	TIMES .HLP	7	< 40>
BPCREF .HLP	6	< 40>	COPY .HLP	3	< 40>
DIRECT .HLP	4	< 40>	ERRDIS .HLP	7	< 40>
FIT .HLP	11	< 40>	DCLSRT .HLP	31	< 40>
DCSESE .HLP	8	< 40>	DCDCSY .HLP	8	< 40>
PIPSAV .HLP	29	< 40>	DCSHDE .HLP	2	< 40>
RSTSFL .HLP	6	< 40>	DSKDMP .HLP	26	< 40>
B2CREF .HLP	12	< 40>	DCDEAC .HLP	8	< 40>
DCDECO .HLP	1	< 40>	DCDEEN .HLP	3	< 40>
DCDEQU .HLP	1	< 40>	DCDESV .HLP	2	< 40>
DCDESY .HLP	3	< 40>	DCSELO .HLP	2	< 40>
DCSHFO .HLP	2	< 40>	DCCOPY .HLP	17	< 40>
DCSHOW .HLP	3	< 40>	DCSHAL .HLP	2	< 40>
DCSHDV .HLP	2	< 40>	DCSHEN .HLP	8	< 40>
DCSHFI .HLP	1	< 40>	DCSHJO .HLP	5	< 40>
DCSHSV .HLP	13	< 40>	DCSHUS .HLP	7	< 40>
FILES .HLP	19	< 40>	DCREJO .HLP	1	< 40>
DCREOV .HLP	1	< 40>	DCINST .HLP	2	< 40>
DCINRU .HLP	11	< 40>	DCFORC .HLP	5	< 40>
DCSHBU .HLP	3	< 40>	DCSHCA .HLP	4	< 40>
DCDELE .HLP	9	< 40>	DCDECS .HLP	2	< 40>
DCSEAC .HLP	14	< 40>	DCSEDE .HLP	2	< 40>
DCSEEN .HLP	9	< 40>	DCSEFI .HLP	7	< 40>
DCSEJO .HLP	5	< 40>	DCSEPA .HLP	3	< 40>
DCSEPR .HLP	9	< 40>	DCSEQU .HLP	13	< 40>
DCSESV .HLP	9	< 40>	DCSETE .HLP	36	< 40>
DCINLI .HLP	9	< 40>	DCINOV .HLP	3	< 40>
DCUNLI .HLP	3	< 40>	DCSESY .HLP	6	< 40>

DCSHAC	.HLP	7	< 40>	DCSHTE	.HLP	5	< 40>
NETCPY	.HLP	4	< 40>	NFTC	.HLP	12	< 40>
NFTS	.HLP	28	< 40>	DCLMGE	.HLP	26	< 40>
FILNAM	.HLP	12	< 40>	KEYBRD	.HLP	5	< 40>
PLEASE	.HLP	5	< 40>	PLEBAC	.HLP	5	< 40>
RSTS	.HLP	17	< 40>	DISK	.HLP	9	< 40>
SETHLP	.HLP	19	< 40>	TECO	.HLP	4	< 40>
TYPE	.HLP	3	< 40>	UTHELP	.HLP	16	< 40>
VTEDIT	.HLP	3	< 40>	DCEXPR	.HLP	3	< 40>
DCFUNC	.HLP	25	< 40>	DCLABE	.HLP	2	< 40>
DCOPER	.HLP	7	< 40>	DCSYMB	.HLP	12	< 40>
MAIL	.HLP	2	< 40>	HELP	.HLP	7	< 40>
DCAT	.HLP	3	< 40>	DCALLO	.HLP	4	< 40>
DCAPPE	.HLP	6	< 40>	DCASSI	.HLP	3	< 40>
DCASQU	.HLP	2	< 40>	DCASSY	.HLP	3	< 40>
DCATTA	.HLP	4	< 40>	DCBACK	.HLP	26	< 40>
DCBASI	.HLP	3	< 40>	DCBROA	.HLP	5	< 40>
DCFOFO	.HLP	3	< 40>	DCFORT	.HLP	2	< 40>
DCF77	.HLP	3	< 40>	DCLINK	.HLP	4	< 40>

Total of 1737 blocks in 264 files in SY:[0,2]

Error Reporting Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,3]
ERRDAT	.FIL	95C	< 60>	ERRINT	.TSK	18C	<124>	
ERRCPY	.TSK	14C	<124>	ERRDIS	.TSK	39C	<124>	
ERRDET	.TSK	40C	<124>	ANALYS	.TSK	47C	<124>	
ANALY1	.TSK	52C	<124>	ANALY2	.TSK	46C	<124>	
ANALY3	.TSK	44C	<124>	ERRLOG	.FIL	2	< 60>	

Total of 397 blocks in 10 files in SY0:[0,3]

Device Testing Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,5]
DSKSEK	.TSK	16C	<124>	DSKEXR	.TSK	20C	<124>	
LPEXER	.TSK	14C	<124>	PPEXER	.TSK	11C	<124>	
PREXER	.TSK	12C	<124>	DXEXER	.TSK	20C	<124>	
DTEXER	.TSK	19C	<124>	CPEXER	.TSK	28C	<124>	
CPUTST	.TSK	28C	<124>	KBEXER	.TSK	16C	<124>	
MTEXER	.TSK	25C	<124>	DDEXER	.TSK	19C	<124>	

Total of 228 blocks in 12 files in SY0:[0,5]

Print/Batch Services Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,6]
PBS	.TSK	97C	<232>	PBSMGR	.TSK	298C	<232>	
PBSERR	.ERR	57	< 40>	FORMS	.SYS	2	< 40>	
PBS	.SYS	32	<188>					

Total of 486 blocks in 5 files in SY0:[0,6]

File Restore Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,7]
BACKUP	.PRM	5	< 60>	BACKUP	.HLP	12	< 60>	
RESTOR	.TSK	50C	<232>	BACLST	.TSK	54C	<232>	
BACCON	.TSK	29C	<232>	BACDIR	.TSK	56C	<232>	
BACMNT	.TSK	60C	<232>	BACLAB	.TSK	44C	<232>	
BACDSK	.TSK	36C	<232>	BACCOM	.TSK	46C	<232>	
BACLOD	.TSK	51C	<232>	BACENT	.TSK	40C	<232>	
BACFRM	.TSK	51C	<232>					

Total of 534 blocks in 13 files in SY0:[0,7]

OPSER-based Spooling Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,8]
CHARS	.QUE	2	< 60>	BATCH	.DCD	12C	< 60>	
QUEMAN	.TSK	32C	<232>	QUMRUN	.TSK	61C	<232>	
OPSER	.TSK	24C	<232>	OPSRUN	.TSK	59C	<232>	
SPOOL	.TSK	54C	<232>	SPLIDL	.TSK	61C	<232>	
SPLRUN	.TSK	59C	<232>	BATCH	.TSK	52C	<232>	
BATIDL	.TSK	50C	<232>	BATDEC	.TSK	62C	<232>	
BATRUN	.TSK	55C	<232>					

Total of 583 blocks in 13 files in SY0:[0,8]

Unsupported Utility Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,9]
DSKPEK	.MAC	4	< 60>	DSKDMP	.HLP	26	< 40>	
QSTATS	.DOC	32	< 60>	DIALER	.DOC	63	< 60>	
RSTSFL	.OBJ	42	< 60>	RSTSFL	.OLB	105C	< 60>	
RSTSFL	.DOC	2	< 60>	RSTSFL	.HLP	6	< 60>	
MONEY	.BAS	51	< 60>	MEMORY	.BAS	14	< 60>	
FLOAT	.BAS	19	< 60>	DSKDMP	.BAS	20	< 60>	
BPDA	.BAS	59	< 60>	CONNEC	.BAS	46	< 60>	
DIALER	.BAS	85	< 60>	EMTCPY	.BAS	102	< 60>	
STATUS	.B2S	69	< 60>	QSTATS	.B2S	46	< 60>	
LQSTAT	.BAS	19	< 60>	MONEY	.TSK	22C	<124>	
MEMORY	.TSK	12C	<124>	FLOAT	.TSK	21C	<124>	
DSKDMP	.TSK	18C	<124>	BPDA	.TSK	37C	<124>	
CONNEC	.TSK	28C	<124>	DIALER	.TSK	43C	<124>	
EMTCPY	.TSK	37C	<124>	STATUS	.TSK	43C	<124>	
QSTATS	.TSK	23C	<124>	LQSTAT	.TSK	22C	<124>	
B2CREF	.TSK	113C	<104>	RNO	.TSK	72C	<104>	
B2CREF	.HLP	12	< 60>	B2CREF	.DOC	2	< 40>	
RNO	.RNO	85	< 60>	RNOBLD	.CMD	6	< 60>	
RNOBLD	.ODL	2	< 60>	RNPRE	.MAC	5	< 60>	
COMND	.MAC	7	< 60>	CMTAB	.MAC	11	< 60>	
ERMSG	.MAC	10	< 60>	FMTCM	.MAC	26	< 60>	
HYPHEN	.MAC	54	< 60>	INDEX	.MAC	11	< 60>	
PINDX	.MAC	9	< 60>	RNCMD	.MAC	22	< 60>	
RNFIO	.MAC	9	< 60>	RNORSX	.MAC	5	< 60>	
RUNOFF	.MAC	71	< 60>	START	.MAC	8	< 60>	
DUMP	.SAV	10C	<104>	SRCCOM	.SAV	17C	<104>	

Total of 1683 blocks in 52 files in SY0:[0,9]

RMS-11 Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,10]
RMSBCK	.TSK	95C	<104>	RMSRST	.TSK	113C	<232>	
RMSDEF	.TSK	79C	<104>	RMSDSP	.TSK	79C	<104>	
RMSCNV	.TSK	82C	<104>	RMSDES	.TSK	116C	<104>	
RMSIFL	.TSK	88C	<104>	RMSRES	.LIB	17C	< 42>	
RMSLBA	.LIB	17C	< 42>	RMSLBB	.LIB	13C	< 42>	
RMSLBC	.LIB	9C	< 42>	RMSLBD	.LIB	9C	< 42>	
RMSLBE	.LIB	13C	< 42>	RMSLBF	.LIB	17C	< 42>	
DAPRES	.LIB	41C	< 42>					

Total of 788 blocks in 15 files in SY0:[0,10]

EDT Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,11]
EDT52	.DOC	3	< 60>	EDT100	.DOC	3	< 60>	
EDT200	.DOC	4	< 60>	EDTKIT	.DOC	39	< 60>	
EDT	.LIB	162C	< 42>	EDT	.TSK	49C	<104>	

Total of 260 blocks in 6 files in SY0:[0,11]

SYSGEN Components and BASIC-PLUS Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,12]
MONITR	.CMD	3	< 60>	DECNTD	.CMD	1	< 60>	
RJ2780	.CMD	21	< 60>	BASIC	.CMD	1	< 60>	
RSXRTS	.CMD	1	< 60>	HOOK	.SAV	28C	<104>	
CHECK	.MAC	19	< 60>	TBL	.MAC	107	< 60>	
KBDEF	.MAC	19	< 60>	TTDINT	.MAC	34	< 60>	
TTDVR	.MAC	407	< 60>	RSTS	.OBJ	654	< 60>	
CRA	.OBJ	7	< 60>	TER	.OBJ	5	< 60>	
DSK	.OBJ	5	< 60>	MCP	.OBJ	3	< 60>	
BBR	.OBJ	2	< 60>	OPN	.OBJ	3	< 60>	
XVR	.OBJ	2	< 60>	MVR	.OBJ	3	< 60>	
EMT	.OBJ	3	< 60>	EM2	.OBJ	3	< 60>	
GEN	.OBJ	3	< 60>	RSX	.OBJ	2	< 60>	
FIPLRG	.OBJ	4	< 60>	FMS	.OBJ	3	< 60>	
OVRLRG	.OBJ	4	< 60>	OVLHD	.OBJ	1	< 40>	
DEFAULT	.SAV	3C	<124>	DEFAULT	.STB	1	< 60>	
SYSGEN	.SAV	140C	<124>	BUFCHK	.TSK	21C	<124>	
EDT	.TSK	237C	<104>	BASIC	.COM	1C	<104>	
BPLGEN	.SAV	60C	<124>	RTS	.OBJ	93	< 60>	
MA2	.OBJ	18	< 60>	MA2I	.OBJ	16	< 60>	
MA2F	.OBJ	16	< 60>	MA4	.OBJ	22	< 60>	
MA4F	.OBJ	18	< 60>	MA4D	.OBJ	16	< 60>	
XL2	.OBJ	3	< 60>	XL2I	.OBJ	3	< 60>	
XL2F	.OBJ	2	< 60>	XL4	.OBJ	4	< 60>	
XL4F	.OBJ	2	< 60>	XT2	.OBJ	3	< 60>	
XT2I	.OBJ	3	< 60>	XT2F	.OBJ	2	< 60>	
XT4	.OBJ	4	< 60>	XT4F	.OBJ	2	< 60>	
SF	.OBJ	6	< 60>	IO	.OBJ	6	< 60>	
PU	.OBJ	6	< 60>	MX	.OBJ	9	< 60>	
SN	.OBJ	3	< 60>	DBG	.OBJ	2	< 60>	
VE	.OBJ	2	< 60>					

Total of 2072 blocks in 59 files in SY0:[0,12]

TECO Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,13]
TECO	.RTS	48C	< 60>	TECO	.TEC	10C	<104>	
TYPE	.TEC	7C	<104>	VTEDIT	.TEC	24C	<104>	
TECO	.HLP	4	< 60>	TECOMD	.HLP	11	< 60>	
TECOFL	.HLP	4	< 60>	VTEDIT	.HLP	3	< 60>	
VTEDKP	.HLP	6	< 40>	VTEDIT	.DOC	118	< 40>	
TECORN	.DOC	108	< 40>	TECO	.INI	8	< 40>	
TECKBM	.TEC	3C	<104>	LOCAL	.TEC	3C	<104>	
SEARCH	.TEC	5C	<104>	SQU	.TEC	10C	<104>	
TECO	.TES	28C	<104>	TYPE	.TES	17C	<104>	
VTEDIT	.TES	34C	<104>	TECOIN	.TES	18	< 40>	
TECKBM	.TES	3C	<104>	LOCAL	.TES	3C	<104>	
SEARCH	.TES	9C	<104>	SQU	.TES	15C	<104>	
TECOLB	.OBJ	68	< 60>	GEXIT	.OBJ	3	< 60>	
SCREEN	.OBJ	13	< 60>	SCRINS	.OBJ	4	< 60>	
SCROLL	.OBJ	4	< 60>	CRTRUB	.OBJ	8	< 60>	
CRTRUB	.MAC	65	< 60>					

Total of 664 blocks in 31 files in SY0:[0,13]

Auxiliary Library Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,14]
REORDR	.TSK	74C	<232>	ODT	.TSK	27C	<104>	
COPY	.TSK	25C	<104>	TALK	.TSK	11C	<232>	
GRIPE	.TSK	16C	<232>	DISPLY	.TSK	61C	<232>	
FIT	.TSK	60C	<232>	FLINT	.TSK	40C	<104>	
PMDUMP	.TSK	47C	<104>	BPCREF	.TSK	24C	<104>	
BPCRF1	.TSK	49C	<104>	RUNOFF	.TSK	58C	<104>	
DSKCVT	.TSK	57C	<232>	RUNOFF	.RNO	56	< 60>	

Total of 605 blocks in 14 files in SY0:[0,14]

SORT/MERGE Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[0,15]
SRTLIB	.OLB	209	< 60>	SRTUTL	.ODL	11	< 60>	
MGELIB	.OLB	189	< 60>	MGEUTL	.ODL	10	< 60>	
SRTMRG	.001	2	< 60>	SRTMRG	.003	5	< 60>	
SRTMRG	.004	179	< 60>	SRTFIL	.ODL	11	< 60>	
SRTREC	.ODL	10	< 60>	MGEFIL	.ODL	9	< 60>	
MGEREC	.ODL	9	< 60>	SRTMRG	.005	16	< 60>	
SRTMRG	.006	15	< 60>	SRTMRG	.007	5	< 60>	
SRTSHR	.OLB	214	< 60>	MGESHR	.OLB	194	< 60>	
SRTMRG	.008	10	< 60>	SRTTST	.DAT	81	< 60>	
SRTMGE	.MST	81	< 60>	SRTMRG	.009	33	< 60>	
SRTMRG	.010	48	< 60>	SRTMRG	.011	31	< 60>	
SRTMRG	.012	26	< 60>	SRTMRG	.013	3	< 60>	
SORT	.COM	10	< 60>	SRTMRG	.002	5	< 60>	
SRTUTL	.TSK	388C	<104>	MGEUTL	.TSK	370C	<104>	
SRTTRN	.TSK	103	<104>					

Total of 2277 blocks in 29 files in SY0:[0,15]

RSX Utilities Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[1,1]
SYSLIB	.OLB	250	< 40>	RSXMAC	.SML	264	< 40>	
BP2	.LNK	2	< 40>	C81	.LNK	1	< 40>	
DIBOL	.LNK	3	< 40>	DMS	.LNK	1	< 40>	
F77	.LNK	3	< 40>	RSX11	.LNK	2	< 40>	
RMSMAC	.MLB	185	< 40>	RMSLIB	.OLB	271	< 40>	
RMS11	.ODL	83	< 40>	RORMS1	.MAC	12	< 40>	
RMS11S	.ODL	3	< 40>	RMS12S	.ODL	3	< 40>	
RMS11X	.ODL	5	< 40>	RMS12X	.ODL	4	< 40>	
RMSRLX	.ODL	2	< 40>	DAP11X	.ODL	5	< 40>	
DAPRLX	.ODL	2	< 40>	RMSRES	.TSK	19	< 40>	
RMSRES	.STB	4	< 40>	DAPRES	.TSK	43	< 40>	
DAPRES	.STB	3	< 40>	ODT	.OBJ	8	< 40>	
ODTID	.OBJ	13	< 40>					
EDTHEL	.HLP	223	< 40>					

Total of 1414 blocks in 26 files in SY0:[1,1]

System Library Package

Name	.Typ	Size	Prot	Name	.Typ	Size	Prot	SY0:[1,2]
INSTAL	.LOG	31	< 60>	SHUTUP	.TSK	64C	<232>	
UTLMGR	.TSK	231C	<232>	DSKINT	.TSK	124C	<124>	
ONLCLN	.TSK	109C	<232>	ACTMGR	.TSK	289C	<232>	
SILUS	.SAV	41C	<104>	PIP	.SAV	55C	<232>	
MACRO	.SAV	60C	<104>	CREF	.SAV	8C	<104>	
LINK	.SAV	57C	<104>	LIBR	.SAV	22C	<104>	
ERR	.STB	3	< 40>	ONLPAT	.SAV	68C	<104>	
COMMON	.MAC	41	< 40>	KERNEL	.MAC	133	< 60>	
DCLUTL	.TSK	24C	<232>					
CONFIG	.MAC	7	< 60>	GLOBAL	.COM	1	< 60>	
SYSGEN	.COM	9	< 60>	SYSLIB	.OBJ	6	< 40>	
LOGIN	.TSK	37C	<232>	LOGOUT	.TSK	20C	<232>	
DIRECT	.TSK	52C	<232>	SYSTAT	.TSK	53C	<232>	
FILCOM	.TSK	48C	<104>	PLEASE	.TSK	13C	<232>	
SWITCH	.TSK	10C	<232>	SYSMAC	.SML	46	< 40>	
SAVRES	.SAV	206C	<124>	TERMGR	.TSK	131C	<232>	
UTILTY	.TSK	48C	<124>					
PAT	.SAV	11C	<104>	MAKSIL	.TSK	52C	<104>	
TKB	.TSK	191C	<104>	STK	.TSK	189C	<104>	
MAC	.TSK	103C	<104>	LBR	.TSK	65C	<104>	
PAT	.TSK	55C	<104>	CRF	.TSK	47C	<104>	
PRELIN	.TSK	43C	<232>	BUILD	.TSK	58C	<124>	
ATPK	.TSK	29C	<252>	PBUILD	.TSK	23C	<124>	
CPATCH	.TSK	24C	<124>	AUTOED	.TSK	26C	<124>	
QUE	.TSK	56C	<232>					
BPLGEN	.COM	3	< 60>	START	.LOG	14	< 60>	

Total of 3065 blocks in 52 files in SY0:[1,2]

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) or type a command to the console emulator to activate 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 V9.0 (MT0) INIT V9.0-14  
Current date: <DD-MMM-YY>?  
Current time: <HH:MM AM/PM>?  
Installing RSTS on a new system disk? <Yes>
```

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. The section, Hardware Bootstrap Procedures, details hardware bootstrap procedures.

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, do the following:

1. Physically mount the system installation 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 TS11 drive.

2. Make sure 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.
3. Set the ONLINE/OFFLINE switch on the tape unit to ONLINE and make sure that the RDY indicator is lit.
4. Make sure that the console terminal is on line.
5. Follow the bootstrap instructions in the section, Hardware Bootstrap Procedures, for the type of hardware bootstrap device that is on the system.

Bootstrapping Disk Distribution

To bootstrap the disk cartridge, proceed as follows:

1. Insert the disk cartridge in a free unit.
2. Make sure that the RDY light is on.
3. Make sure that the WR PROT light is on.
4. Make sure that the console terminal is on line.
5. Follow the instructions in the section, Hardware Bootstrap Procedures, for the type of hardware bootstrap device that is on the system.

Hardware Bootstrap Procedures

Bootstrapping a device involves using the Central Processor Unit (CPU) console switches or typing a command to the console emulator to access and activate a hardware loader. The hardware loader contains machine instructions for reading a bootstrap record from the device. The 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 various processor handbooks. The bootstrap procedure that you should use depends upon the type of hardware bootstrap device on the system.

Table D-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 D-1: Summary of Hardware Bootstrap Addresses

Bootstrap Type					
Device to Bootstrap	M9301-YA	M9301-YB	M9301-YC	M9301-YF	M9312
RK05 disk cartridge unit 0	DK	DK	30	DK	DK
RP02 or RP03 disk pack unit 0	DP	DP	40	DP	DP
RP04, RP05, RP06, RM02, RM03, RM05, or RM80 disk pack unit 0 at 176700 CSR		DB	70	DB	DB
RK05 disk (unit n)	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)	DPn	DPn	40 + n	DPn	DPn
RP04, RP05, RP06, RM02, RM03, RM05, or RM80 disk (unit n) at 176700 CSR		DBn	70 + n	DBn	DBn
TU10/TE10 and TS03 magnetic tape	MT	MT	10	MT	MTn
TU16/TE16/TU45/TU77 magnetic tape		MM	60	MM	MMn
TS11/TSV05/TK25/TU80 magnetic tape					MSn
MSCP devices*** at 172150 CSR					DUn
* 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 the section, Load Program Bootstrap for the TU10, TE10, or TS03. *** MSCP devices include the RA60, RA80, RA81, RC25, RX50, RD51, RD52, and RD53 disk drives.					

BM873-YA Procedure

If the BM873-YA Restart/Loader is on the system, perform the following steps:

1. Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.
2. Set the CPU Switch Register to one of the following values:
773010 for RK05 disk cartridge
773100 for RP02 or RP03 disk pack
773050 for TU10/TE10/TS03 magnetic tape
3. Press the CPU LOAD ADRS switch.
4. Press the CPU START switch.

BM873-YB Procedure

If the BM873-YB Restart/Loader is on the system, perform the following steps:

1. Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.
2. Set the CPU Switch Register to one of the following values:
773030 for RK05 disk cartridge
773350 for RP02 or RP03 disk pack
773320 for RP04, RP05, RP06, RM02, RM03, RM05, or RM80 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, RM03, RM05, or RM80 disk unit
specified in Switch Register
773110 for TU10/TE10/TS03 magnetic tape
773150 for TU16/TE16/TU45/TU77 magnetic tape
3. Press the CPU LOAD ADRS switch.
4. If necessary, set the CPU Switch Register to the unit number of the disk drive being bootstrapped.
5. Press the CPU START switch.

H324 Pushbutton Panel Procedure

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

1. Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.
2. 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.
3. Press the CPU START switch.

MR11-DB Procedure

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

1. Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.
2. Set the CPU Switch Register to one of the following values:
773110 for RK05 disk cartridge
773154 for RP03 disk pack
773136 for TU10/TE10/TS03 magnetic tape
3. Press the CPU LOAD ADRS switch.
4. Press the CPU START switch.

BM792-YB Procedure

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

1. Move the CPU Console ENABLE/HALT switch to its HALT position and back to its ENABLE position.
2. Set the CPU Switch Register to 773100.
3. Press the CPU LOAD ADRS switch.
4. Set the CPU Switch Register to one of the following values:
777406 for RK05 disk cartridge
776716 for RP03 disk pack
5. Press the CPU START switch.

M9301-YA and M9301-YB Procedures

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

1. 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 dollar sign (\$) prompt.
2. In response to the prompt, type the two-character device code and the unit number of the device to be bootstrapped. Terminate your response by pressing RETURN.

Table D-2 describes the device codes.

Table D-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/RM05/RM80 Disk Pack* at 176700 CSR	DB
* M9301-YB Bootstrap Terminator only.	

M9301-YC Procedure

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

1. Move the CPU ENABLE/HALT switch to its HALT position and back to its ENABLE position.
2. Set the start address of 17765000 in the console switches.
3. Press the CPU LOAD ADDR switch.
4. Set the device unit number in switches 0 through 2.
5. Set the device code for the device to be bootstrapped in switches 3 through 6. Table D-3 lists the device codes.
6. Make sure that switches 7 through 21 are off (down).
7. Press the CPU START switch.

Table D-3 lists the device codes.

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

Device	Code
TU10/TE10/TS03 Magnetic Tape	1
RK05 Disk Cartridge	3
RP02/RP03 Disk Pack	4
RK06 Disk Cartridge	5
TU16/TE16/TU45/TU77 Magnetic Tape	6
RP04/RP05/RP06/RM02/RM03/RM05/RM80 Disk Pack at 176700 CSR	7

Note

Before the M9301-YC bootstrap 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 your 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.

M9301-YF Procedure

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

1. 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 dollar (\$) prompt.

2. In response to the prompt, type the two-character device code and the unit number of the device to be bootstrapped. Terminate your response by pressing RETURN.

Table D-4 lists the device codes.

Table D-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 Disk Cartridge	DM
RP02/RP03 Disk Pack	DP
RP04/RP05/RP06/RM02/RM03/RM05/RM80 Disk Pack at 176700 CSR	DB

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 D-1 is a diagram of the ROM arrangement for the M9312 Bootstrap Module.

CPU
ROM
BOOT #1 ROM
BOOT #2 ROM
BOOT #3 ROM
BOOT #4 ROM

Figure D-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 the section, Using the M9312 Console Emulator (PDP-11/60s and PDP-11/70s 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 the section, Determining the M9312 Bootstrap ROM Configuration.
- 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 the section, Bootstrapping With the M9312.
- If you do not have the M9312 Bootstrap/Terminator Module on your system and need to boot the RL01, RL02, or the RK07 disk device, perform the manual load routine described in the section, Load Program Bootstrap for the RL01/RL02 and RK07.

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 procedures with 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 prompts you with the commercial at sign (@).

In response to the @ character, type the two-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 D-7 contains the device codes.

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

```
Enabling only console, disks, and tapes
RSTS V9.0 (MTO) INIT V9.0-14
Installing RSTS on a new system disk? <Yes>
```

Begin the system installation process in Phase 2, Prepare System Disk.

2. *Switch register* boot procedures with 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 prompts you with the commercial at sign (@).

In response to the @ character, type the two-character device code (in uppercase) 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 D-7 contains the device codes.

Note

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.

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 installation process in Phase 2, Prepare System Disk.

Determining the M9312 Bootstrap ROM Configuration

If you do not know the M9312 ROM configuration, it can be determined by using Tables D-5 and D-7 and performing the instructions that follow Table D-5.

Table D-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 D-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 D-6 lists the M9312 bootstrap ROM configurations.

Table D-6: M9312 Bootstrap ROM Configuration

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

If you do not know the M9312 ROM configuration, use Tables D-5, D-6, and D-7 and follow these instructions:

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

Table D-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
RP02/RP03	DP	0-7	042120
RP04/RP05/RP06	DB	0-7	
RM02/RM03/RM05/RM80 at CSR 176700	DB*		
RK05	DK	0-7	042113
TU56	DT	0-7	
TU16/TE16/TU45/TU77	MM	0-7	046515
TU10/TE10/TS03	MT	0-7	046524
TS11/TSV05/TU80	MS	0-7	046523
TK50	MU	0-7	
RA60/RA80/RA81/RC25/ RD51/RD52/RX50/RD53 (MSCP controller devices) at CSR 172150	DU	0-15	042125
Console Emulator 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, RM03, or RM05 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 the section, Using the M9312 Console Emulator, if you find you have a console emulator; otherwise, perform the procedures in the section, Bootstrapping With the M9312. The following section explains how to bootstrap with the M9312 module using a switch register controlled CPU.

Bootstrapping with the M9312

The following procedure describes how a device is bootstrapped when the M9312 bootstrap ROM configuration is known. Table D-8 provides the data needed to bootstrap a device.

1. Locate in Table D-8 the name of the device to be booted.
2. Determine from the ROM configuration in Table D-6 the location (ROM 1/2/3/4) of the device boot ROM.
3. Select the three-digit Switch Register Code (SWR) from Table D-8 for the particular ROM location.
4. Move the CPU console Enable/Halt switch to its Halt position, then back to its Enable position.
5. Set the CPU switch register to 765744 (or 17765744 for PDP-11/70).
6. Press the CPU LOAD ADRS switch.
7. Set the Switch Register Code (SWR) selected from Table D-8 in CPU switches 0-8, as shown in Table D-9.
8. Set the unit number of the boot device in CPU switches 9-11 (see Table D-9).
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 installation process in Phase 2, Prepare System Disk.

```
Enabling only console, disks, and tapes.  
RSTS V9.0 (MT0) INIT V9.0-14  
Installing RSTS on a new system disk? <Yes>
```

Table D-8 lists the switch register codes.

Table D-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
RP02/RP03	012	212	412	612
RP04/RP05/RP06	056	256	456	656
RM02/RM03/RM05/RM80 at CSR 176700				
RA80/RA81/RA60	012	212	412	612
RC25/RX50/RD51/RD52				
RD53 (MSCP controller devices) at CSR 172150				
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 D-9 lists the console switch register settings.

Table D-9: Console Switch Register Settings

15 - 12	11 - 09	08 - 00
—	Octal Unit Number	Switch Register Code (SWR) from Table D-8

Load Program Bootstrap for the RL01/RL02 and RK06/RK07

To bootstrap an RL01, RL02, RK06, 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.

1. While holding down the CTRL button, press the HLT/SS button on the CPU.
2. Set address 1000 in the console register by using the numbered console buttons.
3. Press the LAD (load address) button.
4. Press the CLR button to clear the register.

5. 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		RK06/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:

1. Place address 1000 in the console register again by using the numbered buttons.
2. Press the CPU LAD (load address) button to load the address.
3. While holding the CTRL button down, press the START button on the CPU to boot the device.
4. 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.

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:

1. Move the CPU Console ENABLE/HALT Switch to its HALT position and back to its ENABLE position.
2. Set the CPU Switch Register to 010000.
3. Press the CPU LOAD ADRS switch.
4. 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

5. Set the Console Switch Register to 010000.
6. Press the CPU LOAD ADRS switch.
7. 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.

Additional System Installation-Related Programs



This appendix contains programs you may need to use during your installation or update. It also contains programs related to patching RSTS/E code. The BUILD program perform system installation-related tasks. The DSKCVT program converts a disk to RDS1.2 format. The ONLPAT program allows you to patch binary code. The CPATCH and PBUILD programs patch ASCII source code.

Using the BUILD/PATCH Program

The BUILD program builds new software. The /PATCH qualifier of the BUILD program automatically installs updates as you build new software. (If there are no update files for the software you build, then BUILD does not attempt the update procedure.)

BUILD is a privileged program that is installed with a protection code of <232>. To use the various BUILD functions, you need all privileges except:

- SYSMOD
- EXQTA
- USER1-8

The BUILD program requires that the patches and replacement modules be on disk. If your media is tape, you must first use the layered product installation procedures. See Part III for more information.

To run BUILD, type:

```
$ RUN UPDATE$:BUILD
```

BUILD then asks the following questions:

```
BUILD  V9.0-14 RSTS V9.0-14
Input device <SY:> ?
Output device <SY0:> ?
Control File is ?
Function (Build/Patch, Patch, Build) <Build/Patch> ?
Patch file input location <PATCH#:>
.
.
.
!*** BUILD Complete ***

!*** Processing ended on 31-May-85 at 11:13 AM ***
```

During most installations, BUILD asks additional questions that are specific to the individual layered product. See the installation guide for the individual product for guidelines on answering specific questions.

You can create a log file of the build procedure and also specify that the build is to run detached, in the format shown after the Input device? prompt in the BUILD dialogue:

logfile = dev:/det

For example:

```
Input device <SY:>: ? <file name>=MM0:/DET
```

Note that the Input device? prompt also accepts a /DOS or /ANSI qualifier.

Using the DSKCVT Program

The DSKCVT (Disk Convert) utility converts V8.0 and older disks to the new V9.0 RDS1.2 format. Specifically, DSKCVT performs the following functions:

- Convert RDS0.0 disks to RDS1.2 format
- Convert RDS1.1 disks to RDS1.2 format
- Convert accounts with "LOOKUP" passwords to "NOLOOKUP" at any time, on any RDS1.2 disk (optional)

To run DSKCVT, you must start with a disk that does not need rebuilding. (Use the MOUNT command if necessary to rebuild the disk first.) As a precaution, DIGITAL recommends that you back up any disk before conversion.

DSKCVT requires some work space if the pack being converted is RDS0.0 format. Therefore, you must make sure that there are 32 blocks times the number of different group numbers used on the pack, in order to allow conversion. (For example, if there are ten group numbers, then the pack should have 320 blocks of free space for conversion.)

DSKCVT accepts either logically mounted or logically dismounted packs. However, the pack should not be in use when you run DSKCVT. To verify that no one is using the pack, DSKCVT dismounts and remounts it at the start of processing.

The following is an example of the DSKCVT program:

```
$ RUN $DSKCVT
DSKCVT  V9.0-14  RSTS  V9.0-14  SYSTEM

Disk to convert? DM0:
Is this a System Disk <NO>? YES
Generate NOLOOKUP passwords <YES>? (RET)
Display accounts <YES>? (RET)

** CURRENT DISK ATTRIBUTES **

      Disk:          _DM0:
      Label:         SYSDSK
      Level:         1.1

Proceed (Y or N)? Y

Converting _DM0:SYSDSK from level 1.1 to 1.2 ...
[0,1] Converted
[1,1] Converted
[1,2] Converted
      ,
      ,
      ,

_DM0: conversion to 1.2 completed 31-May-85 11:05 AM

Converting _DM0: Passwords to NOLOOKUP
[0,1] Converted
[1,1] Converted
[1,2] Converted
      ,
      ,
      ,

_DM0: Password conversion completed 31-May-85 11:06 AM
```

In the example, DM0: is the disk pack to convert to RDS1.2: When you type DM0: in response to the prompt, DSKCVT displays the pack ID DM0:SYSDSK. This lets you verify that you are converting the proper pack. If the pack was already converted, DSKCVT displays an error message and then repeats the Disk to convert: prompt. Otherwise, DSKCVT continues with the dialogue.

When you answer Y to the Proceed (Y or N)? prompt, DSKCVT begins the conversion. DSKCVT processes the accounts in ascending order. When the pack is converted, DSKCVT dismounts it and updates the pack label. The pack is now in RDS1.2 format. However, the storage allocation table (SAT) does not yet reflect the free disk space on the pack. Therefore, the pack is marked "dirty" until DSKCVT updates the SAT. Then the pack label is updated to show that the pack is now rebuilt. If the pack was mounted when DSKCVT started, it will be mounted once again, with the pack ID as its logical name.

DSKCVT will not lose data even if the program aborts because of lack of work space, a system crash, or a disk hardware problem. If there is a problem during the conversion, you need only correct the problem and rerun the conversion. In such a case, it is not necessary to restore the pack from a backup pack.

If the conversion proceeded far enough that DSKCVT was able to convert the pack, it is then necessary only to mount it. Otherwise, DSKCVT restarts the conversion from the beginning, after deleting the work files that were left behind from the first attempt at conversion.

When you convert an RDS0.0 (pre-V8.0) disk, DSKCVT makes two passes. In the first pass, DSKCVT converts the RDS0.0 pack to RDS1.1. The second pass converts the RDS1.1 pack to RDS1.2.

In converting RDS1.1 disks to RDS1.2 format, DSKCVT adds several new attribute blocks to each account. Since some of the new attributes are only relevant on system disks, DSKCVT asks you whether the disk being converted is a system disk. DSKCVT adds the following new attribute blocks:

- Disk quota/usage block
- Privilege block, for system disks
- Non-disk quota block, for system disks

In creating the privilege attribute block, DSKCVT uses the following rules:

- For account [1,1], it assigns all privileges, except EXQTA
- For all other [1,*] accounts, it assigns all privileges, except SYSMOD and EXQTA
- For accounts not in the [1,*] group, it assigns no privileges.

This scheme assigns privileges that are compatible with previous versions of RSTS/E.

Using the ONLPAT Program to Patch RSTS/E Binary Code

The need for manual file patching has greatly decreased. However, you may still have to use ONLPAT to make emergency corrections.

The ONLPAT.SAV program allows you to patch binary code. You can run ONLPAT in either the keyboard mode or the command file mode. In the keyboard mode, you enter patch information on your terminal. In the command file mode, the patch information is read from a command file.

Using ONLPAT in Keyboard and Command File Mode

ONLPAT gives you a choice. You can make patches to the software by entering the corrections manually at your keyboard or you can use a previously created command file to apply the patches for you. You make the choice at the beginning of the ONLPAT dialogue when the program asks for the name of the command file you want to use (if one exists). Your response determines how ONLPAT gets the patch information.

If you enter a command file name, ONLPAT uses the command to make the corrections. When you press the RETURN or LINE FEED key, ONLPAT assumes the patch information comes from the keyboard. ONLPAT expects keyboard input when

you enter a file name followed by an equal sign (=) symbol. This indicates you want ONLPAT to create a log file of the patch. The remainder of this section describes how to patch software using either of these methods.

When you enter patches at the keyboard, follow procedures similar to those you use for the PATCH option of INIT.SYS. Unlike the PATCH option, ONLPAT does not install a patch until you enter a circumflex/C (^C) at the end of the last line in the patch. Do not press CTRL/C unless you want to abort the patching operation. Because the program waits while you enter all the patch information, you can review the entire patch and make changes before installing the patch.

The ONLPAT program can apply patches to the monitor or to programs written in MACRO, such as PIP.SAV. To install a published patch, you must first look in the *RSTS/E Maintenance Notebook* or the *RSTS/E Software Dispatch* for the article containing the patch you want to install. After reading the article thoroughly, you can create a command file or install the patch manually.

An ONLPAT example follows:

```
RUN $ONLPAT
Command file name? (RET)
File to patch? [0,1]BASIC.RTS
File found in account [0,1]
Base address? ..XTN
Offset address? 0
Base      Offset    Old      New?
??????  000000    020000    ? 0
??????  000002    ???????  ? ^C
```

Table E-1 lists and describes the types of responses ONLPAT accepts in the program dialogue.

Table E-1: Responses to ONLPAT Questions

Response	Meaning
Number	Enter an octal number from 0 to 177777; leading zeros are optional. Or, enter a decimal number in the range 0. to 65535., making sure to include a trailing decimal point to distinguish it from an octal number. The octal or decimal number you enter becomes the new contents of the current location.
Symbol	Substitute a global symbol name for an octal number as the new contents of the current location. 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.
Expression	Use an expression as a substitute for an octal number. An expression consists of one or more numbers or global symbols, separated by arithmetic operators (+, -, and *). You can use parentheses to group portions of an expression.
RETURN or LINE FEED key	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	Enter CTRL/Z to return to the previous question.
CTRL/C	Enter CTRL/C to abort all patching and return to the program prompt.

Table E-2 describes the questions asked by ONLPAT.

Table E-2: ONLPAT Dialogue Questions

Question and Response
COMMAND FILE NAME? • Enter a command file name to have ONLPAT install patches using commands in the command file. You can have ONLPAT make a record of the patches as well as install them if you include a log file name with the command file name in the command line: Command file name? log file = command file name If you do not include a file type for the command file, ONLPAT selects .CMD. The default file type for the log file is .LOG. • Press the RETURN or LINE FEED key if you do not have a command file to apply the patches. ONLPAT assumes you want to enter the patches manually from the keyboard. If you want a record of the patches that you apply manually from the keyboard, include only the log file name in the command line: Command file name? log file = You must place an equal sign after the log file name to make sure ONLPAT does not interpret the file you specify as being a command file. Again, ONLPAT uses .LOG as the file type if you do not specify one with the file name. FILE TO PATCH? Press the RETURN or LINE FEED key if you are applying a patch to the installed monitor SIL. However, another response may be necessary. If so, enter the response suggested either by the <i>RSTS/E Maintenance Notebook</i> or the <i>RSTS/E Software Dispatch</i> article. MODULE NAME? Enter the module name included with the patch described either in the <i>RSTS/E Maintenance Notebook</i> or the <i>RSTS/E Software Dispatch</i> article. BASE ADDRESS? Type the base address included with the patch described either in the <i>RSTS/E Maintenance Notebook</i> or in the <i>RSTS/E Software Dispatch</i> article. OFFSET ADDRESS? Type the offset address included with the patch described either in the <i>RSTS/E Release Notes</i> article or the <i>RSTS/E Software Dispatch</i> article. The offset address is the first location to be patched relative to the specified base. The response suggested in the patch article will be a number, symbol, or expression as described in Table E-1.

Use the information in Table E-2 and the following procedures to apply patches manually:

1. Gather the articles that contain the patches you need. You can find the articles either in the *RSTS/E Maintenance Notebook* or the *RSTS/E Software Dispatch*.

2. Run the ONLPAT program by typing RUN \$ONLPAT. The program begins by displaying the first of a set of dialogue questions:

Command file name?

At this point you:

1. Press the RETURN key to enter the patch manually from your terminal.
2. Type the name of a file, followed by an equal sign (=) symbol. This instructs ONLPAT to create a log file of the patch. The patch is also displayed on your terminal.
3. You then answer the remaining ONLPAT dialogue questions, following the instructions in the *RSTS/E Maintenance Notebook* or the *RSTS/E Software Dispatch*. Remember that ONLPAT does not install the patch until you type ^C (not CTRL/C) to end the program. Typing ^C is entirely different than entering CTRL/C: ^C ends the patch successfully; CTRL/C stops execution of ONLPAT without making any patches.
4. After installing the patch, ONLPAT displays a message informing you that the patch has been installed:

```
PATCH COMPLETE
1 PATCH INSTALLED
```

ONLPAT then returns to the command file question. You can then either exit the program or enter another patch.

To install a patch with a command file:

1. Create a command file. See the section, Building ONLPAT Command Files.
2. Run the ONLPAT program by typing RUN \$ONLPAT, and then press the RETURN key. The program displays a question asking for the name of the command file that contains the patches. Enter a command file in the following format:

log file = command file

If you want a record of the patch, type the name of a log file. The default file type for a log file is .LOG. ONLPAT does not create a log file by default.

3. Type the name of the file that contains the commands ONLPAT uses to install the patch. The default file type for a command file is .CMD. ONLPAT then executes the command file. If you did not include in the command file the name of the file you want to patch, ONLPAT pauses, letting you enter the file name.
4. When ONLPAT finishes processing, the program displays a summary of the patches installed and any patches skipped, and then returns to your keyboard monitor.

Patching a Running Monitor with ONLPAT

Usually you can patch the installed monitor Save Image Library (SIL). The monitor is modified on disk, and only after you shut down, and then restart the system, do the patches become effective. However, patches to monitor overlay code (OVR) are a special case. If you use patched code from OVR along with an unpatched monitor in memory, your system may crash, or not work properly. This is because monitor overlays are read in from the monitor SIL (from disk) as they are needed, and changes to the monitor do not take place until the system is brought down and then restarted.

When ONLPAT detects that the file being patched is the installed monitor SIL, the program imposes certain restrictions:

- Installs the patch if the patch does not involve OVR. That is, ONLPAT applies the patch to the monitor image on disk. The patch takes affect only after you shut down the system and then restart it.
- If only one block of OVR is involved in the patch, ONLPAT installs the patch. Because the patch affects only one block, ONLPAT can make all monitor modifications with a single disk write.
- If the patch involves more than one OVR block, ONLPAT does not modify the monitor, and displays the following error message:

```
?Patch to module ovr too long for installed sil
```

- If the patch involves both OVR and some other module of the monitor, ONLPAT displays the following error message:

```
?Patch to installed sil spans ovr and other module(s)
```

The way to install a patch of this type is to copy your installed SIL, patch the copy, shut down the system, start the patched copy, and delete the old unpatched SIL.

Building ONLPAT Command Files

Create ONLPAT command files as follows:

1. Run ONLPAT from any logged-in terminal by typing `RUN $ONLPAT`. The program then displays the `COMMAND FILE NAME?` question.
2. Respond to the command file question in the following format:

Patchfile = KB:

First type the file name of the patch file you want to create and then KB: to indicate you are creating the patch file from the keyboard.

3. Press the RETURN key after you finish entering the command string. ONLPAT then asks:

FILE TO PATCH?

Type the name of the file you want to patch, press the RETURN key, and enter the text of the patch described in the *RSTS/E Maintenance Notebook* or the *RSTS/E Software Dispatch* article.

After creating the command file, you may want to modify it. If modifications are necessary, apply the following rules:

- End each individual command in the patch by pressing RETURN.
- When ONLPAT executes the command file, the program changes all lowercase characters to uppercase and reduces all tabs and spaces to a single space.
- Blanks are significant. Use them exactly as shown for individual command lines.
- You can include comment lines at the beginning of a patch. A comment line must begin with an exclamation mark (!).
- You must include a line that specifies the file you want to patch. The format of this line is:

FILE TO PATCH? filename.type

Type the name of the file that you want ONLPAT to patch. If you do not include a file name, ONLPAT prompts you for the file name during program execution. ONLPAT uses the file name to specify any subsequent patches in the command file that do not specify the file name.

- Subsequent command lines in a patch are identical to the formats used in the *RSTS/E Software Dispatch* or the *RSTS/E Maintenance Notebook*. The following command line is optional, but must appear with spacing exactly as shown in the *RSTS/E Software Dispatch* or the *RSTS/E Maintenance Notebook* articles:

BASE OFFSET OLD NEW?

Also, do not use any parenthetical comments.

- You must use the following notation:

^Z is a circumflex, then Z; or CTRL/Z

^C is a circumflex, then C; not CTRL/C

<LF> is the LINE FEED key

Using the CPATCH Program to Patch ASCII Source Code

With the advent of prebuilt tasks and other replacement modules, the need for manual patching has greatly decreased.

Use the CPATCH program to install patches to the source code of the BASIC-PLUS library programs. CPATCH can patch individual programs, as described in this section or build patching command files (see the section, Building CPATCH Command Files).

General Operating Procedures

The general procedures to patch a BASIC-PLUS source file are:

1. Run the program by typing RUN UPDATE\$:CPATCH. After printing a header line, CPATCH prints:

```
FILE TO PATCH-
```

2. Respond in the format:

```
out-filespec = in-filespec
```

Enter the file name for the unpatched source file on the input side of the command line and any file specification you want on the output side. The default file type for both files is .BAK. If you do not include an output file, CPATCH assumes the file has the same name as the input file and gives it a .BAK file type.

3. Press the RETURN key in response to the number sign (#) prompt. The prompt printed by CPATCH indicates that it is ready to patch the source program.
4. Edit the source program, using the instructions in the *RSTS/E Maintenance Notebook* or the *RSTS/E Software Dispatch*. CPATCH prints an * prompt to show when to begin editing the source.
5. Type EXIT in response to the * prompt when you finish editing. CPATCH prints a message indicating the patch is installed:

```
PATCH FROM file specification COMPLETE.
```

CPATCH returns to the # prompt. If there are other patches to the current file, do them now, or enter CTRL/Z. If you enter CTRL/Z, CPATCH returns to the prompt:

```
FILE TO PATCH-
```

6. Return to Step 2 in this procedure if there are other files to patch.
7. Enter CTRL/Z to exit the program if there are no more files to patch.
8. Follow instructions in either the *RSTS/E Maintenance Notebook* or the *RSTS/E Software Dispatch* for including the patched source program in the system library.

Running the PBUILD Program

After you build the patching and PBUILD command files (see the section Building CPATCH Command Files), run the PBUILD program to install the patches.

Note

References in these sections to BP2COM are for V1.6 of BASIC-PLUS-2. V1.6 is no longer supported or available.

PBUILD Dialogue

Type RUN UPDATE\$:PBUILD, and press the RETURN key to begin the PBUILD dialogue:

```
READ FILES TO PATCH FROM <SY:[1,2]>:
```

Enter the device and account that contains the unpatched versions of the text files. The device and project-programmer number (PPN) in angle brackets is the default value. If either the device or the PPN is incorrect, enter the correct values in the following format:

logfile = commandfile[-]

Logfile is the name of the file in which the entire patching procedure is recorded. Device represents the input device name and unit number and is followed by the project-programmer number (account number). The DETACH switch causes PBUILD to detach from the keyboard while performing the patching operation. If you specify both a log file and the DETACH switch, some patching operations are faster because they are not limited by the speed of the terminal.

For example, if the files are on the public structure under account [120,5], the correct response is [120,5]. If the files are on magnetic tape drive MM0: on account [1,2], the correct response is MM0:. If both the account and the device are wrong, you must enter both, such as MM0:[120,5]. If both are correct, then just enter a carriage return.

After you specify the input device, PBUILD prints:

```
COMPILE PATCHED PROGRAMS<YES>:
```

If you press the RETURN key, PBUILD compiles the resulting patched file and prints additional patch questions. If you Type NO and PBUILD does not ask the next three patch questions.

If you want PBUILD to compile the files, it asks where to store the compiled programs:

```
LIBRARY DEVICE <SY:[1,2]>:  
SYSTEM DEVICE <SY0:[1,2]>:
```

The library device is the device and account that PBUILD uses for the programs that normally go to the library account. The system device refers to the disk that contains the RSTS/E system. The compiled programs normally reside in the library account.

If you want to have PBUILD save the patched sources, type YES in response to the following question:

```
SAVE PATCHED SOURCES<NO>:
```

If you type NO or press the RETURN key, PBUILD skips the next question and deletes the patched sources after compiling.

If you choose to retain the patched sources, the program prints:

```
WRITE PATCHED SOURCES TO <SY:[200,200]>:
```

Your response indicates on which device and in which account you want the patched sources to reside. DIGITAL recommends that you not place the patched sources in account [1,2]. If you have no particular device or account for the sources, you can accept the default. This allows PBUILD to place the sources in account [200,200] of the public disk structure.

When PBUILD prints the # prompt, type a command line in the format:

```
logfile=commandfile[-]
```

CPATCH uses the log file to write the log of the actual text file edits as they take place. If you do not specify a log file, CPATCH uses the file name KB:PBUILD.CMD. If you specify a file, the default file type is .LOG. The command file field is the name of the file containing the commands to PBUILD. The default file type is .CMD. In both the log and command files, the default device is SY: and the default account number is the current user account. As an option, you can place a hyphen (-) after the command file specification to cause PBUILD to prompt you for additional command files. Because the prompting of the additional control file question is also dependent on other factors, PBUILD may ask for additional control files if you do not attach a hyphen to the command file specification. After you press LINE FEED, PBUILD chains to the BUILD program, which controls the remainder of the dialogue.

Once you enter a correct command file name, BUILD prints a message to indicate it is copying the specified command file to the public disk structure. The variable [nnn,nnn] represents the command file account number, and the nn in the PBLDnn.TMP specification is the job number. The format of the message is:

```
*** COPYING FILE dev:[nnn,nnn]commandfile TO SY:PBLDnn.TMP ***
```

BUILD then preprocesses the command file. Normally at this point, during the preprocessing of the first command file, BUILD prints a run-time system question that asks you for the name of the run-time system under which you want the executable programs to run. The format of the question is:

```
Run-Time System <xxxxxx>?
```

BUILD prints the name of the system primary run-time system in angle brackets. Press the LINE FEED key to accept the default, or enter the name of another run-time system. If you decide not to accept the default, note that the run-time

system you specify includes a keyboard monitor and has a default executable file type of .BAC or .TSK. If BUILD does not accept your response, it prints an error message:

- XXXXXX is not a keyboard monitor
- Run-time system must have a default extension of .BAC or .TSK
- XXXXXX is not installed
Attempt to install xxxxxx <Yes or No>?

After BUILD prints either of the first two messages, it prints the RUN-TIME SYSTEM question again. Enter a new run-time system name that conforms to the run-time system restrictions indicated in the error message. If BUILD prints the XXXXXX IS NOT INSTALLED message, it has found the specified run-time system in account [0,1] but has discovered the run-time system is not installed. After printing the message, BUILD asks if you want to install the run-time system:

ATTEMPT TO INSTALL XXXXXX<No>?

BUILD inserts the run-time system name in the XXXXXX field, which represents the run-time system that BUILD will attempt to install. Type NO if you want BUILD to return to the RUN-TIME SYSTEM prompt. One of the following cases occurs if you type YES:

- BUILD installs the run-time system successfully and prints the message, XXXXXX INSTALLED. BUILD asks the CUSP COMPILER question if you selected RSX or BP2COM as your run-time system.
- BUILD installs the run-time system, determines whether it includes a keyboard monitor and has the correct file type, and then prints one of the following two error messages:

- XXXXXX is not a keyboard monitor
- Run-time system must have a default extension of .BAC or .TSK.

After printing either of these messages, BUILD tells you 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.

- BUILD may detect errors other than those already described. When it does, it prints:

Run-time system operation failed<text>

The text can be any valid RSTS/E error message. After printing the error, BUILD returns to the RUN-TIME SYSTEM prompt.

If you selected either the BP2COM or RSX run-time system, BUILD asks the following CUSP COMPILER question:

USE THE CUSP COMPILER 'CSPCOM'<YES>?

Type YES if your run-time system is RSX; type NO if it is BP2COM.

After the preprocessing of the first command file, BUILD may prompt you for the name of another command file by printing:

```
ADDITIONAL CONTROL FILE IS <Process file>?
```

Type another command file specification and terminate the response by pressing the LINE FEED key. Like the previous command file procedure, BUILD prints the COPYING FILE message and then preprocesses the file. BUILD continues to print the ADDITIONAL CONTROL FILE IS question until the default is selected. Press the LINE FEED key to accept the default. BUILD prints the current date and time and begins executing the command files. If you did not attach a hyphen to the original command file specification, PBUILD may not ask for additional control files. Therefore, if you need to process more than one command file, attach a hyphen to the logfile=commandfile[-] specification to ensure BUILD asks the ADDITIONAL CONTROL FILE question. Note that PBUILD prints the COPYING FILE message and preprocesses the command files; it does not execute any command file until you specify all files.

During the preprocessing phase, BUILD may ask additional dialogue questions. These questions cannot be listed here; they are initiated by the particular command file that BUILD is processing. There are many control files that might be processed, each with its own unique set of questions. You must therefore see documentation regarding the particular command file to answer these questions.

PBUILD/BUILD Terminal Output

PBUILD/BUILD performs all patch operations by printing the required commands on a pseudo keyboard and echoing them to the user's terminal. Every operation causes an output to the terminal to provide an accurate log of all operations. The steps that occur in a patch operation are summarized in the following list. Note that the commands described are those which are printed on the pseudo keyboard and thus require no user input:

1. RUN UPDATE\$:CPATCH

This runs the CPATCH program.

2. outfile=infile

This string is typed to the prompt FILE TO PATCH issued by CPATCH. Infile is the program to be patched, with the input device and account number being that which is entered at the beginning of the dialogue. The output file can be one of two possible values. If the patched sources are going to be saved, and the device is a file-structured disk, the output file will be the same as input file but with the device and account number selected in answer to the WRITE PATCHED SOURCES TO question. If the sources are not to be saved, or if they will be saved on a device other than disk, the device and account number will be the library account.

3. logfile=commandfile

A command line in this format is typed in response to the CPATCH # prompt. CPATCH uses the command file to perform the patch to the text file. The file name is obtained from the command file currently being executed by PBUILD.

If the name as specified within the command file is missing either a device or an account number specification, the device and/or account number that contained the command file executing is used. The log file in this command line represents the log file you enter in response to the PBUILD # prompt. This step is repeated for each patch to the particular source program.

4. ^Z (CTRL/Z)

This character combination is forced to the keyboard after all patches have been applied. It causes CPATCH to print the FILE TO PATCH prompt.

5. ^Z

A second CTRL/Z causes the program to return to the RSTS/E keyboard monitor.

6. OLD outfile

This is typed only if the compile option was selected in the dialogue. It causes the source file to be compiled.

7. COMPILE comfile

This is typed if the compile option was selected. It causes the compiled version of the program to be saved as the file named comfile. The file to compile normally has the same file name as the output file but has the same device and account number as the library device entered in the dialogue. If a new name was provided in the PBUILD command file, that name appears as the file to compile.

8. RUN [1,2]PIP.SAV

*<permfile> = <outfile>

^Z

If the patched sources are to be saved and the save device is not a disk, then these commands are printed on the pseudo keyboard. The permanent file has the same file name as output file but has the same device and PPN as the response to the WRITE PATCHED SOURCES TO question.

9. RUN [1,2]PIP.SAV

*<outfile>/DE:NOWARN

^Z

This command is used to delete the output file that was created in the library account. It only appears if the previous copy operation was performed or if the current patched sources were not to be saved.

10. RUN [1,2]PIP.SAV

*<backfile>/DE:NOWARN

^Z

If the output file and the input file are the same file name, CPATCH creates a backup file (backfile). If that occurs, this command deletes it.

In a normal patch operation only some of the CPATCH commands actually appear. However, CPATCH does perform some combination of the previous commands for each patch in the PBUILD command file.

Building CPATCH Command Files

This section describes how to create new files used by CPATCH to perform the actual edit of your source programs.

Building the Patching Command File

To make a new patch, you must create a CPATCH command file by running the CPATCH program. Enter the commands at your terminal and use a file as the log. The output log becomes the new CPATCH command file.

File Naming Convention

Patch files are much easier to manage if you adopt a consistent file naming convention. The convention used for all patches to the Commonly Used System Program (CUSP) Library is presented here as an example.

A typical example might be the program QUMRUN. Assume the first article in the *RSTS/E Software Dispatch* concerning QUMRUN describes a patch. The article's sequence number is 14.6.1, where the number 14 is the component number (Spooler and Operator Services Package), 6 is the subcomponent number, and 1 indicates it is the first article published about QUMRUN. The corresponding patch file name would be PA1406.001.

Creating the CPATCH Command File

Run the CPATCH program to create the CPATCH command file. The file for which the patch file is being created is specified at the FILE TO PATCH prompt, and the keyboard is specified as the command file with the CPATCH command file being created as the log file. The patch is then manually applied. Note, however, that CPATCH is a line editor which means its text buffer contains only a single line of text at any one time. When the patch is completed, the log file contains a CPATCH command file that performs the same patch when applied using CPATCH. The commands to create the CPATCH command file to perform the first patch to QUMRUN is an example.

You first start the program by typing:

```
RUN UPDATE$:CPATCH
```

After printing a header line, CPATCH prints:

```
FILE TO PATCH-
```

The response to this prompt would be:

```
out:QUMRUN.BAS=in:QUMRUN.BAS
```

You place on the input side of the command line the device name and PPN that contains the unpatched source file QUMRUN.BAS. On the output side, specify any device and PPN. Use a different device name and PPN from the one used for the input specification. Then you can test the patched program before replacing the original source.

CPATCH prints a # prompt to which the correct response for the example patch would be:

```
PA1406.001=
```

With PA1406.001 on the output side of the command line, CPATCH uses it as the log file. There is no specification on the input side, and thus CPATCH uses the terminal (KB:) as the default command file. Note, however, that you may want to check or determine the patch checksum by including the /CS switch (see the section Verifying the Patch).

CPATCH prints the * prompt again. At this point, use CPATCH editing commands to perform the patch on the file. The following sections introduce you to the editing capabilities of the CPATCH program.

Editing with CPATCH

After CPATCH prints the * prompt, you are ready to use the CPATCH line editor to perform the patch. When the patch is complete, use the EX command to return to the # prompt. A CTRL/Z returns the FILE TO PATCH prompt, and another CTRL/Z exits the program. The file PA1406.001 (from the example in the previous section) then becomes the CPATCH command file required to perform the patch.

The CPATCH editor is a character-oriented text editing program written in BASIC-PLUS for use on the RSTS/E operating system. It reads ASCII files from any input device, makes specified changes, and writes on any output device. You operate the editor through the use of commands typed at your terminal. The basic editing process can be divided into three parts:

1. Reading the input text into an internal buffer
2. Changing the text stored in the buffer
3. Transferring the revised text to a new file

The following sections list terms and definitions and describe the commands used with the CPATCH editor.

CPATCH Editor Terms and Definitions

The CPATCH editor enables you to perform editing operations on ASCII text. The program stores the text to be edited in an intermediate area of memory called a buffer. It does not alter text in the input files.

The editor refers to text in the buffer by using a character location pointer called a cursor. The cursor is considered to reside between any two characters. At the start of editing operations, the cursor precedes the first character in the buffer. You move the

cursor during editing operations according to the type of editing being performed. You can refer to text in the buffer as so many characters or lines preceding or following the cursor.

To edit text, you must specify a command or series of commands in response to the * prompt printed by the CPATCH program. The commands are classed according to the type of operation they perform:

Cursor Manipulation	Moves the cursor without altering text within the buffer.
Character Search	Finds a specified occurrence of text within the buffer to facilitate editing.
Character Manipulation	Adds to and removes characters or a line of text from the buffer.

Many editor commands are character-oriented. That is, they affect a specified number of characters preceding or following the cursor. The argument of these commands specifies the number of characters in the buffer on which to operate. The number of characters you specify with the argument *n* is the same forward (*n*) as backward (*-n*). The LF, CR, and NUL characters, although not printed, are embedded in text lines, counted as characters in character-oriented commands, and treated as any other text characters.

Some commands are line-oriented. The argument of these commands specifies the number of lines on which to operate. Because the editor counts the line-terminating characters to determine the number of lines on which to operate, an argument *n* does not affect the same number of lines forward (positive number *n*) as it affects backward (negative number *-n*).

For example, the argument *-1* applies to the line beginning with the first character following the second previous end-of-line and ending with the character preceding the cursor. The argument *1* in a line-oriented command, however, applies to the text beginning with the first character following the cursor and ending at the first end-of-line. Thus, if the cursor is at the center of the line, the argument *-1* affects one and one-half lines backwards from the cursor and the argument *1* affects one-half line beyond the cursor.

Character search and manipulation commands operate in command mode. The text used to search or being manipulated can be a single character or a group of characters (called a string). If the text does not contain a CR or LF character and is small enough to fit on a single typed line, command mode can be used to specify the text. In command mode, the editor expects the first character following a search or manipulation command to be a delimiting character for the desired text. The editor uses as the text the characters between delimiters. The delimiting character, therefore, cannot appear in the text, nor can the characters CR and LF.

To specify the word INPUT as the text in command mode, you can use the following string with the search or manipulation commands:

/INPUT/

The editor uses the characters between the slash delimiters (/) as the text. In command mode, you can use any printable character that does not appear in the text as a delimiter. If the delimiting character appears in the text, the editor attempts to interpret the remaining characters as commands.

To prevent ambiguities when a file is used for command input, CPATCH requires all “invisible” characters, (ESCAPE, LINE FEED, and so forth) to be translated to a visible form. This translation is always done on log file output to permit log files to be used for command input with no modification. Because the output is used for patch verification, it must be typed exactly. An error causes a rejection of the patch.

The translation is:

Command File

Format	Control Characters
<TAB>	ASCII 9 (horizontal tab)
<FF>	ASCII 12 (form feed)
<ESC>	ASCII 27 (escape)
<LF>	ASCII 10, 13, 0 (line feed sequence)
<CR>	ASCII 13, 10 (carriage return sequence)
<null>	ASCII 0 (isolated null character)
<13>	ASCII 13 (isolated carriage return sequence)
<10>	ASCII 10 (isolated line feed character)

CPATCH Editor Commands

The commands you can use with the CPATCH editor are:

Advance Command (nA)

The Advance command is a line-oriented command that moves the cursor to a point preceding the first character of a line. depending on the size of the argument used. If you do not include an argument, the editor selects one line forward as the default. That is, the A command moves the cursor to the beginning of the next line. Arguments and their effect on the Advance command are listed as follows:

- nA Advances the cursor n lines and positions the cursor at the beginning of the line.
- 0A Moves the cursor to the beginning of the current line.

Change Command (nC/xxxx/)

The Change command changes a specified number of characters following the location of the cursor. The text `</xxxx/>` must be set off by delimiters. The C command is equivalent to an Insert command followed by a Delete command. Arguments and their effect on the C command are described as follows:

- nC Replaces n characters following the cursor with the specified text. The cursor is placed after the inserted text. The C command does not affect text beyond the current line.
- nC Replaces n characters preceding the cursor with the specified text. The cursor is placed after the inserted text. The C command allows you to make changes to the current line only.
- 0C Replaces the current line up to the cursor with the specified text.

Delete Command (nD)

The Delete command is a character-oriented command that deletes n characters in the page buffer beginning at the cursor. If you do not include a value for n, the editor deletes the character immediately following the cursor. After executing the command, the editor places the cursor at the first character following the deleted text. The following list describes each argument and its effect on the Delete command:

- nD Deletes n character following the cursor. The D command does not allow you to delete text beyond the current line.
- nD Deletes n characters preceding the cursor. You cannot use the D command to delete text other than on the current line.
- 0D Deletes the current line up to the cursor. The editor positions the cursor at the first character following the deleted text.

Get Command (nG/xxxx/)

The Get command is a search command that allows you to search for the nth occurrence of the specified text (`/xxxx/`) starting at the current cursor location. If you do not include a value for n, the editor searches for the first occurrence of the text. The search ends when the editor either finds the nth occurrence or encounters the end of the buffer. If the search is successful, the editor places the cursor at the end of the searched text. The editor prints the G command followed by a question mark (?) to indicate an unsuccessful search. In that case, the cursor follows the last character in the buffer.

Whole Command (nH)

The Whole command reads each page of the primary input file into the buffer until the nth occurrence of the specified text object is found. The editor begins at the cursor and searches the current buffer until the nth occurrence of the text is found or the end of the buffer is reached. If the search is successful, the editor positions the cursor immediately following it. If the editor does not find the nth occurrence in the current buffer, it writes the buffer to the primary output file, clears the buffer, reads the next page of the primary input file into the buffer, and continues the search. The search is unsuccessful when the nth occurrence is not found and the end of the primary input file is reached. The H command followed by a question mark indicates

an unsuccessful search. When this occurs, the editor copies the entire contents of the primary input file to the primary output file and places the cursor at the beginning of an empty buffer. The H command operates in a forward direction only; negative arguments are not allowed.

Insert Command (I/xxxx/)

The Insert command allows you to insert text (/xxxx/). The editor inserts the text and places the cursor after the last character of the inserted text. You cannot use an argument with the Insert command. Up to 80 characters per line can be specified by typing the letter I on one line followed by the RETURN key and the text to be inserted on the following line(s). Execution of the command occurs when you press the LINE FEED key. If the text does not contain a carriage return or a line feed character, it can be typed on the same line as the I command but must be set off by delimiters.

Jump Command (nJ)

The Jump command moves the cursor over a specified number of character locations. If you do not include an argument, the J command moves the cursor one character position forward. Arguments and their effects upon the Jump command are described as follows:

- nJ Moves the cursor forward one character. The J command does not affect any text beyond the current line; that is, a command such as -400J only moves the cursor to the beginning of the current line.
- nJ Moves the cursor backward n characters. The J command does not affect any text beyond the current line; that is, you cannot move the cursor further than the end of the current line.
- 0J Moves the cursor to the beginning of the current line.

Kill Command (nK)

The Kill command removes n lines of text (including the carriage return and line feed characters) from the page buffer beginning at the cursor and ending with the nth end-of-line. The editor places the cursor at the beginning of the line following the deleted text. The following list describes each argument and its effect on the Kill command:

- nK Removes the character string (including the CR and LF sequence) beginning at the cursor and ending at the nth end-of-line.
- OK Removes the current line up to the cursor location.

List Command (nL)

The List command prints at your terminal lines of text as they appear in the buffer. An argument preceding the L command indicates the portion of the text to print. For example, the command 2L prints on your terminal the text beginning at the cursor and ending with the second end-of-line character. The cursor is unaffected by the L command. Arguments and their effect on the List command are described as follows:

- nL Prints one line of text at the terminal. The L command accepts only zero and one as arguments.
- 0L Prints the current line up to the cursor

Verify Command (V)

The Verify command (V) prints at your terminal the entire line in which the cursor is located. It provides an easy means of determining the location of the cursor after a search is completed and before any editing commands are given. You can also use the V command after you have typed an editing command to allow you to check your input. The V command does not take arguments.

EX Command (EX)

To end an editing session, you use the EX command. It writes the buffer to the primary output file, transfers the remainder of the primary input file to the output file, closes all open files, and renames the temporary file as the edited, primary output file. The following dialogue shows the procedure:

```
*EX  
#^Z
```

The editor prints the # prompt (in response to which you can enter more input and output specifications). Entering CTRL/Z ends the editing session and control returns to your keyboard monitor.

You should periodically use the EX command to end the editing session. The primary input file remains intact while you are editing. The temporary file retains the revised text as edits are made. If the system crashes during the editing session, the primary input file is not disturbed, but the edits you are making are lost. Therefore, it is recommended that you frequently exit to update the primary output file. In the event of a system crash, the amount of editing lost is limited to those edits made since the beginning of the latest session.

Verifying the Patch

The CPATCH program provides two switches to verify the accuracy of the patching operation. To make sure CPATCH applies a patch correctly, you must specify the /CS switch while creating a patch file and the /CS:n switch when you are applying the patch.

To create a patch file, run CPATCH and answer the FILE TO PATCH prompt. After you enter the name of the file to patch and press the RETURN key, CPATCH prints a # prompt. Because you are creating a file to store the patches, enter its file specification followed by an equal sign, attach the /CS switch, and press the RETURN key. CPATCH prints an * prompt to indicate its readiness to accept the patch.

After you enter the patch and terminate your input by typing EX, CPATCH calculates a number, called a checksum, and prints it on your terminal. CPATCH uses this number while applying the patch to verify the patch was correctly incorporated. CPATCH prints the patch complete message to mark the end of the operation and returns to the # prompt. You can then enter the name of a new patch file or enter CTRL/Z to return to the FILE TO PATCH prompt. If you also enter CTRL/Z in response to the FILE TO PATCH prompt, CPATCH terminates and returns control to

your keyboard monitor. The following terminal output illustrates the use of the /CS switch and the creation of a checksum number:

```
RUN UPDATE$:CPATCH
<CPATCH's header line>
File to Patch - PATCHA.BAS=PATCHA.BAS
#PA2325.001=/CS
*G/-10/-1D
*EX
Checksum = 53437
Patch from _KB:[1,247]CPATCH.CMD complete.
#^Z
File to Patch - ^Z
```

After creating the patch file, you can use CPATCH again to apply the patch. As before, run CPATCH, specify the file to patch, and press the RETURN key to receive the # prompt. In response, attach the /CS:n switch, replacing n with the checksum number that CPATCH calculated previously (53437). Press the RETURN key, enter the patch, and exit by typing EX. If you enter the patch correctly, CPATCH calculates the same checksum number, applies the patch, and prints the patch complete message. Otherwise, it prints an error message:

```
?Actual checksum of 53437 does not match 53537
%Patch from _KB:[1,247]CPATCH.CMD skipped.
```

You must retrace your steps and try again. An example of a successful attempt to apply a patch follows:

```
RUN UPDATE$:CPATCH
<CPATCH's header line>
File to Patch - PATCHA.BAS=PATCHA.BAS
#PA2325.001/CS:53437
*G/-10/-1D
*EX
Patch from _SY:[1,247]PA2325.001 complete.
#^Z
File to Patch - ^Z
```

The /CS:n switch, n representing a number from 0 to 65535, causes CPATCH to recalculate the checksum as a result of your new input and to compare it to the original calculation. In this case, you entered the patch accurately; CPATCH was able to calculate the same checksum and then apply the patch.

Building the PBUILD Command File

After building a command file of patches, the next step is to build another command file that contains the instructions to PBUILD for installing the patches.

Using Comments

Comments may appear anywhere in a PBUILD command file. PBUILD treats any line of text with an ! character as its first character as a comment. If you use the ! character as an account specifier, you must place it in a column other than the first. One or more blanks before the ! character is sufficient.

Using Indirect Command Files

Any command line beginning with an at sign character (@) is used as a file that contains the next commands. The position in the current command file is saved, and all subsequent input comes from the file specified until an end-of-file is reached. Command input then resumes from the saved position in the command file. You can nest indirect command files up to 15 levels deep.

You must observe the following rules when using indirect files.

- The default file type for indirect command files is .CMD. Therefore, you must specify explicitly any other file type.
- If either the device or the PPN is absent from an indirect file name, the device and/or PPN is obtained from the command file name at the previous level. To avoid ambiguity in device specification, place all command files in the same account; make sure they do not include a device and PPN. Instead, the device and /PPN for all indirect command files should be specified at PBUILD's # prompt, setting the default value for all subsequent indirect command files.

Using the Underscore as a Quote Character

You can quote any character or command with the underscore (_) character. For example, if it is necessary to have the text "\$FORCE" not interpreted as a \$FORCE command, prefix the command with the underscore character by typing: _\$FORCE. In doing so, you alter the way in which the system responds to data following the underscore.

Command File Statements

There are four types of PBUILD command file statements:

\$FORCE	Forces command lines to the keyboard until the next \$PATCH or \$END statement.
\$PATCH	Identifies the file to be patched.
patchfile	Contains the specification for a patching file.
\$END	Indicates the end of patching for one file.

Comment lines can appear anywhere in a PBUILD command file but usually appear at the beginning of the file to identify its content. PBUILD treats any line of text beginning with an ! character as a comment.

To patch a file, the PBUILD command lines must be in the following order:

\$PATCH statement
patchfile statement

patchfile statement
\$END statement

\$FORCE statement
(commands to be forced)
\$END statement

\$FORCE Statement

The \$FORCE statement is not required for patching BASIC-PLUS programs. It allows you to batch commands into the file (to run programs, delete files, and so forth). For example, ONLPAT is run in this manner to patch binary files. If \$FORCE is used, it and its related command lines must be placed outside the bounds of a \$PATCH/\$END set, either before a \$PATCH statement or after an \$END statement.

The command lines following a \$FORCE statement use logical names to allow device and PPN assignments (those made during the PBUILD dialogue). The substitutions are:

- SYSTEM: Is the value for the device and PPN specified as the library device.
- SYSDSK: Is the value for the device and PPN specified as the library or the system device.
- INPUT: Is the value for the device PPN specified as the unpatched source file.
- SAVDEV: Is the value for the device and PPN specified as the patched source file. If sources are not to be saved, SAVDEV defaults to the system value.
- ^Z CHR\$(26%)(CTRL/Z)
- ^C CHR\$(3%)(CTRL/C)

The \$FORCE statement is in effect until a \$PATCH statement or end-of-file is encountered. Any command line beginning with an @ character is treated as an indirect command file.

\$PATCH Statement

The \$PATCH statement is the first statement in a sequence of statements to perform a patch. The format of the statement is: \$PATCH filename. You must specify the file name. The default value for the file type is .BAS and the default device and PPN is the one specified in the opening question of the dialogue. If a file type or a device and PPN is specified with file name, it overrides the default. For example, suppose the input device entered at the beginning of the dialogue is MM:[120,51]. The

following list shows various values for file name in the \$PATCH statement and the resulting file name after filling in the defaults:

\$PATCH File Name	Name Actually Used
TEST	MM:[120,51]TEST.BAS
TEST.	MM:[120,51]TEST.
SY:TEST	SY:[120,51]TEST.BAS
SY:TEST.FIL	SY:[1,2]TEST.FIL

The statement consists of a single file name, which is the name of a command file to be used by CPATCH to perform the source text editing. Any number of \$Patch file statements are permitted. There is one patch file statement for each patch to the program.

The default file type for the Patch files is .CMD. The default device and PPN is that of the current PBUILD command file which is open. To avoid confusion, make sure all command files include indirect files and patch files, are in the same account, and, have neither device, nor PPN specified.

\$END Statement

The \$END statement indicates the end of a patch. It also selects a number of options for the operations that override those entered in the dialogue. The format of the end statement is:

\$END [/NC] [newname]

When PBUILD encounters the \$END statement, it normally performs the OLD and COMPILE operations. However, you can change the operation by providing either (but not both) of two optional arguments. The first is the /NC switch. When you include this switch, no compile operation is performed. The patched source is saved on the account specified as the library in the opening dialogue.

The newname option allows the name of the file to be changed after it is compiled. The default name for the compiled program is ~SYSTEM:file.BAC; ~SYSTEM: is replaced by the library device and PPN specified in the opening dialogue, and file is the file name specified in the \$PATCH statement. The protection code is always <124>. If any of these values is to be changed, the new value is included as the newname argument. Only those values that are different from the default must be included. For example, if the file name is to be ~SYSTEM:file.BAC<232>, only the protection code is different from the default, therefore the argument would be <232>, for example, "\$END <232>".

If you want to have a file compiled and stored on the system device instead of the library device, use the newname option. PBUILD substitutes the system device and PPN for the string ~SYSDSK:. For example, if the system device specified in the opening dialogue is SY0:[1,2], the new name string ~SYSDSK:<232> results in the file name SY0:[1,2]file.BAC<232>.

Sample PBUILD Command File

The PBUILD command file must reference the CPATCH file created in the section “Creating the CPATCH Command File.” You can create a new PBUILD file with the required PBUILD commands, or you can insert the commands in an existing file. In either case, use an editor to edit the file.

In the example, the CPATCH file for the first patch to QUMRUN was created. Now the commands to reference this file are inserted in the PBUILD file (either new or existing). The commands required are:

```
$PATCH QUMRUN
PA1406.001
$END
```

Because this is the first patch to QUMRUN, all three of the commands must be added. If there were already existing patches to QUMRUN, you must add the reference to the new patch before the \$END statement of any previous patches to QUMRUN. For example, if the second article concerning QUMRUN is also a patch article, the CPATCH command file for that patch would be PA1406.002. A patch already exists for this program (PA1406.001), therefore you insert PA1406.002 immediately before the \$END statement in the sequence of commands that apply the previous patch. The resulting command sequence is:

```
$PATCH QUMRUN
PA1406.001
PA1406.002
$END
```

These commands cause PA1406.001 to be applied to QUMRUN. The file PA1406.002 would be applied to the patched file resulting from first applying PA1406.001.

If you want to include checksums, add the /CS:n switch after each patch file reference. For example:

```
$PATCH QUMRUN
PA1406.001/CS:57315
PA1406.002/CS:12345
$END
```

Error Messages

This section describes the errors that can occur when running the patching programs. Error messages can originate either from the PBUILD program, Table E-3 or the CPATCH program, Table E-4.

Errors can occur in PBUILD when:

- You enter information required to run the program but the information is incorrect. In this case, PBUILD displays the incorrect input with a text error message and prints the prompt requesting the input again.
- You enter an incorrect command in a command file. Errors occurring in PBUILD while it is running from the command file are always fatal. PBUILD prints the error message and return control to your keyboard monitor.
- CPATCH, which is run by PBUILD, attempts to apply an invalid CPATCH command file as a patch to a program. The program will continue to run.

CPATCH error messages appear at the user's terminal. If they occur while running under PBUILD, PBUILD continues to run. If they occur running CPATCH stand-alone, they may cause CPATCH to terminate execution.

Table E-3 lists the PBUILD error messages. When running CPATCH under PBUILD using patch files supplied by DIGITAL, the first error message in Table E-3 should be the only one which will ever occur.

Table E-3: PBUILD Error Messages

Message and Meaning
MUST BE PRIVILEGED TO RUN PBUILD An attempt was made to run PBUILD from a nonprivileged account.
?FILE NAME ERROR This error indicates that a bad file name was found in the command file currently executing.
?BAD FILE NAME: <filename> Filename does not follow proper syntax rules. This error can occur during the dialogue.
?<file string> NOT PERMITTED File string is valid but contains a feature that is not permitted for the operation, such as wild card characters, or a file name when only a device and PPN was expected.
FILE NOT FOUND: <filename> The syntax of the file name is correct, but refers to a nonexistent file.
?<file string> ERR = <error number> The file string is invalid for a reason other than the previous three error messages. The number returned by the message represents the error number produced by the BASIC-PLUS run-time system.
?COMMAND FILE MUST BE ON DISK A command file name was entered with a device specifier other than a file-structured disk. Command files must be copied from the device to disk before running PBUILD.
?CAN'T COPY <file1> TO <file2> <BASIC-PLUS error message> Occurs after the message !COPYING TEMP FILE <file1> TO <file2>. PBUILD was attempting to copy the source file from the current account to the permanent account. The copy failed for the reason given in the BASIC-PLUS error message. The BASIC-PLUS errors that are most likely are ?No room for user on device and ?Device not available. Others are various magnetic tape errors or hardware I/O errors.
?FATAL ERROR NO. <error number> ON LINE <error line> LEAVING PROGRAM The program was terminated by an unexpected error, which may indicate a system error or a hardware failure. The error returns the BASIC-PLUS error number and line number.

Table E-4 lists the CPATCH error messages.

Table E-4: CPATCH Error Messages

Message and Meaning
?MISMATCH Occurs when editing a version of the file that was not correct, for example, attempting to patch a file that was already patched. When this happens, the patch is ignored, and the file is restored to the state before attempting to apply the patch. The log file (or KB: if that is the log) shows the cause of the mismatch by printing: <pre>= cmd = > string = log = > string! ?mismatch?</pre> String is the contents of the command file that is the correct program response to the previous command in the command file; string! is the actual program response produced. It can be a verification message on a line that has been modified or a CPATCH error message, such as ?Srch fail when a string that was expected has been deleted. This is a nonfatal error when running under PBUILD. PBUILD continues to run normally but the source file used for any commands to follow will be the original, unmodified source.
\$SRCH FAIL The string searched for with the G command was not found.
?EOF If the error occurs in response to the H command, it indicates that the string was not found, and the source input file has been read to the end of file. If it occurs while running from a command file, it indicates that an end of file occurred in the command file before an EX command was encountered.
?BAD ARG FOR <command> The argument provided with command is invalid for that command. For example, the L command only permits 0 and 1 as valid arguments.
?BAD COM: <command> Command is not a valid command string.
?CAN'T BE THE SAME <log> = <command> Unless the log file and the command file are both the keyboard, they must be different files. If they are not, this message is printed: <pre>FATAL ERROR NO. <err> ON LINE <error line> LEAVING PROGRAM</pre> The same as in PBUILD. However, err = 10 is possible in normal operation. That error number indicates a protection violation, which can occur because CPATCH does not have to be run in a privileged account.
?FATAL ERROR NO.<error number>ON LINE <error line> IN AUTOED The same as above, however, the error occurred in the program AUTOED which is chained to by CPATCH. This error does not terminate CPATCH, however. It has the same effect as a ?Mismatch error, but it may still indicate the need for to send DIGITAL an SPR.

(continued on next page)

Table E-4: CPATCH Error Messages (Cont.)

Message and Meaning
?Please 'RUN CPATCH' An attempt was made to run AUTOED as a stand-alone program. ?<file string> NOT PERMITTED ?BAD FILE NAME: <file string> ?<file string> ERR = <error number> ?FILE NOT FOUND ?CAN'T COPY <file1> TO <file2> These messages have the same meaning as they do for PBUILD: see Table E-3.

Mixed Disk Drives on the Same Controller



RSTS/E V9.0 supports many types of mixed disk configurations. Usually, each type of disk requires a separate controller. Frequently, however, similar disks may share the same controller. The following sections describe the level of support for each possible disk combination.

Mixing RP04/RP05/RP06 Drives on the Same Controller

The RP04/RP05/RP06 drives all use the RH11 interface (RH70 for PDP-11/70s). You can mix up to eight of these drives on a given controller, as long as each drive in the combined set has a unique drive number. The RSTS/E monitor distinguishes which type of disk is on a given controller and uses it appropriately. The RP05 is functionally identical to the RP04.

Mixing RK06 and RK07 Drives on the Same Controller

The RK06 and RK07 drives use the RK611 and RK711 controllers. You can mix up to eight of these drives on a given controller, as long as each drive in the combined set has a unique drive number. The RSTS/E monitor distinguishes which type of disk is on a given controller and uses it appropriately. (Some older RK611 controllers need an ECO to have this capability.)

Mixing RL01 and RL02 Drives on the Same Controller

The RL01 and RL02 drives use the RL11 controller. You can mix up to four of these drives on a given controller, as long as each drive in the combined set has a unique drive number. The RSTS/E monitor distinguishes which type of disk is on a given controller and uses it appropriately.

Mixing RM02/RM03/RM05/RM80 Drives on the Same Controller

The RM02, RM03, RM05, and RM80 disks are very similar to the RP04, RP05, and RP06 disks. They also use the RH controllers. The RM02 disk uses the RH70 (for PDP-11/70s) or the RH11 interface (for other PDP-11s). The RM03, RM05, and RM80 disks only use the RH70 interface and are supported only on PDP-11/70 systems.

On a PDP-11/70 system, RM02, RM03, RM05, and RM80 disks may share the same RH70 controller. You can mix up to eight of these drives on a given controller, as long as each drive in the combined set has a unique drive number. The RSTS/E monitor distinguishes which type of disk is on a given controller and uses it appropriately.

Mixing RM02/RM03/RM05/RM80 and RP04/RP05/RP06 Drives on Separate Controllers

To use both the RM and RP disks on a single system configuration, DIGITAL recommends using a separate RH controller for each kind of disk. The normal arrangement is to have the RH controller for the RP disks at the standard CSR address of 176700 and the RH controller for the RM disks at the nonstandard CSR address of 176300. However, with this arrangement you cannot bootstrap the RM disks with any hardware bootstraps, although you can use the BOOT option of INIT.SYS.

If you would rather use the hardware bootstrap with the RM disks, you should reverse the CSR assignments so that the RP disk controller is at the nonstandard address (176300) and the RM disk controller is at the standard address (176700).

Note that if the hardware bootstrap requires you to type a device name at the console keyboard, typing either DB (the name used for RP disks) or DR (the name used for RM disks) will bootstrap a disk controlled through the standard CSR address, regardless of which type it actually is. However, most bootstraps require that you type DB, regardless of the actual type of drive.

Mixing RM02/RM03/RM05/RM80 and RP04/RP05/RP06 Drives on the Same Controller

It is possible to mix RM02/RM03/RM05/RM80 drives with RP04/RP05/RP06 drives on the same RH controller. Up to eight drives are allowed per RH, and each drive must have a unique drive number. The monitor knows which type of disk is on a given drive and uses it appropriately. Note that RM03, RM05, and RM80 disks are supported only on PDP-11/70s.

The unusual aspect of this arrangement is the device naming scheme. The lowest numbered drive on the RH determines whether all drives on this RH are known as DBn: or DRn:. For example, if the lowest numbered drive is an RP04, RP05, or RP06, then the device name DB is used for all drives. If the lowest numbered drive is an RM02, RM03, RM05, or RM80, then the device name DR is used for all drives.

The RSTS/E monitor can determine the identity of the disks, although the naming scheme is not obvious.

Multiple RH Controllers for the Same Type of Disk

RSTS/E supports two similar RH controllers on the same system. These two RH controllers can both be controlling the same kind of disk, either RP or RM. Only one of these two RH controllers can be at the standard CSR address. The other controller must be at the nonstandard CSR address. Each RH can control up to eight drives, giving a possible combined total of 16 drives.

The naming scheme for the above arrangement is as follows: the drives interfaced at the standard CSR address are known by the device name that corresponds to the lowest numbered drive type (DB or DR). The drives interfaced at the nonstandard CSR addresses are known by the other name.

Random Mixing of RP and RM Disks on Multiple Controllers

RSTS/E supports two RH controllers with a combination of RP and RM disks on both RH controllers. If the respective lowest numbered drives on the two RH controllers are of different types, then the previous rule of “lowest numbered drive determines the device name” applies. If both lowest numbered drives are of the same type, then the deciding rule is: the RH at the standard CSR address gets the device name that corresponds to the lowest numbered drive type, and the RH at the nonstandard CSR address gets the other device name.

Booting Mixed RM02/RM03/RM05/RM80 and RP04/RP05/RP06 Disks

RSTS/E supports mixed RP and RM disks combinations as described in the previous section. However, you can hardware boot disks only at the primary controller address (176700). You can use the INIT.SYS BOOT option to boot all disks.

Avoiding Bootstrap Conflicts

Because of possible bootstrap conflicts, DIGITAL does not recommend configuring systems that contain both RP03 and secondary CSR RH11/70 disk drives.

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