HP Apollo 9000 Series 400 Model 425e Domain/OS Owner's Guide

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HEWLETT PACKARD

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WARNING: This equipment generates, uses, and may emit radio frequency energy and, if not installed and used in accordance with these instructions, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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Electrostatic charges can damage the integrated circuits on printed circuit boards. To prevent such damage from occurring, observe the following precautions during board unpacking and installation:

- Stand on a static–free mat.
- Wear a static strap to ensure that any accumulated electrostatic charge will be discharged from your body to ground.
- Connect all equipment together, including the static–free mat, static strap, routing nodes, and peripheral units.
- Keep uninstalled printed circuit boards in their protective antistatic bags.
- Handle printed circuit boards by their edges, once you have removed them from their protective antistatic bags.

Warnings and Cautions

WARNING:

Removing device cover may expose sharp edges in equipment chassis. To avoid injury, use care when installing customer add-on devices.

WARNUNG:

Das Entfernen der Geräteabdeckung legt die scharfen Kanten im Inneren des Gerätes frei. Um Verietzungen zu vermeiden, seien Sie vorsichtig beim Einbau von zusätzlichen Bauteilen, die vom Kunden selber eingebaut werden können.

AVERTISSEMENT:

Des bords tranchants du châssis de l'équipement peuvent être exposés quand le cache de l'unité n'est pas en place. Pour éviter des blessures, faire très attention lors de l'installation de modules supplémentaires par le client.

WARNING:

To avoid personal injury and to prevent possible equipment damage, ensure that the ac power is off and the ac power cord is disconnected.

WARNUNG:

Um Verletzungen und mögliche Ausrüstungsschäden zu verhindern, muβ die Wechselstrmoquelle ausgeschaltet sein und das Wechselstromzuführungskabel aus der Steckdose entfernt sein.

AVERTISSEMENT:

Pour éviter les risques de blessures et de dommages au matériel, s'assurer que le système n'est pas sous tension et que le fil d'alimentation électrique c.a. est débranché.

WARNING:

Disconnect power plug from wall outlet or source power before moving or removing the device, or installing add-on components.

WARNUNG:

Entfernen Sie die Stromzuführung von der Steckdose oder der Stromquelle bevor Sie das Gerät bewegen, abbauen, oder zusätzliche Bauteile installieren.

AVERTISSEMENT:

Débrancher la fiche de la prise de courant ou de la source d'alimentation électrique avant de déplacer ou de retirer l'unité, ou avant d'installer des modules supplémentaires.

Warnings and Cautions

WARNING:

Lifting the 19–inch monitor requires more than one person because the unit weighs more than 40 pounds (18 kilograms).

WARNUNG:

Der–19–inch (48 cm) Bildschirm muβ von mehreren Personen angehoben werden, da die Einheit über 40 Pfund (18 kilogramm) wiegt.

ADVERTISSEMENT:

Il faut plus d'une personne pour soulever le moniteur de 48 cm (19 pouces) étant donné qu'il pèse plus de 18 kg.

CAUTION:

Monitor intput voltage must be the same as the system's input voltage.

VORSICHT:

Die Bildschirm–Engangsspannung muβ genauso groβ sein wie die Eingangsspannung des Systems.

ATTENTION:

La tension d'entree du moniteur doit être la même que la tension d'entrée du système.

CAUTION:

Do not unplug the monitor video cable while the system unit is powered on.

VORSICHT:

Ziehen Sie nicht das Stromzuführungskabel zum Bildschirm aus der Steckdose, solange das Gerät eingeschaltet ist.

ATTENTION:

Ne pas débrancher le câble vidéo du moniteur pendant que l'unité est alimentée.

Warnings and Cautions

CAUTION:

System power cord must be plugged into an accessible dedicated ac mains receptacle.

VORSICHT:

Das System-Netzanschluβkabel muβ an eine zugängliche spezielle Wechselstrom-Hauptzuführungssteckdose angeschlossen werden.

ATTENTION:

Le fil d'alimentation électrique du système doit être branché dans une prise de courant c.a. spécialisée accessible.

CAUTION:

Monitor screen damage will occur if the monitor is left on for extended periods of time with the same image on the screen at high intensity.

VORSICHT:

Bildschirmschaden ist unvermeidlich, falls der Bildschirm über längere Zeit und mit demselben Bild auf dem Schirm bei hoher Intensität angeschaltet bleibt.

ATTENTION:

L' écran du moniteur sera endommagé si le moniteur est laissé pendant une période prolongée avec la même image sur l' écran à haute intensité.

Preface

The *HP Apollo 9000 Series 400 Model 425e Domain/OS Owner's Guide* describes how to use your Model 425e with Domain/OS.

We've organized this guide as follows:

Chapter 1 Describes the workstation, system controls, connectors, and indicators.

Chapter 2 Describes how to start up a disked system.

Chapter 3 Describes how to start up a diskless system.

Chapter 4 Describes how to use the floppy disk drive.

Chapter 5 Describes how to use the CD-ROM drive.

Chapter 6 Describes how to use multiple disks.

Chapter 7 Describes some troubleshooting techniques to use with a Model 425e workstation.

Chapter 8 Describes how to recover from a system crash or a system hang.

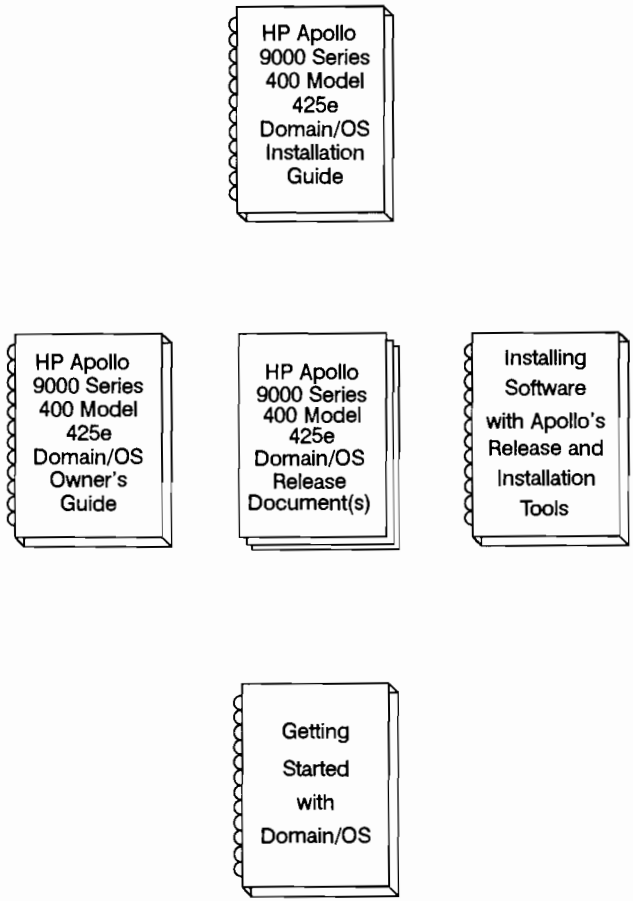
Chapter 9 Describes how to check the operation of an 802.3 (ETHERNET) network.

Chapter 10 Describes how to start up a system in Service mode.

Appendix A Describes how to connect SCSI devices to a Model 425e workstation.

Appendix B Describes how to change yoursystem's hardware configuration.

The following illustration shows the documentation that comes with your workstation.



Audience

This guide is intended for use by technically qualified personnel and computer-knowledgeable customers to install and use their HP Apollo 9000 Series 400 Model 425e workstation.

Installation Notice

Products designated in the HP Apollo applicable price list as customer-installable can be installed by computer-knowledgeable customers who carefully read and follow the instructions provided. Customers who elect to have the product installed by our field personnel will be charged the applicable Field Installation Charge (FIC), as covered under the standard terms and conditions. For more information, please contact your local sales representative.

Release Document(s)

Please refer to the *Release Document(s)* you received with your system and/or system software for additional information that we may not have been able to include in this guide at the time of its publication.

Related Manuals

The file **/install/doc/apollo/os.v.** *latest software release number*__**manuals** lists current titles and revisions for all available manuals. For example, at SR10.2 refer to **/install/doc/apollo/os.v.10.2__manuals** to check that you are using the correct version of manuals. You may also want to use this file to check that you have ordered all of the manuals that you need. (If you are using the Aegis environment, you can access the same information through the Help system by typing **help manuals**.) To order manuals, call **Apollo Direct Channel** at **1-800-225-5290**. Outside the USA, please contact your local sales office.

Refer to the *Domain Documentation Quick Reference* (002685) and the *Domain Documentation Master Index* (011242) for a complete list of related documents. For more information on the Model 425e workstation, refer to the following documents:

- *HP Apollo 9000 Series 400 Model 425e Domain/OS Installation Guide* (A1499--9000)
- *Installing Software with Apollo's Release and Installation Tools* (008860)
- *Getting Started with Domain/OS* (002348)
- *Using Your SysV Environment* (011022)
  Using Your BSD Environment (011020)
  Using Your Aegis Environment (011021)
- *Managing SysV System Software* (010851)
  Managing BSD System Software (010853)
  Managing Aegis System Software (010852)
- *SysV Command Reference* (005798)
  BSD Command Reference (005800)
  Aegis Command Reference (002547)
- *Writing Device Drivers with GPIO* (000959)
- *Domain Hardware Utilities Reference* (014881)

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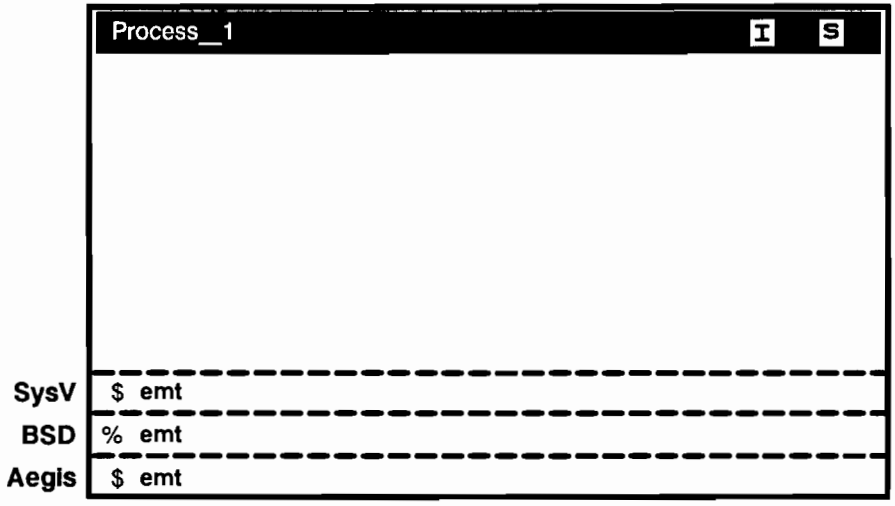
Documentation Conventions

Unless otherwise noted in the text, this guide uses the following symbolic conventions.

literal values	Bold words or characters in formats and command descriptions represent commands or keywords that you must use literally. Pathname are also in bold.
user–supplied values	Italic words or characters in formats and command descriptions represent values that you must supply.
sample user input	In examples, information that the user enters appears in color.
< >	Angle brackets enclose the name of a key on the keyboard.
CTRL/	The notation CTRL/ followed by the name of a key indicates a control character sequence. Hold down <CTRL> while you press the key.
. . .	Horizontal ellipsis points indicate that you can repeat the preceding item one or more times.
. . .	Vertical ellipsis points mean that irrelevant parts of a figure or example have been omitted.
——⊞——	This symbol indicates the end of a chapter or a part of this guide.

Operating Environments

After your system is installed, the system administrator can change the default operating system environment to any of three versions: SysV, BSD, or Aegis. To assist you in entering commands illustrated in the text, we provide a visual display of all three operating environments. The screen displays in the text are similar to the following example:



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Chapter 2 Starting Up the Disked Workstation

Chapter 3 Starting Up a Diskless Workstation

Chapter 4 Using the Floppy Disk Drive

Chapter 5 Using the CD-ROM Drive

Chapter 6 Using Multiple Disks

Part 2 — Troubleshooting

Chapter 7 Troubleshooting

Chapter 8 Recovering from a System Crash

Chapter 9 Checking the 802.3 Network

Chapter 10 Starting Up in Service Mode

Appendix A SCSI Connections

Appendix B Changing Your Workstation's Hardware Configuration

Glossary

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Tables

Chapter 1
Introduction

This chapter introduces the Model 425e workstation. Included in this chapter are the following:

- Product description
- System unit controls
- System unit LED indicators
- System unit connectors
- Monitor controls

Product Description

The HP Apollo 9000 Series 400 Model 425e workstation is designed to run either the HP-UX and Domain/OS operating systems. Both operating systems are object code compatible with most earlier Series 300 and Series 400 workstations. Your system is configured to run the Domain/OS operating system.

The Model 425e workstation houses up to two internal mass storage devices connected to the internal SCSI interface. The workstation is available in diskless as well as disked configurations. Disked configurations have their hard disk drive bay fitted with either a 200 or 400 MByte hard disk drives. Hard disk drives are pre-formatted. The Model 425e workstation contains the following key features:

- MC 68040 CPU operating at 25 MHz
- 200 or 400 Mbyte hard disk drive
- ECC RAM configurable from 8 Mbytes to 48 Mbytes
- 1280 by 1024 graphics resolutions for 19-in. color and grayscale monitors
- 1024 by 768 graphics medium resolutions for 16-in. color monitors
- Three 9-pin RS-232 serial ports
- One 25-pin HP Parallel port
- Self-terminating SCSI Type 2 port; external terminator not required when cable is removed
- HP-HIL port for HP-UX keyboards and other HP-HIL devices (HP-UX only)
- Domain keyboard port (Domain/OS only)
- Ethernet IEEE 802.3 LAN ports, jumper selectable to either AUI (Thick net) or BNC (Thin net)
- Voice quality audio and speaker output (HP-UX only)
- Voice quality microphone or audio input (HP-UX only)
- Optional 3.5-in flexible disk drive
- Optional CD-ROM disk drive

System Unit Controls

Before powering on your system, you should become familiar with the system unit controls.

Figure 1–1 shows the Power, Reset, and Service/Normal mode switches. It also shows the Power LED light.

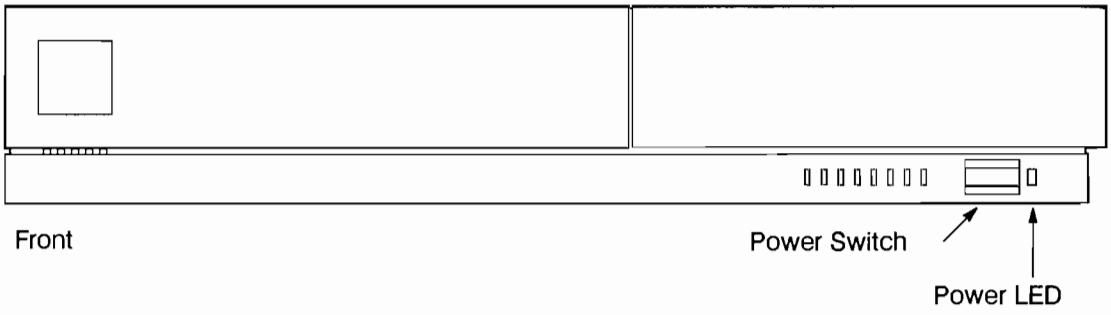
Use the Power switch to power the system unit on and off.

Press the Reset switch to restart the workstation (reset the operating system) only when you are in Service mode. Do not press the Reset switch when the operating system is up and running. Chapter 7 describes how to use the Reset switch to handle a system hang.

You can toggle the Service/Normal mode switch (move the switch to the right for Normal mode and to the left for Service mode) to set the system to Service mode.

When your system is in Normal mode, the system automatically runs system diagnostics at power–up and then boots the operating system. Use Normal mode for everyday computing activities.

You *only* use Service mode when instructed to do so for diagnostic purposes. *Do not* use Service mode for everyday computing activities. Refer to Chapter 10 for information on how to use Service mode. When you power on the system in Service mode, the operating system does not boot; rather the system stays at the Mnemonic Debugger (MD) level – a facility that provides a set of commands and utility programs.



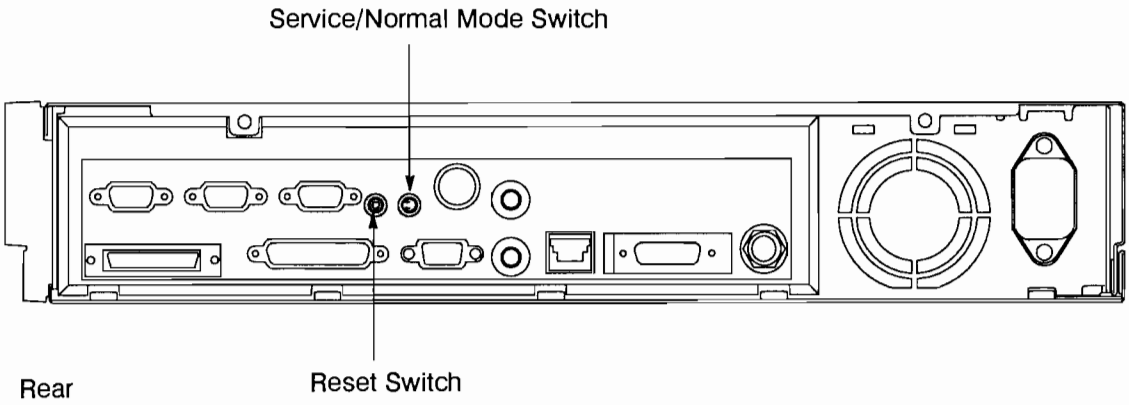


Figure 1–1. System Unit Controls

Understanding the LEDs

There are 9 LEDs located on the front of the system unit, as shown in Figure 1–2. The first four amber LEDs (labeled A, B, C, and D) show that the system is running the operating system and communicating over the network. Along with the next four amber LEDs (E, F, G, and H) they also help you to troubleshoot the workstation by coming on in certain patterns during system failures (see Chapter 7).

The green Power LED lights when the system unit power is on.

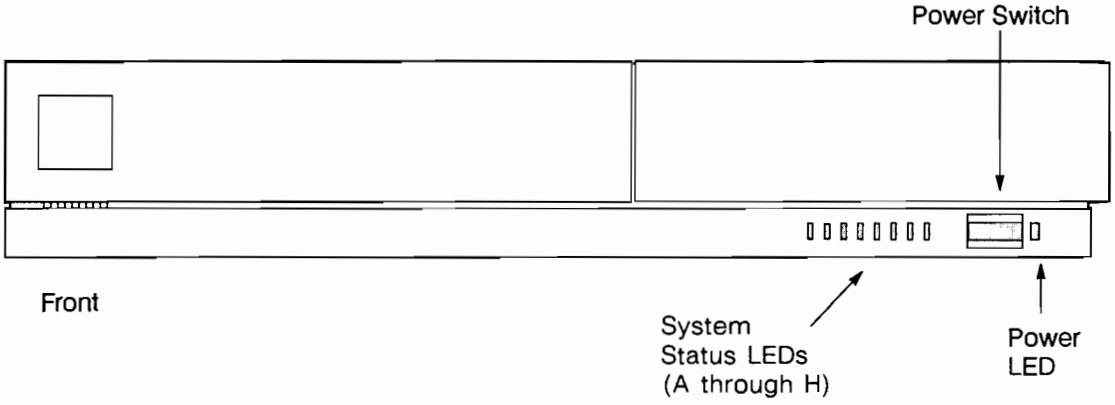
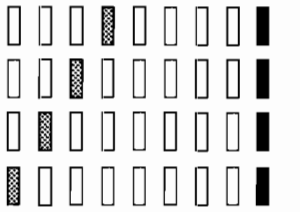


Figure 1–2. Front Panel LEDs

Table 1-1 lists how the LEDs report during normal Domain/OS system activity. The green Power LED remains lit while the system is powered on.

Table 1-1. LED Display During Normal System Activity

LED Display (A Through D Flashing)	**Message**
A B C D E F G H P 	Operating System Running
	Disk Access In Progress
	Network Receive In Progress
	Network Transmit In Progress
P = Power-On Indicator  = LED On	

System Unit Rear Panel Connectors

This section describes the following connectors on the system unit's rear panel:

- SCSI Connector
- HP Parallel I/O Connector
- Domain Keyboard Connector
- Audio Out Connector (HP-UX only)
- Audio/Mic In Connector (HP-UX only)
- RS-232 Connectors
- 802.3 Thin LAN (BNC) Connector
- 802.3 AUI LAN (Thick net) Connector
- System ac Connector
- Video Connector
- HP-HIL Connector (HP-UX only)

See Figure 1-3 for the locations of these connectors on the rear panel of the Model 425e workstation.

NOTICE: The connectors that are HP-UX only are not described in this section.

NOTICE: To maintain FCC/EMI compliance, verify that all cables are seated and properly fastened.

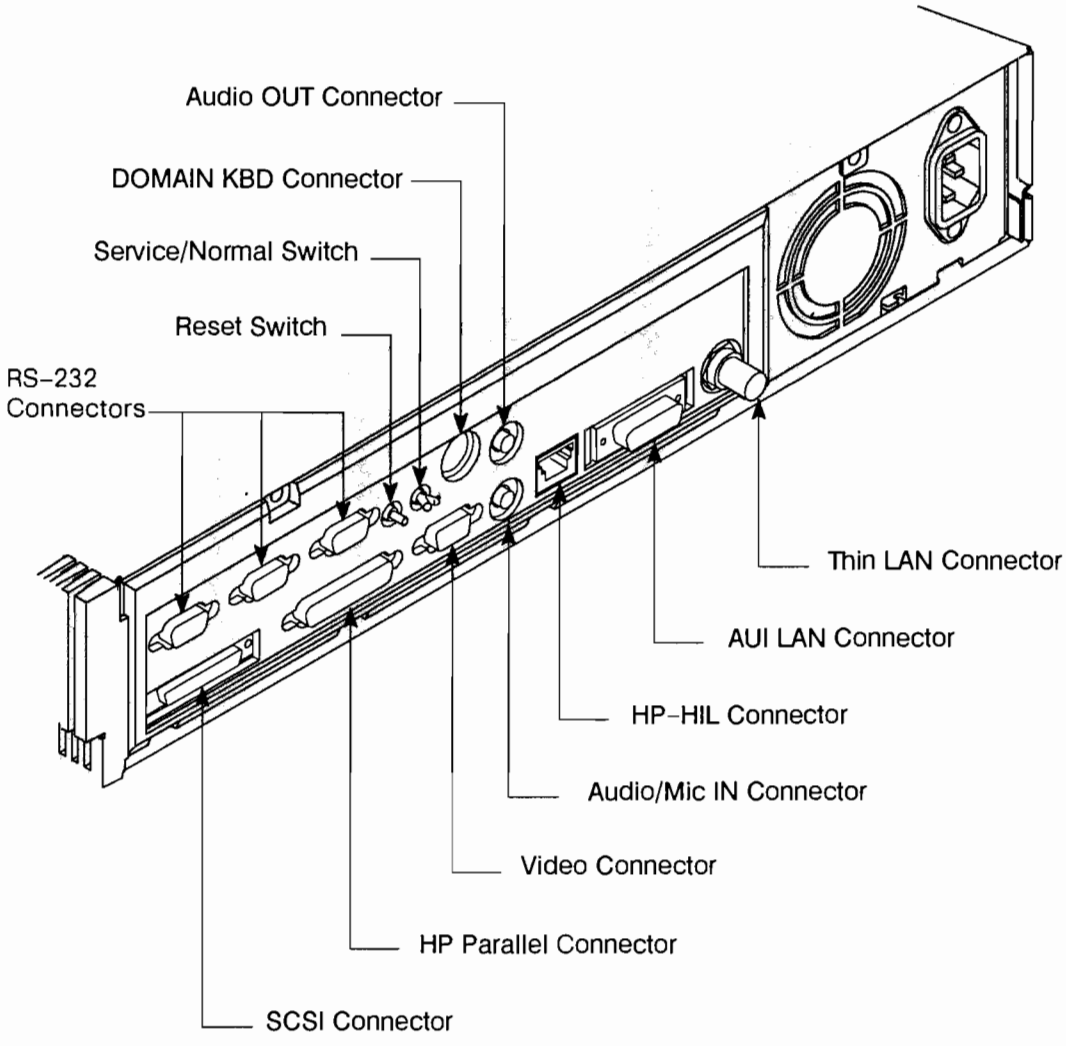


Figure 1-3. Rear Panel Connectors

Keyboard Connector

Figure 1–4 shows the location of the Domain keyboard connector.

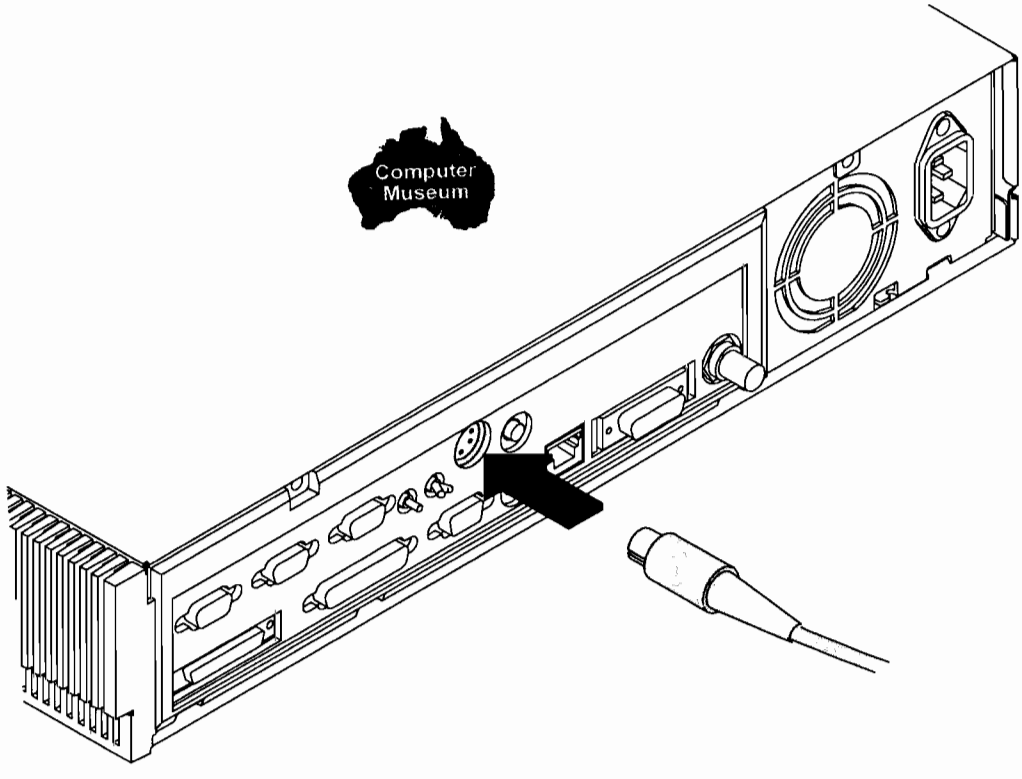


Figure 1–4. Domain Keyboard Connector

HP Parallel I/O Connector

The 25-pin HP Parallel I/O interface port is provided for use with devices using the Centronics interface protocols. Figure 1-5 shows the location of the HP parallel I/O connector.

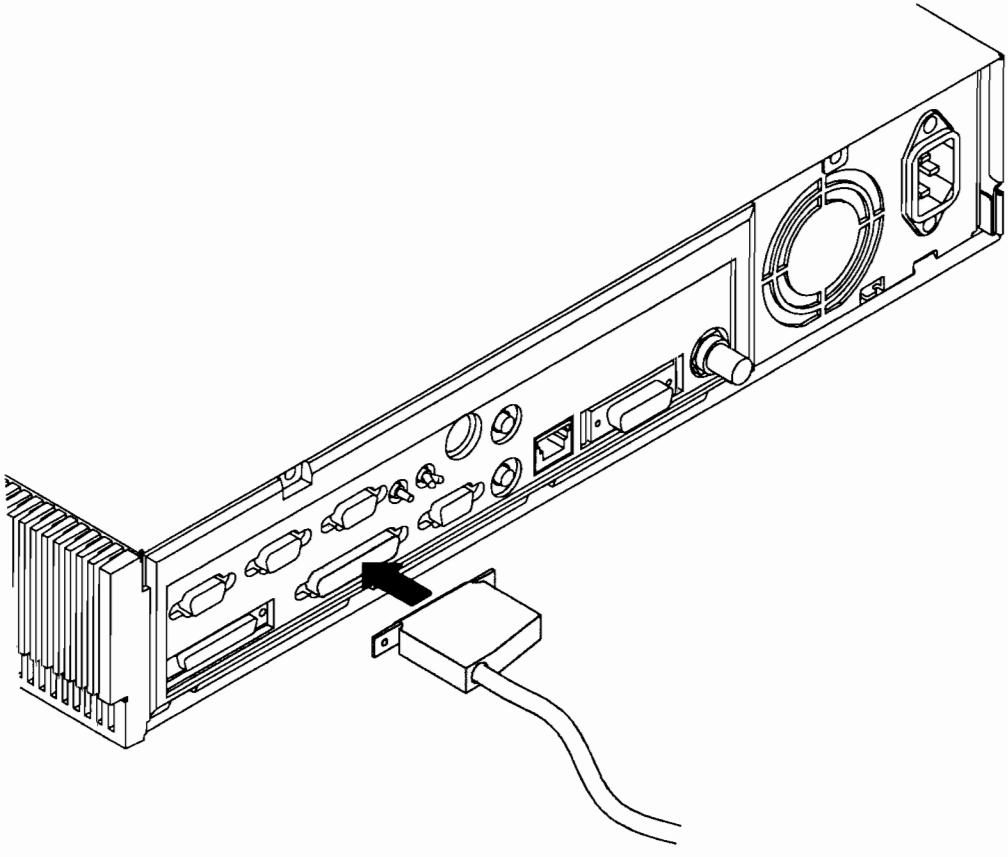


Figure 1-5. Parallel I/O Connector

SCSI Connector

Figure 1–6 shows the location of the SCSI port on the Model 425e workstation.

Appendix A provides the following information about connecting HP Apollo SCSI devices to the SCSI port:

- Domain/OS Series 400 SCSI restrictions
- Connecting to the SCSI port
- Assigning Domain/OS SCSI device IDs

NOTICE: When attaching external SCSI devices, be sure to terminate the last device on the external SCSI bus.

NOTICE: HP Apollo does not provide maintenance for SCSI devices not sold by HP Apollo. For a list of SCSI devices that are sold by HP Apollo, contact your sales representative.

If you are connecting a SCSI device for which HP Apollo has not provided a driver you can refer to *Writing Device Drivers with GPIO* for information on how to write a device driver.

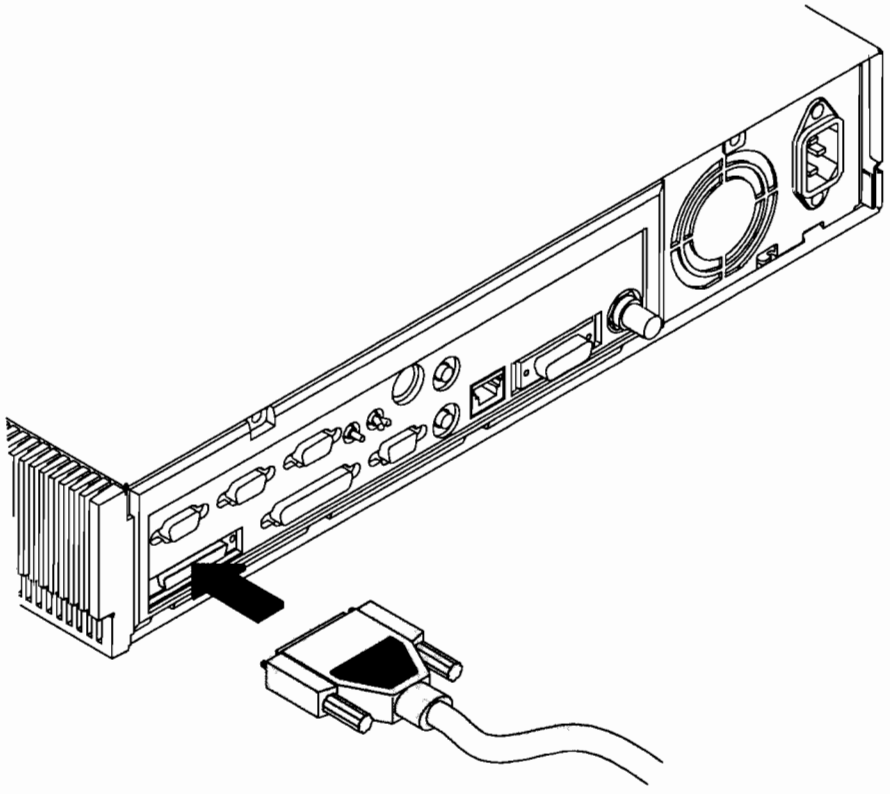


Figure 1–6. SCSI Connector

802.3 Network Connectors

Figure 1–7 shows the location of Thin LAN (BNC) and AUI LAN (Thick net) connectors for the 802.3 (ETHERNET) network.

You use only one of these connectors on the workstation. Which connector you use depends on the type of cabling used at your location.

If you want to change from one LAN type to another, see Appendix B for instructions.

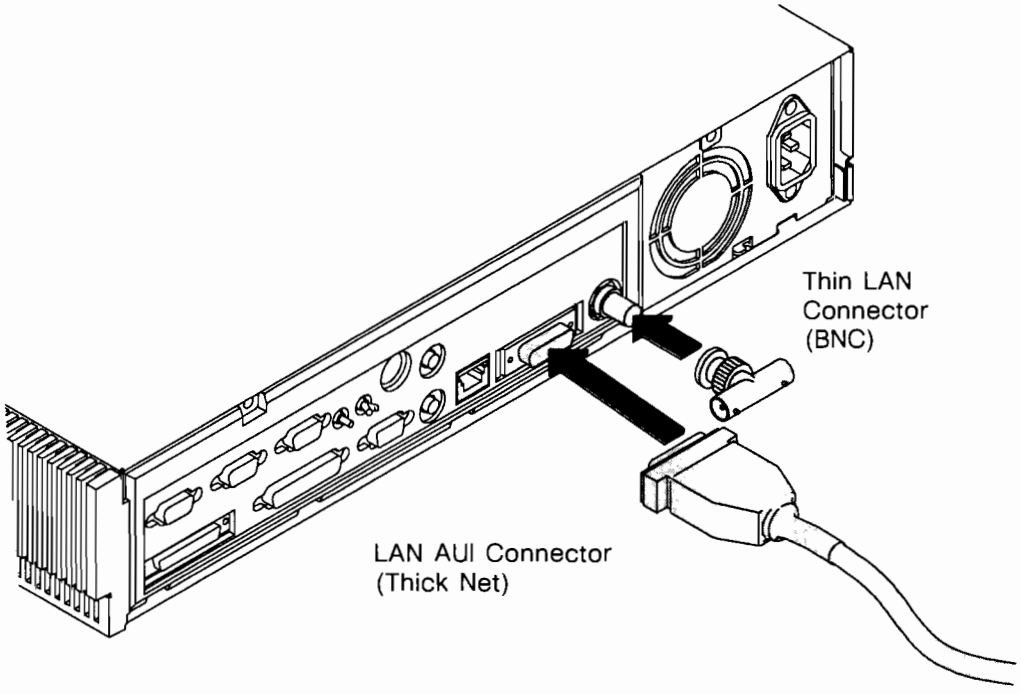


Figure 1–7. 802.3 Network Connectors

RS-232 Serial Input/Output Connectors

You can attach a variety of peripheral devices to the three 9-pin, RS-232 Serial Input/Output (SIO) ports on the workstation. These peripheral devices include printers, plotters, modems, and scanners. Consult the documentation that accompanies each peripheral device for specific information concerning its use.

Table 1-2 shows the P2 SIO connector pin listings. Signal names are those specified in the EIA RS-232 standard.

Table 1-2. Serial I/O Pins

Pin No.	Signal	Description
1	dcd	Data Carrier Detect
2	rxd	Receive Data
3	txd	Transmit Data
4	dtr	Data Terminal Read
5	GND	Ground
6	nc	Not Connected
7	rts	Request To Send
8	cts	Clear To Send
9	nc	Not Connected

Figure 1–8 shows the location of the three 9–pin SIO RS–232 connectors on the rear of the Model 425e workstation.

There are three full–duplex serial ports on the workstation. All ports are programmable. You can set functions such as bit rate, character length, parity, and stop bits. Ports 1, 2, and 3 are used as interfaces for serial asynchronous devices to the CPU. All ports operate at up to a 19.2K baud rate. The interface to SIO1, 2, and 3 is by way of RS–232 drivers and receivers.

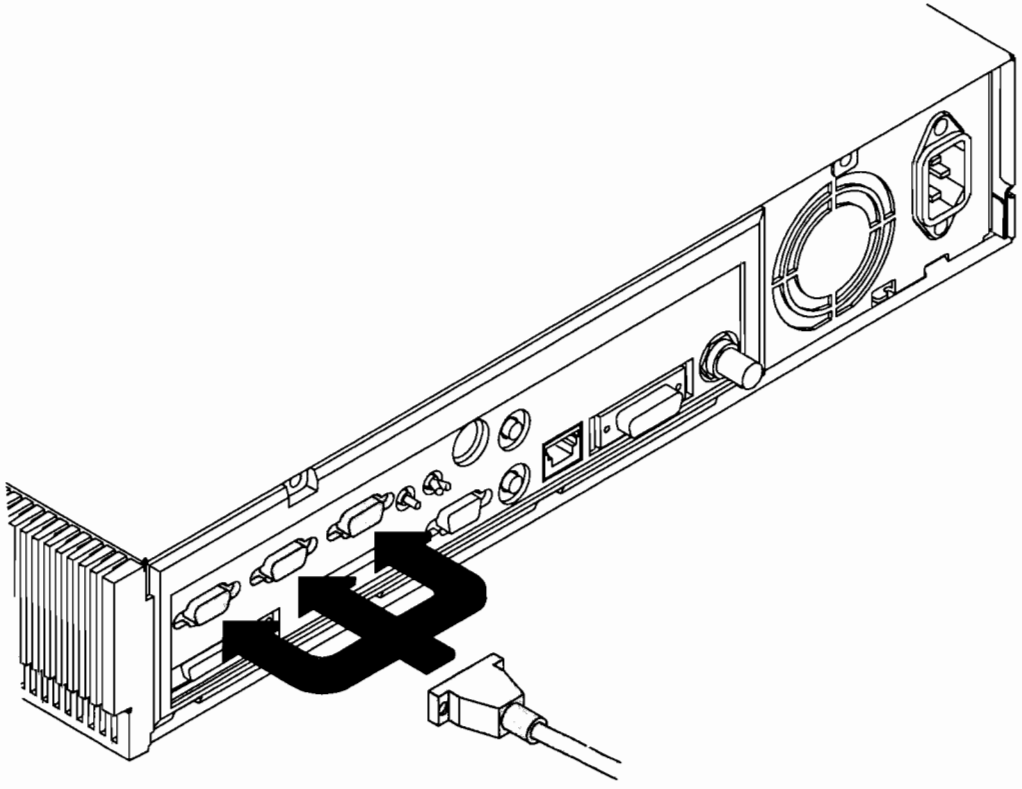


Figure 1–8. RS–232 SIO Connector

ac Connector

Figure 1–9 shows the system ac connector on the Model 425e workstation. There is no monitor ac connector on the Model 425e workstation.

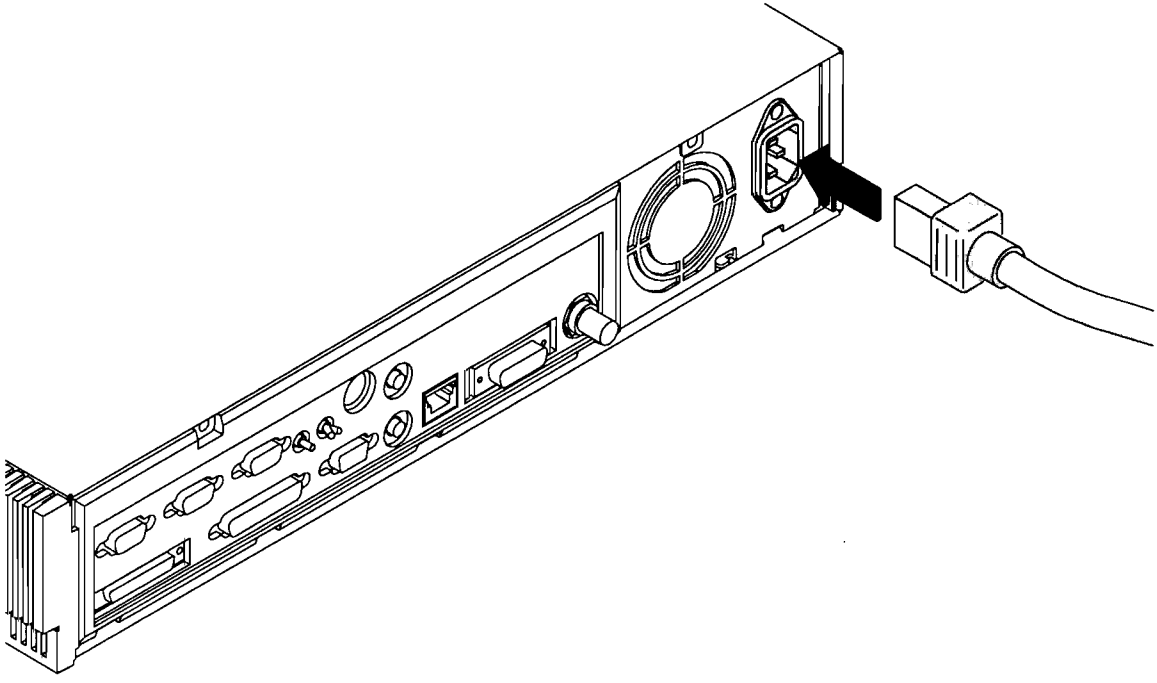


Figure 1–9. ac Connector

Video Connector

Figure shows the video connector on the Model 425e workstation.

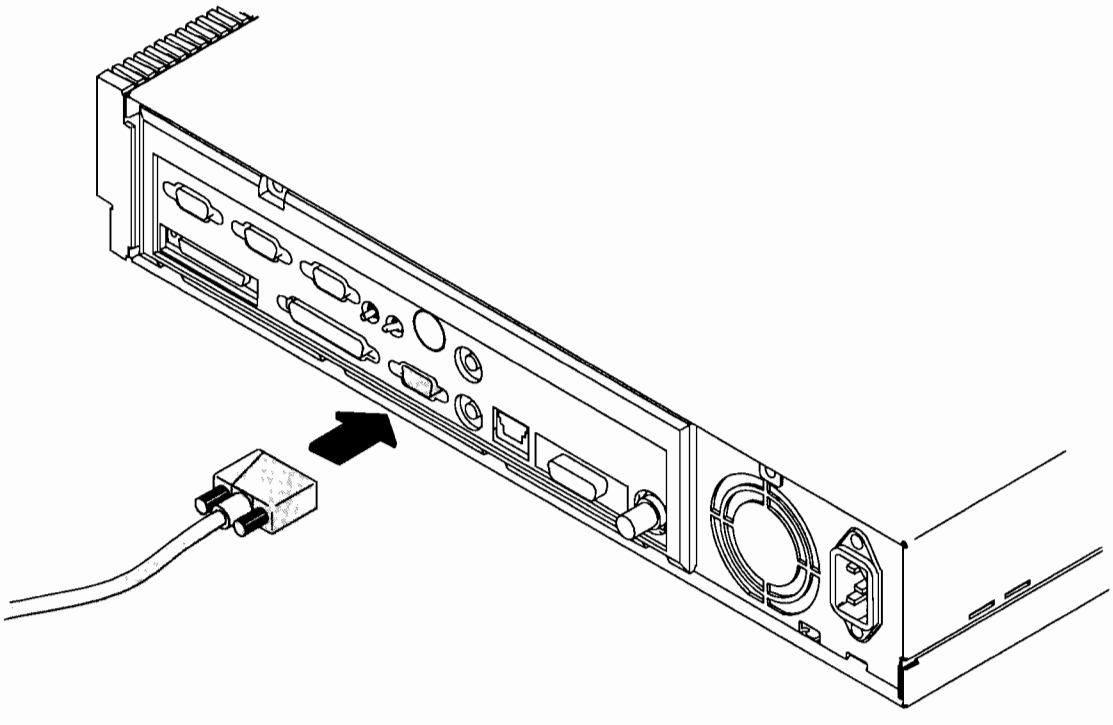


Figure 1–10. Video Connector

Monitor Controls, Connectors, and Indicators

Before using your monitor, you should become familiar with its controls, connectors, and indicators.

The Power-On LED, when lit, indicates that the monitor has ac power applied. Use the follwoing controls to adjust your monitor:

- The Brightness control adjusts the brightness of the display.
- The Contrast control adjusts the light-to-dark and dark-to-light contrast of the display.
- The Degaus control demagnetizes the monitor. Degaussing disperses any accumulated magnetic change from the face of the monitor. Magnetic disturbances such as picture distortion or color impurity can be caused by either moving the the monitor fromone place to another or swiveling the monitor on its base.

The following three figures illustrate the Model 425e workstation monitors.

Figure 1-11 shows the 19-inch color monitor (Model A1097A/A1097B)

Figure 1-12 shows the 19-inch grayscale monitor (Model 98774A).

Figure 1-13 shows the 16-inch color monitor (Model A1497A).

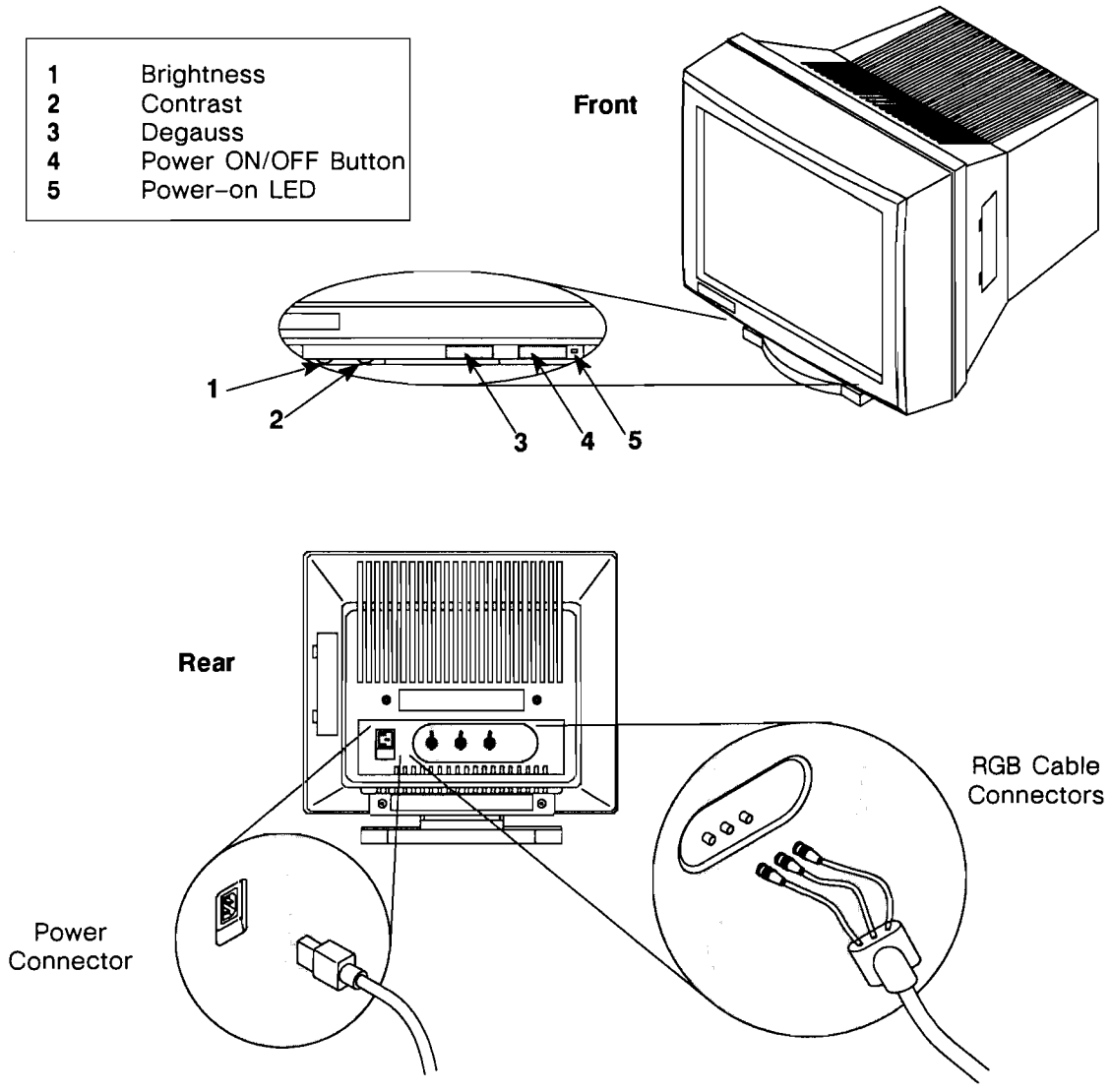


Figure 1–11. 19–Inch Color Monitor (Model A1097A/A1097B))

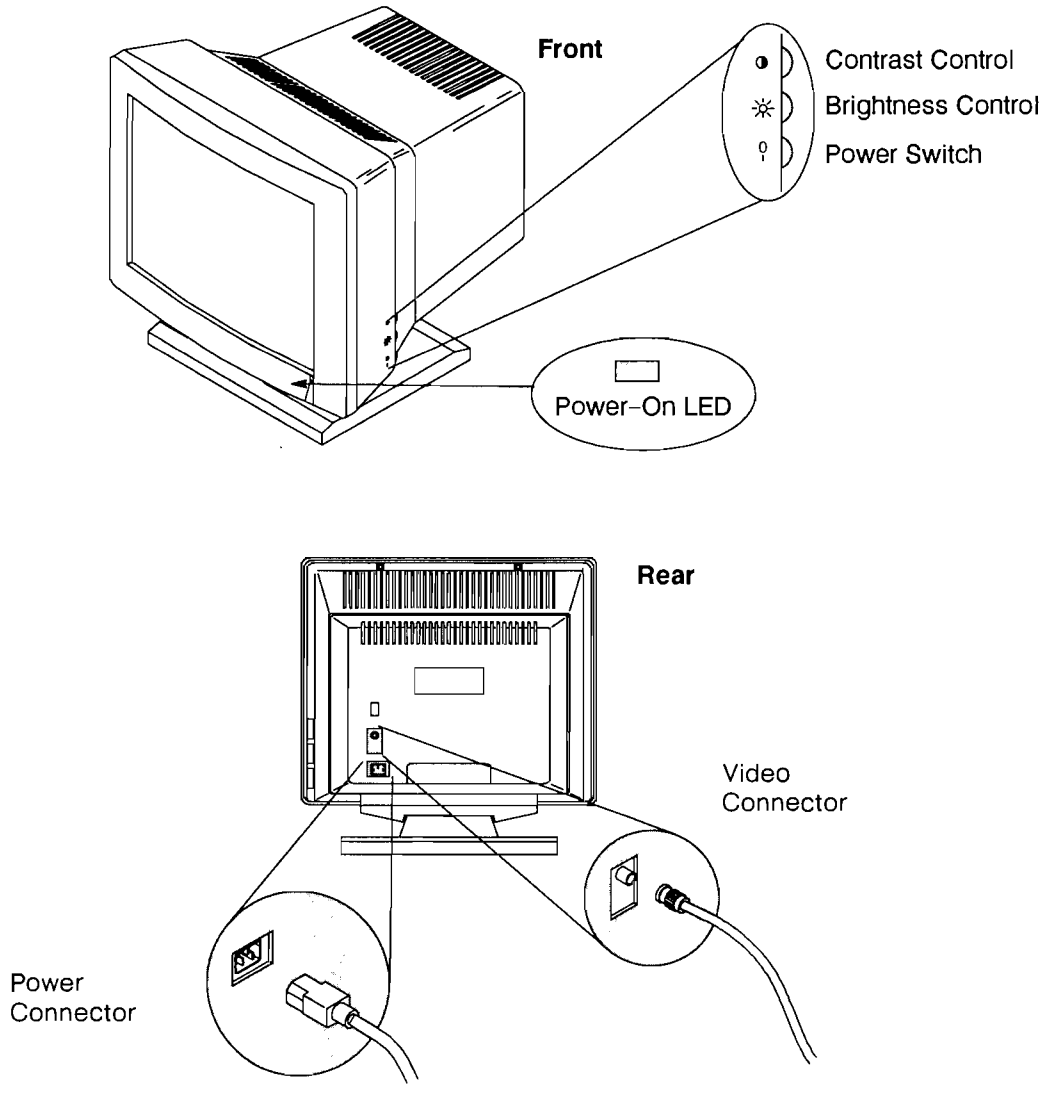


Figure 1-12. 19-Inch Grayscale Monitor (Model 98774A)

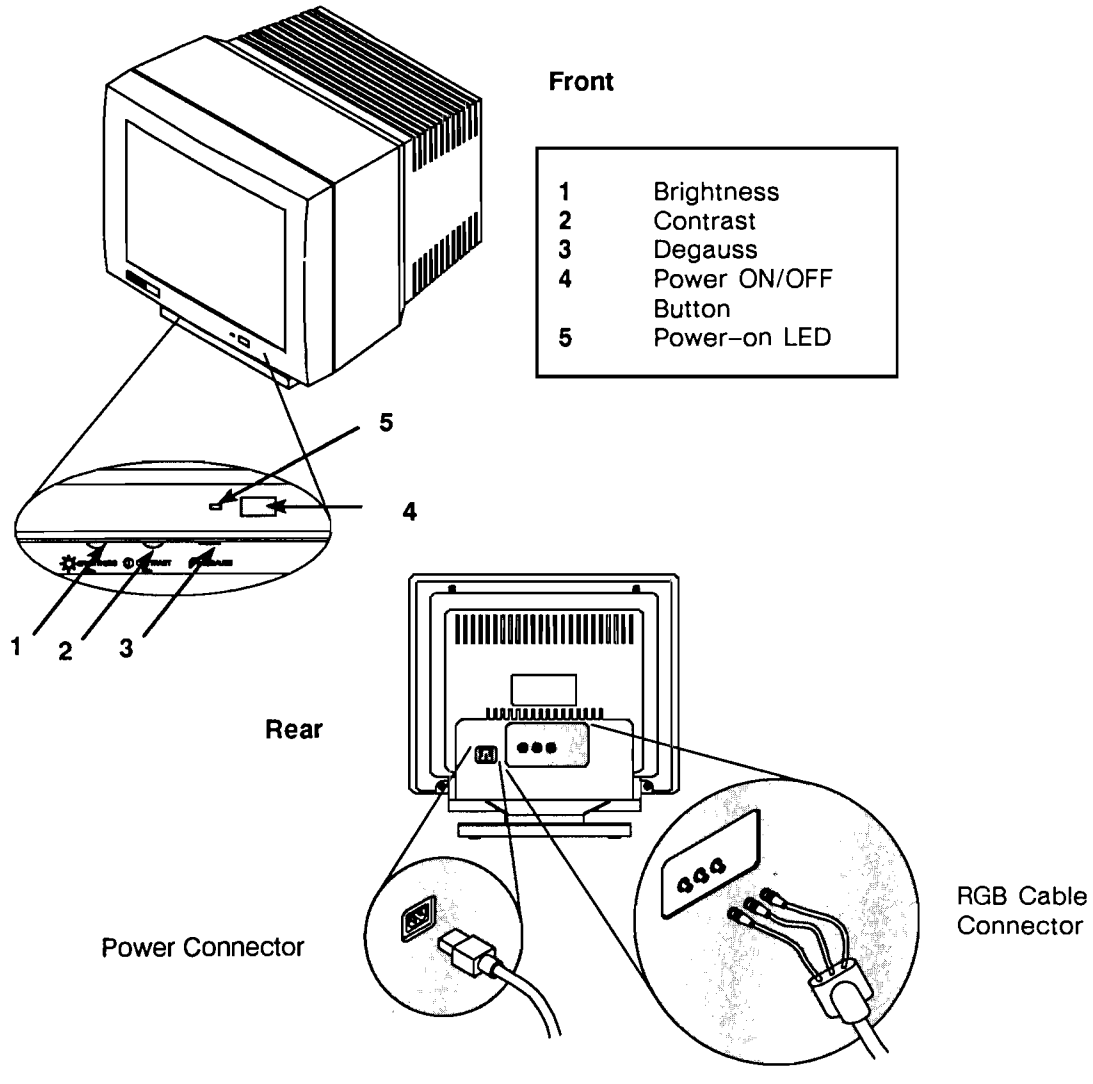


Figure 1–13. 16–Inch Color Monitor (Model A1497A/A1497B)

What to Read Next

After familiarizing yourself with your workstation's controls, indicators, and connectors you are ready to start up the workstation.

If your workstation has an internal Winchester disk drive, go to Chapter 2 for instructions on how to start up the system.

If your workstation does not have an internal Winchester disk drive (that is, it is diskless), go to Chapter 3 for instructions on how to start up the system.

Chapter 2
Starting Up the Disked Workstation

This chapter describes how to start up a Model 425e workstation (with one or more internal disk drives) running Domain/OS. It includes the following information:

- Starting up (including information about Normal mode and setting the sytem's calendar)
- Logging in
- Logging out
- Shutting down

NOTICE: Before starting up your workstation, make sure that it has been installed according to the instructions in the *HP Apollo 9000 Series 400 Model 425e Domain/OS Installation Guide* that you received with your system.

Starting Up

Use the procedures in this chapter to start up a workstation that contains a Winchester disk drive. In order to start up a workstation with Domain/OS, your system must include a Domain keyboard.

You can start up (boot) your system in either Normal or Service mode. You use Normal mode for everyday computing activities. Normal mode is the default mode when you power up the system. Chapter 10 describes starting up in Service mode to troubleshoot or reconfigure the workstation.

Starting Up in Normal Mode

1. Power on the monitor and the system unit.

   The workstation now runs a series of internal self tests. The workstation LEDs display the number of each test as the workstation performs it, and the monitor lists the hardware that the workstation finds as it is tested. These tests, stored on the CPU board and on the Winchester disk, check the functionality of each major workstation subsystem.

2. Following the internal tests, the workstation starts up the operating system. When the operating system is loaded, you will see the "login:" prompt.

   If you receive the "login:" prompt, go directly to Step 7.

   If you receive a message concerning the system's calendar, go to Step 3 and run the **calendar** program.

   If you receive an error message, check for possible solutions in Table 7–5.

Running the Calendar Program

3. If you receive one of the messages shown in Figure 2–1, you need to set the system's calendar. Respond to either of these screen prompts as shown in Figure 2–1.

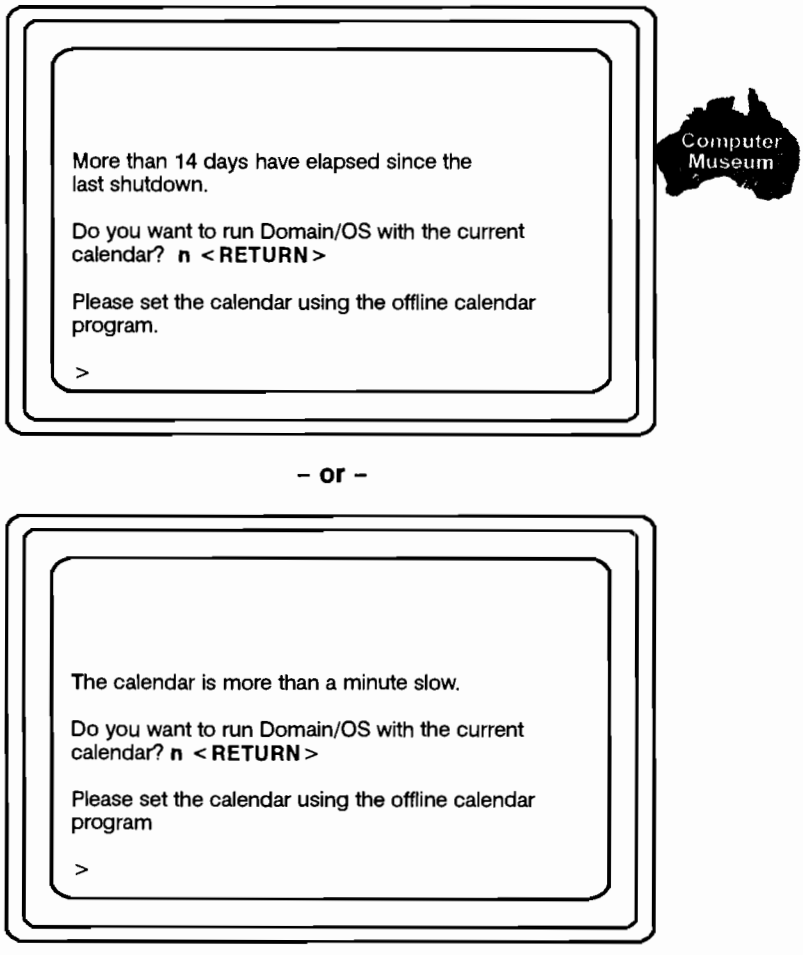


Figure 2–1. Running the ***calendar*** *Program*

4. Use the commands shown in Figure 2–2 to start the **calendar** program.

5. Your screen now displays the SCSI disk controller and unit numbers and a series of prompts. Answer the question about disk type as shown in Figure 2–3. Press <**RETURN**> after answering each question.

   Note that when running **calendar** and other utility programs, you must enter the disk type (**w** = Winchester), controller number, and unit number. The controller and unit numbers are separated by a colon (**:**). In the Series 400 workstations, a single Winchester system disk is designated as controller number **6**, unit number **0**. This designation is shown in Figure 2–3.

   If you need to run **calendar** at a later time, you can do so by shutting down the system and repeating this procedure. Follow the instructions in this "Shutting Down" section and "Running the Calendar Program" section, later in this chapter.

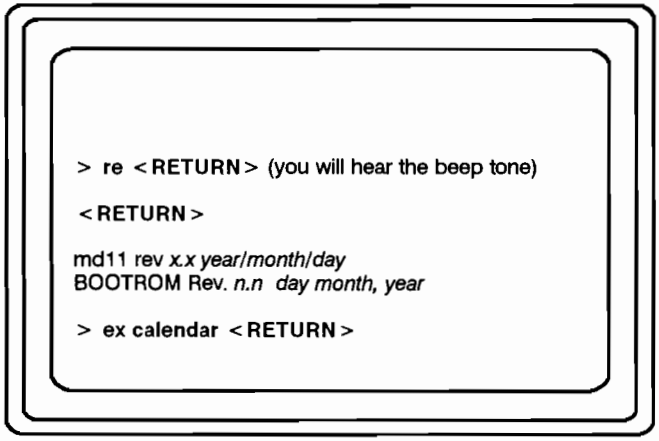


*Figure 2–2. Starting the **calendar** Program*

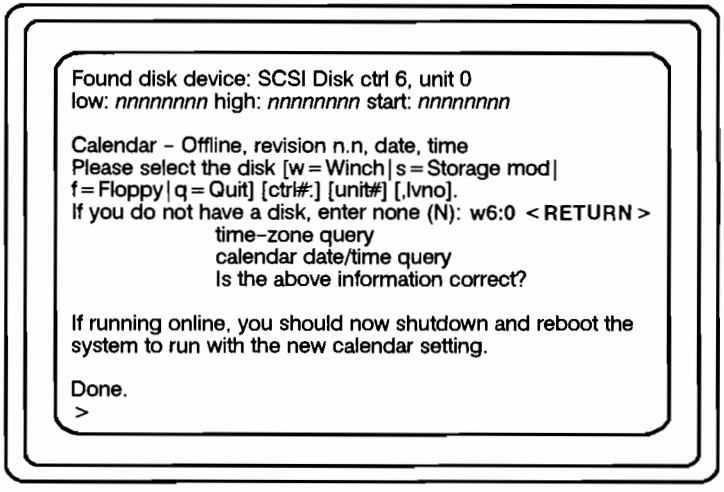


Figure 2–3. Specifying the Disk Type

6. When "Done." appears on your screen, type the command shown in Figure 2–4 to start up the system software.

At initial system startup, this command starts up the Hardware Acceptance Program (HAP) software. Once you load Domain/OS software, typing the command shown in Figure 2–4 executes (boots) Domain/OS.

NOTICE: If the following message appears in the DM output window (the lower-left corner of this screen), ignore it:

(CMDF) user_data/startup_dm.1280color name not found
from (stream manager / IOS

When the system starts up successfully, LED "D" on the system unit's front panel flashes continuously. If the software does not load, check for possible solutions in Table 7–5.

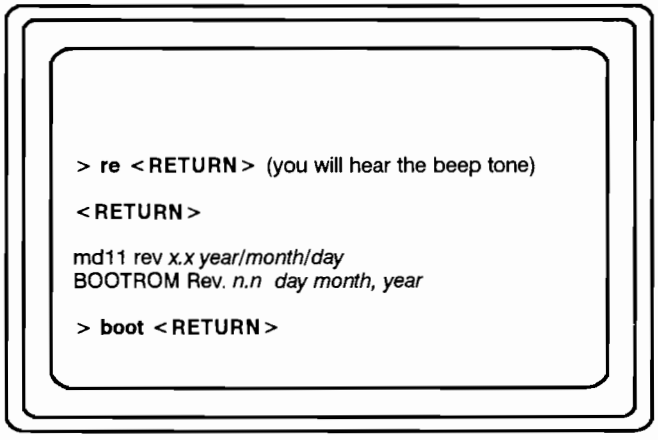


Figure 2–4. Loading Domain/OS

Logging In

7. Log in (type your username) as shown in Figure 2–5. If you don't have a username account yet, you may log in as **user**. If you log in as **user**, press <**RETURN**> at the "Password:" prompt.

   When you log in as **user**, the operating system sets the working directory to the entry directory on the workstation. Ask your system administrator to assign you a personal username account. When you log in with your own log–in name, the operating system sets the working directory to your home directory.

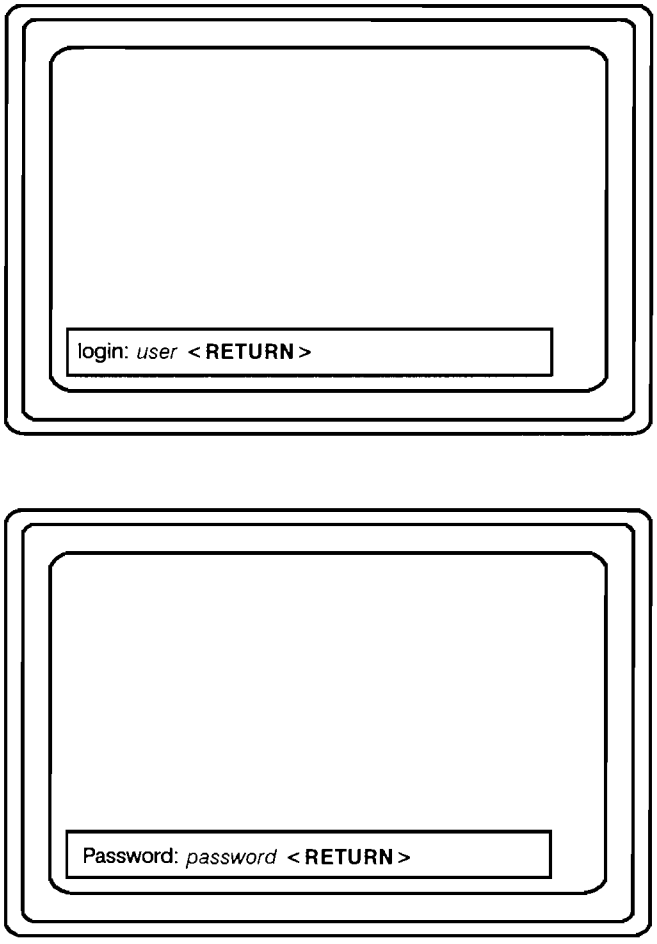


Figure 2–5. Logging In

8. Your screen comes up with a blank process window as shown in Figure 2–6. You see only one system prompt, although Figure 2–6 and other process windows in this book show three prompts (and command lines) to indicate the three different environments of Domain/OS.

If you have already loaded your system software, you are now ready to work on your system. Go to the "Logging Out" section, later in this chapter, if you want to log out, or refer to the *Getting Started with Domain/OS* manual if you need assistance to continue working. See the Preface of this guide for a complete list of related manuals and order numbers. Refer to the appropriate *Using Your Environment* manual for information about using directories and files.

If you have not loaded your system software yet, go to Step 9.

9. At initial system startup, the HAP banner instructs you to load the operating system software (Domain/OS), using the procedures in the *Software Release Document* that you received with your system software.

NOTICE: If you have multiple disks in your system, and intend to set them up as striped volumes, do not load your system software. Go to the Chapter 6, "Using the Multidisk Option", before loading your system software.

If you do not have multiple disk drives, or if you have them and do not intend to set them up as striped, load your system software now, using the procedures in the *Software Release Document* that you received with your system software. When you have finished the procedures in the *Software Release Document*, return to "Starting Up" at the beginning of this chapter to start up your system.

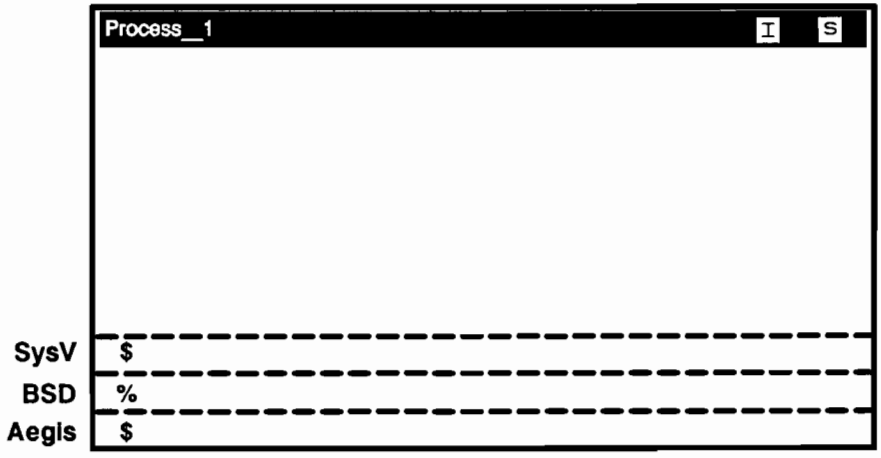


Figure 2–6. Process Window Showing Default Shell Prompts

NOTICE: You see one of the prompts, depending on which shell you use.

Logging Out

When you are done working on your system, you may want to log out. Logging out prevents anyone else from working under your username account.

To log out, press **<CMD>** and type **lo** as shown in Figure 2–7.

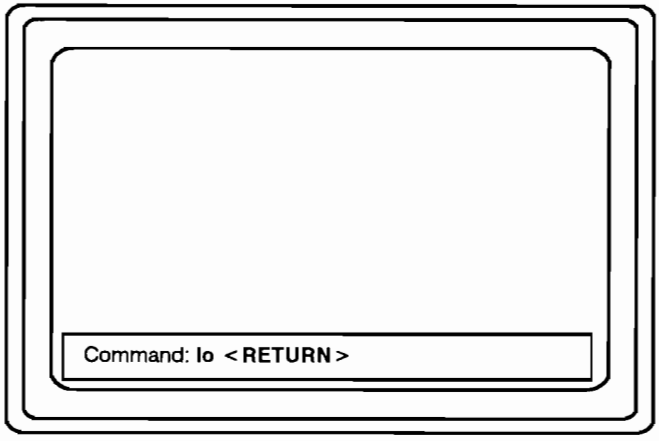


Figure 2–7. Logging Out

Shutting Down

You shut down your workstation if you need to remove power from your system (for example, to install additional memory). Use the following steps to avoid damaging the Winchester disk.

NOTICE: When shutting down the system, remove all media from the system's floppy disk or CD–ROM drive. (See Chapter 4 for floppy disk and/or Chapter 5 for CD–ROM media removal instructions.)

1. Log out of the system by pressing **<CMD>** and entering the **lo** command as shown in Figure 2–7.

2. Stop all processes by pressing **<CMD>** and entering the **shut** command at the "login" prompt as shown in Figure 2–8.

   If you are not currently logged onto your system, you may type **shut** and press **<RETURN>** at the "login:" prompt to shut down the system.

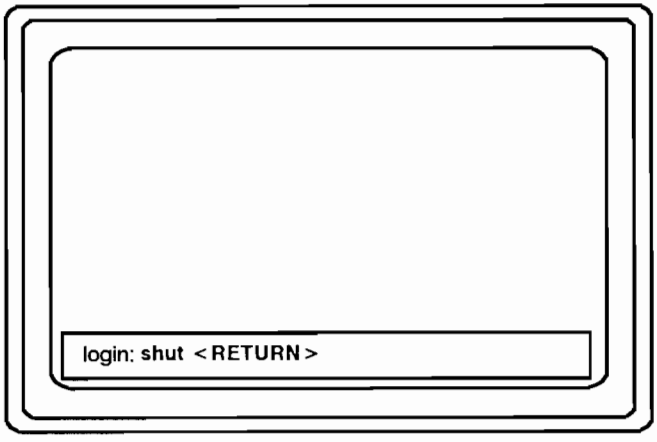


Figure 2–8. Shutting Down

3. When you see the "shutdown successful" message shown in Figure 2–9, shut off both the monitor and the system unit power switches.

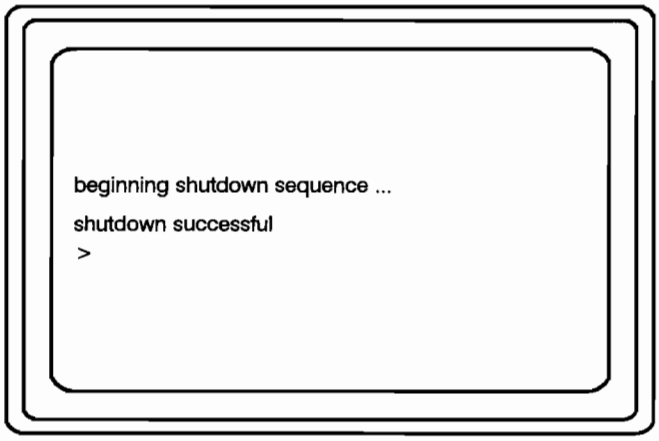


Figure 2–9. Successful Shutdown Sequence

Chapter 3
Starting Up a Diskless Workstation

This chapter describes how to start up your diskless workstation. It includes the following information:

- Starting up (including information about Normal mode and setting up the system's calendar)
- Logging in
- Logging out
- Shutting down

NOTICE: Before starting up your workstation, make sure that it has been installed according to the *HP Apollo 9000 Series 400 Model 425e Domain/OS Installation Guide* that you received with your system.

Starting Up

Use the procedures in this chapter to start up and use a diskless Model 425e workstation with Domain/OS. You must have a Domain keyboard with your system in order to start up the workstation with Domain/OS.

You can start up (boot) your workstation in either Normal or Service mode. You use Normal mode for everyday computing activities. Normal mode is the default when you power up the system. Chapter 10 describes starting up in Service mode to troubleshoot or reconfigure the workstation.

If you're starting up a diskless workstation in Normal mode, it must be linked to a **partner** system that is equipped with a Winchester disk. Your workstation will run its operating software from the partner's disk. At power-on, your workstation automatically looks for a **network partner** system that is equipped with a Winchester disk.

Make sure the partner meets the following conditions:

- It is on the same network.
- It is running the **netman** program.
- It is running the minimum Software Release (SR) level. (See the *Release Document(s)* you received with your workstation for minimum SR level.)
- It Contains the appropriate **/sau*nn*** subdirectory of the node entry directory.

  For Model 425e, the partner node must contain the **/sau11** subdirectory of the node entry directory.

- It Has your workstation's ID (node ID) listed in its **/sys/net/diskless_list** file.

NOTICE: If your diskless workstation is not listed in the **/sys/net/diskless_list** file, edit the file and add your workstation's ID to the list.

See the *Getting Started with Domain/OS* manual if you need assistance.

Starting Up in Normal Mode

1. Power on the monitor and the system unit.

   The workstation now runs a series of internal self tests.

   The workstation now runs a series of internal self tests. The workstation LEDs display the number of each test as the workstation performs it, and the monitor lists the hardware that the workstation finds as it is tested. These tests, stored on the CPU board and on the Winchester disk, check the functionality of each major workstation subsystem.

2. Following the internal tests, the workstation starts up the operating system. When the operating system is loaded, you see the "login:" prompt.

   If you receive the "login:" prompt, go directly to Step 7.

   If you receive a message concerning the workstation's calendar, go to Step 3 and run the **calendar** program.

   If you receive an error message, check for possible solutions in Table 7-6.

Running the Calendar Program

3. If you receive one of the messages shown in Figure 3–1, you need to set the system's calendar. Respond to either of these screen prompts as shown in Figure 3–1.

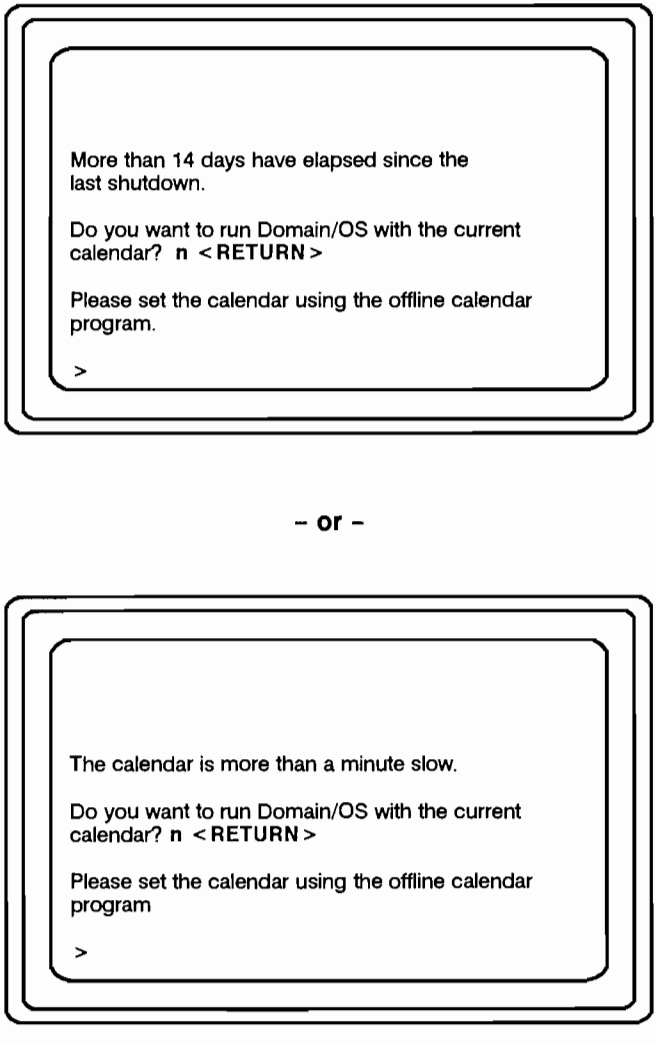


*Figure 3–1. Running the **calendar** Program*

4. Use the commands shown in Figure 3–2 to start the **calendar** program.

5. Your screen now displays a series of prompts. Answer the disk question as shown in Figure 3–3. Press <**RETURN**> after answering each question.

   If you need to run **calendar** at a later time, you can do so by shutting down the system and repeating this procedure. Follow the instructions in this "Shutting Down" section and "Running the Calendar Program" section, later in this chapter.

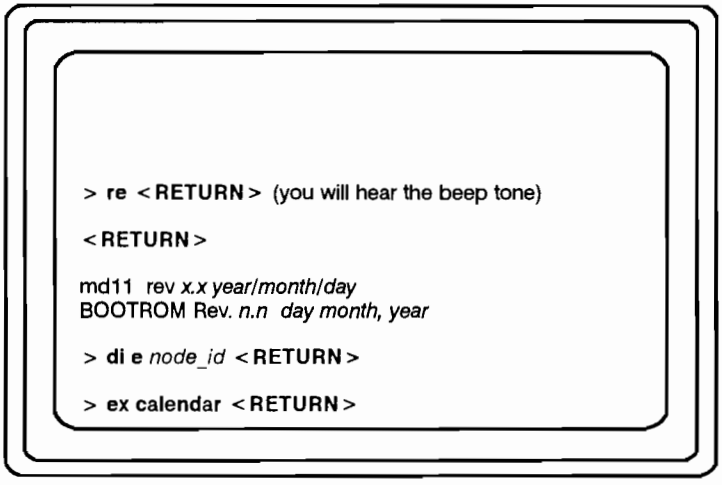


Figure 3–2. Starting the ***calendar*** *Program*

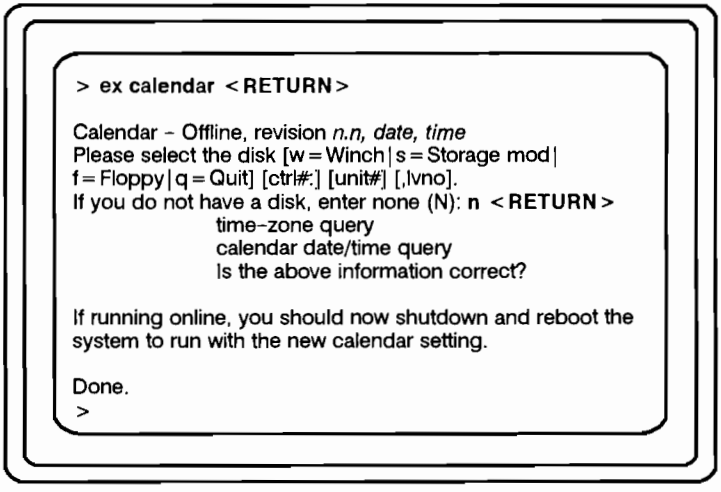


Figure 3–3. Specifying the Disk Type

6. When "Done." appears on your screen, type the command shown in Figure 3–4 to start up Domain/OS software from its network partner.

As the diskless workstation boots from its partner, you see screen messages similar to those in Figure 3–5.

NOTICE: If the following message appears in the DM output window (the lower–left corner of this screen), ignore it:

(CMDF) user_data/startup_dm.1280color name not found from (stream manager / IOS

When the workstation starts up successfully, LED "D" on the system unit's front panel flashes continuously. If the software does not load, check for possible solutions in Table 7–6.

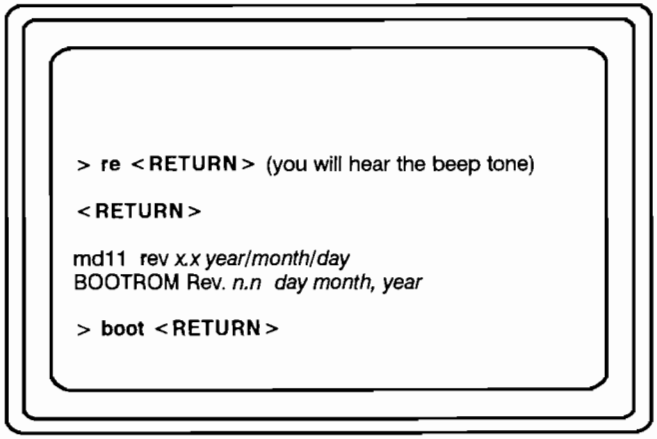


Figure 3–4. Loading Domain/OS

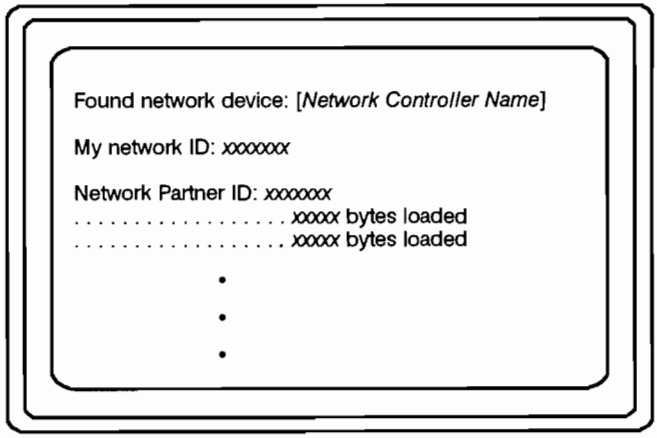


Figure 3–5. Booting from the Partner Node

Logging In

7. Log in (type your username) as shown in Figure 3–6. If you don't have a username account yet, you may log in as **user**. If you log in as **user**, press <RETURN> at the "Password:" prompt.

   When you log in as **user**, the operating system sets the working directory to the entry directory on the disked partner workstation. Ask your system administrator to assign you a personal username account. When you log in with your own log–in name, the operating system sets the working directory to your home directory.

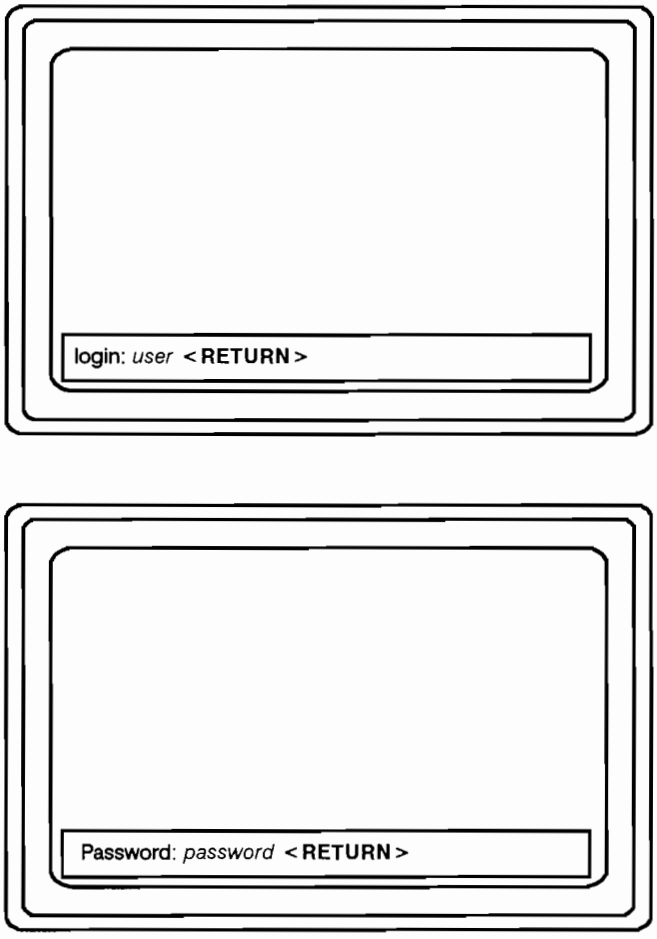


Figure 3–6. Logging In

8. Your screen comes up with a blank process window as shown in Figure 3–7.

You may now use the workstation. See the manual entitled *Getting Started with Domain/OS* for more information.

See the Preface of this guide for a list of related manuals and order numbers. Refer to the appropriate *Using Your Environment* manual for information about using directories and files.

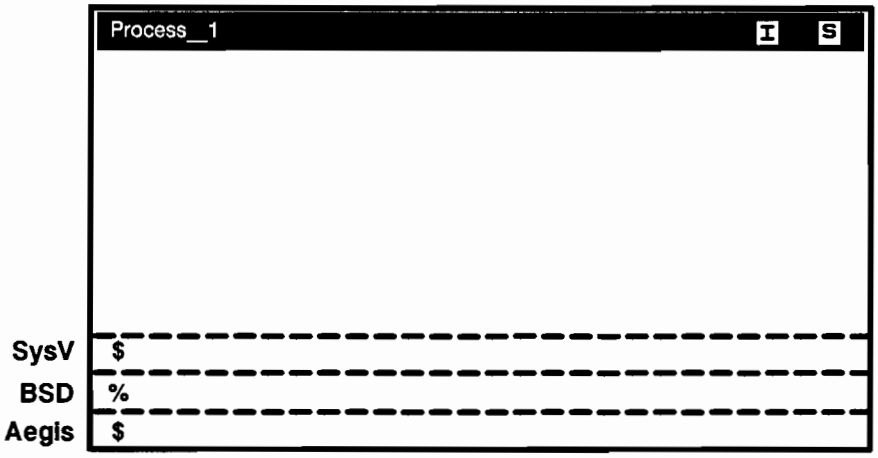


Figure 3–7. Process Window Showing Default Shell Prompts

NOTICE: You see one of these prompts, depending on which shell you use.

Logging Out

When you are done working on your system, you may want to log out. Logging out prevents anyone else from working under your username account.

To log out, press **<CMD>** and type **lo** as shown in Figure 3–8.

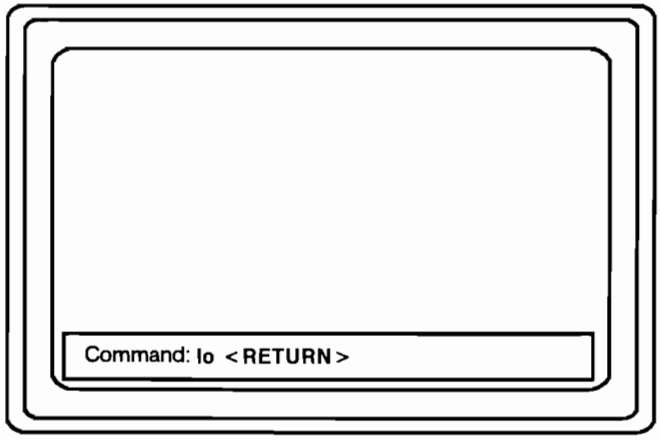


Figure 3–8. Logging Out

Shutting Down

Shutting down your workstation is nearly the reverse of the start-up procedure. You only need to shut down your workstation if you need to remove power from your system.

1. Log out of the system by pressing **<CMD>** and enting the **lo** command as shown in Figure 3-8.

2. To stop all processes, enter the **shut** command as shown in Figure 3-9.

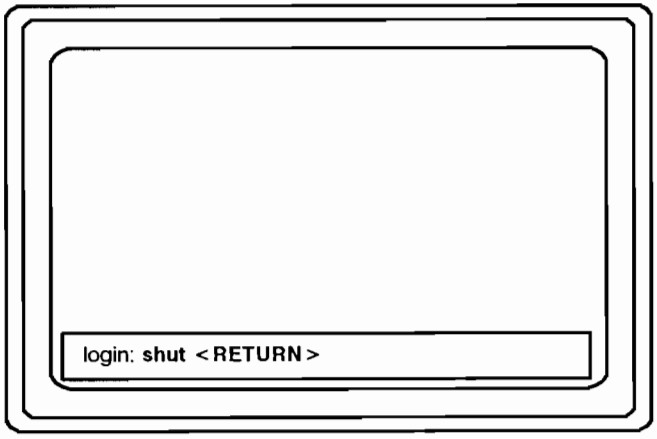


Figure 3-9. Shutting Down

3. When you see the "shutdown successful"message shown in Figure 3–10, shut off both the monitor and the system unit power switches.

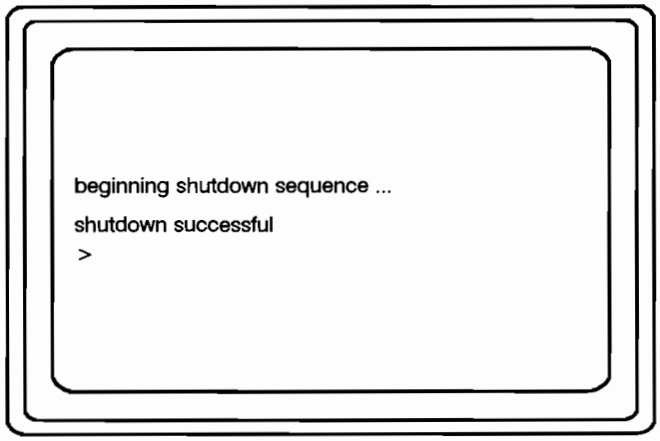


Figure 3–10. Successful Shutdown Sequence

Chapter 4
Using the Floppy Disk Drive

This chapter tells you how to use the diskette drive by describing the following:

- Handling diskettes
- Inserting diskettes
- Initializing diskettes
- Mounting diskettes
- Dismounting and removing diskettes

Handling Diskettes

To perform reliably, diskettes require special care. Since improper handling can destroy information stored on the diskette, please consider the following instructions as you use your diskette drive.

- When you're not using a diskette, store it in its envelope.
- Use only soft–tip pens to write on diskette labels. Never use pencils or ballpoint pens.
- Never bend or fold a diskette.
- Keep diskettes away from magnetic fields. Telephones, electronic calculators, and paper clips are common magnetic sources.
- Don't expose diskettes to dust or extreme temperatures. Avoid placing them in direct sunlight.
- Never clean a diskette.
- Always switch on the power before inserting a diskette into the drive.
- Never leave a diskette in the drive when the power is switched off.

NOTICE: Use only 3 1/2–inch, high–capacity, double–sided, double–track (96–tpi) diskettes in the diskette drive. You can purchase these diskettes from vendors such as Maxell and Dysan.

Inserting Diskettes

Always power on the system before inserting a diskette in its diskette drive.

1. Take the diskette out of the envelope.

2. You can only store or change information on a diskette when the write-enable notch is exposed. So, before performing a write (store) operation, make sure that the notch is exposed (remove the paper tab that covers the notch) as shown in Figure 4–1. (To write-protect the data, place the paper tab over the write-enable notch.)

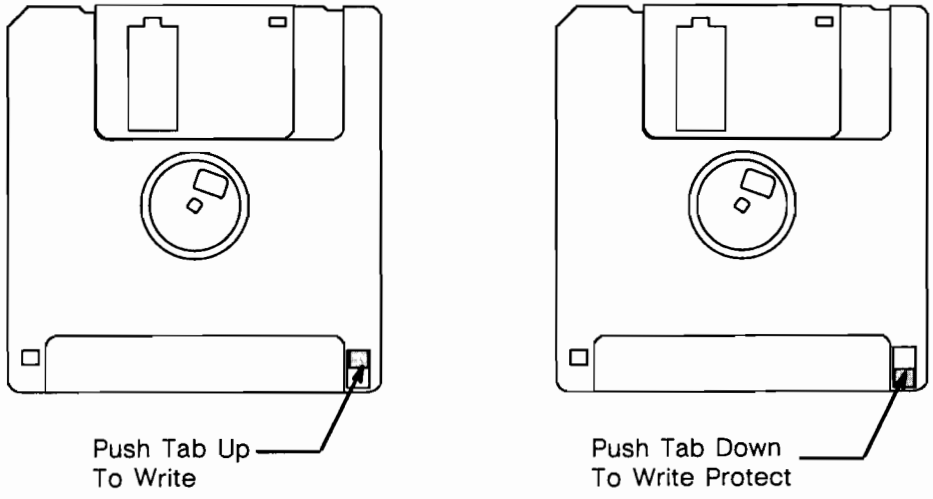


Figure 4–1. Setting the Floppy Diskette Write/Write-Protect Tab

3. Insert the diskette into the drive as shown in Figure 4–2.

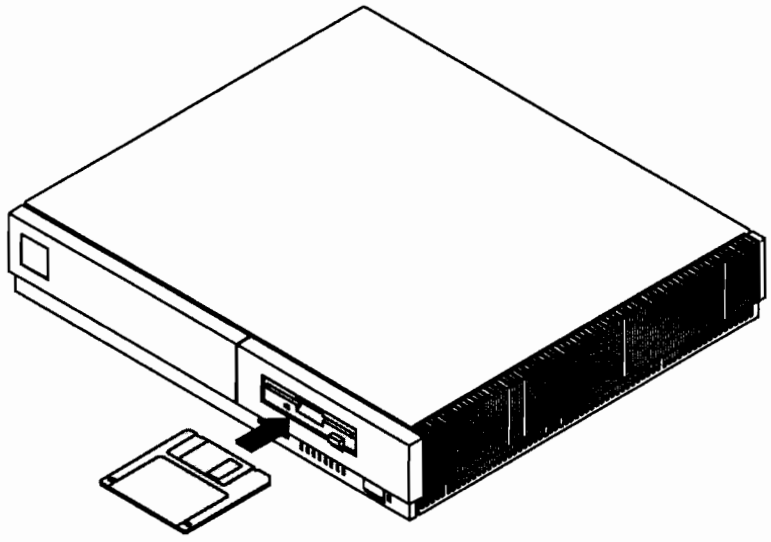


Figure 4–2. Inserting the Floppy Disk into the Disk Drive

The diskette drive has an in-use light that comes on when the diskette drive is in use as shown in Figure 4-3.

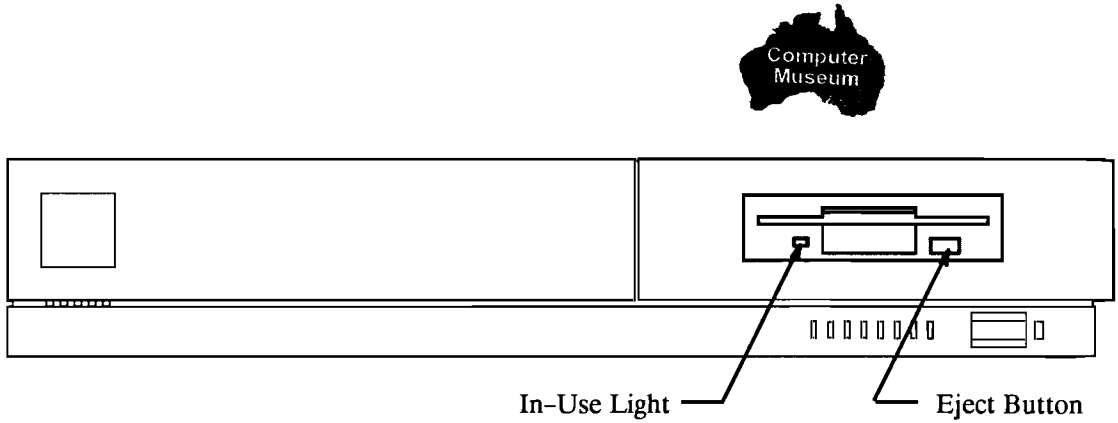


Figure 4-3. Floppy Diskette Drive In-Use Light

Initializing Diskettes

4. The first time that you use a new diskette, you must **initialize** it before you can write files to it. If your diskette has already been initialized, go to Step 9.

If you're not sure that a diskette has been initialized, try to mount it as described in Step 9. If you're unable to mount it, return to this step.Although a system can have up to seven Winchester and magneto–optical disk drives, there is a limit of five mounted disk volumes per system at any one time.

To initialize a diskette, log in and then type the **invol** command as shown in Figure 4–4:

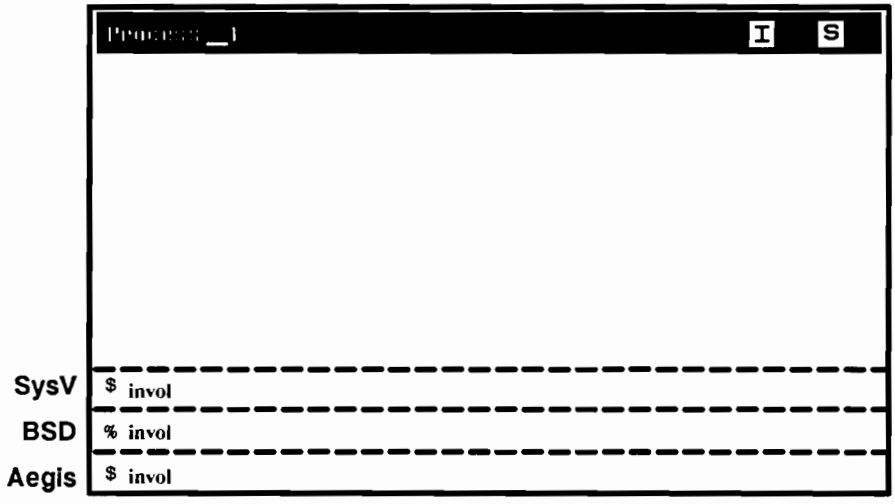


Figure 4–4. Initializing Diskettes Using the ***invol*** *Command*

5. The **invol** command runs a program that prompts you for information. Respond to the prompts as shown in Figure 4–5:

```
Prompt: _I                                                    I   S

invol (initialize_volume), revision xx mm/dd/yy
Options are:

 1 - initialize virgin physical volume.
 2 - initialize partial physical volume, preserving existing logical
     volumes.
 3 - re-initialize an existing logical volume.
 4 - delete a logical volume.
 5 - list logical volumes.
 6 - list badspots on volume.
 7 - input and record badspot information.
 8 - create or modify an os paging file on an existing logical
     volume.
 9 - add to existing badspot list.
10 - display/change sector interleave factor for a logical volume.
11 - pre-SR10: initialize virgin physical volume.
12 - pre-SR10: initialize partial physical volume, preserving
     existing logical volumes.

Option:  1
```

*Figure 4–5. Sample **invol** Response*

6. Continue responding to the prompts as shown in Figure 4–6:

```
$ invol _1                                                    I   S

Controller type
(W = Winchester, S = Storage module, F = Floppy):       f

Verification options are:
        1 - no verification
        2 - write all blocks on the volume
        3 - write and re-read all blocks on the volume
        Enter verification option:      3




Expected average file size, in blocks,
(CR for default, 5 blocks):     <RETURN>
```

Figure 4–6. Sample ***invol*** *Verification Response*

7. Continue responding to the prompts as shown in Figure 4–7:

```
Process _1                                          I    S

For each logical volume to be formatted, enter the
logical volume size, followed by the name, in the form
"size, name". Up to 10 volumes may be specified.
Terminate input with a blank line.
There are 1231 blocks available.
Volume 1:      1231

Enter badspots between physical disk addresses 1 and 4CF,
one per line. Badspots must be input in (hex) physical
disk address form. Terminate badspot entry with a blank
line. -q will abort the run.
: <RETURN>

Is the badspot information you entered correct?          y
```

Figure 4–7. Sample ***invol*** *Badspot Response*

8. Continue responding to the prompts as shown in Figure 4–8:

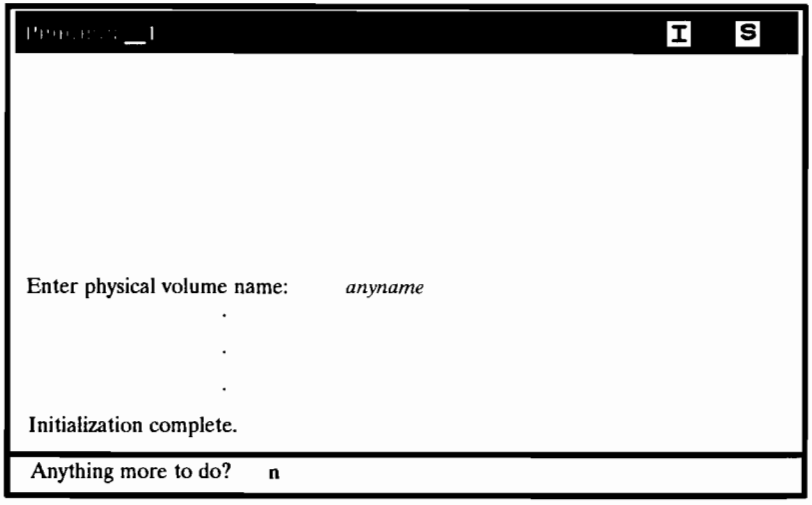


*Figure 4–8. Sample **invol** Physical Volume Response*

NOTICE: The initialization takes approximately 5 minutes.

Mounting Diskettes

9. Now mount the diskette by entering the mount volume command as shown in Figure 4–9. This command makes the storage areas in the logical volume available to the operating system.

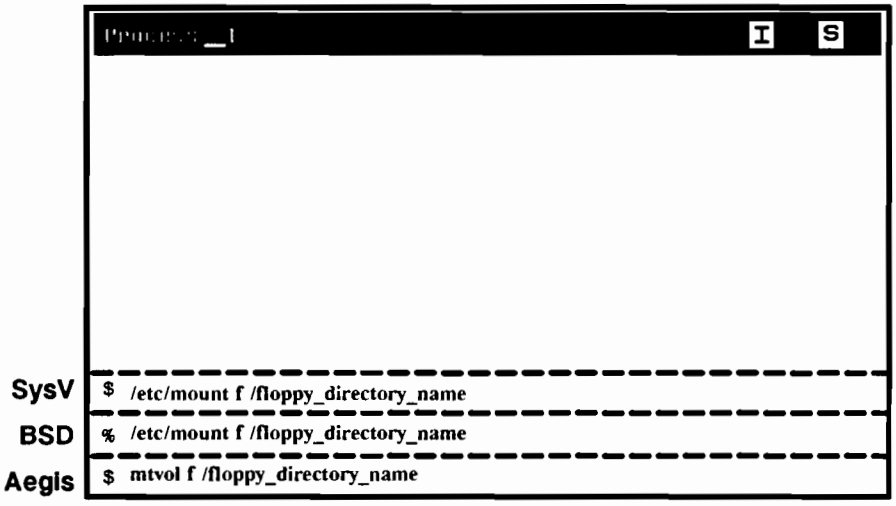


Figure 4–9. Mounting Diskettes

The **f** option specifies that you're mounting a floppy diskette. The **/floppy_directory_name** becomes the top–level directory name for the files stored on your diskette.

NOTICE: If your diskette is not initialized, you receive the message "Unable to mount volume, bad disk format." If this happens, go back to Step 5.

10. Set your working directory to the floppy directory as shown in Figure 4–10.

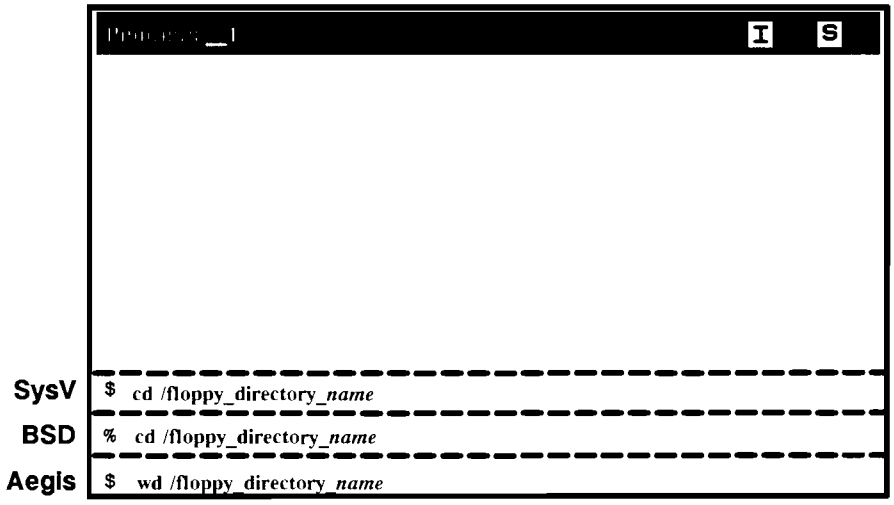


Figure 4–10. Setting Your Working Directory

You can now create directories and files on the floppy, list directories, copy to and from the floppy, and perform any other operations that you normally do with directories and files.

Dismounting and Removing Diskettes

When you've finished using a diskette, you must dismount it. Dismounting makes the storage areas in the logical volume inaccessible to the operating system.

NOTICE: You must dismount the diskette before removing it from the drive. Otherwise, you may lose the information stored on it.

1. Change your working directory to another directory that is not on the mounted file system.

2. To dismount the diskette, enter the following command as shown in Figure4–11:

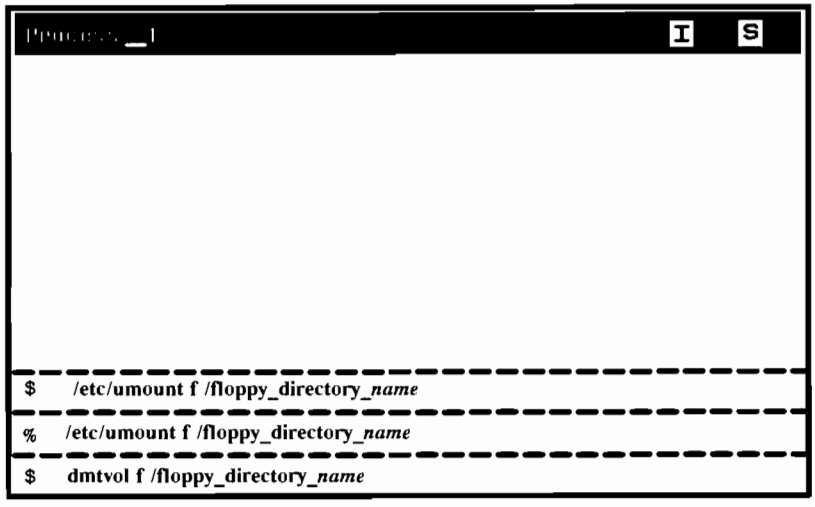


Figure 4–11. Dismounting Diskettes

3. When the prompt reappears, press the pushbutton to release the diskette from the drive.

NOTICE: Do **not** remove a diskette from the drive until the screen prompt reappears. Doing so can damage the diskette surface.

4. Using a soft-tip pen, write the **floppy_directory**_*name* on the diskette label. To access files stored on this diskette the next time, mount the diskette (as explained in Step 9 of the "Mounting Diskettes"section, earlier in this chapter) and set your working directory to /**floppy_directory**_*name*.

NOTICE: Never use a hard-tip pen or pencil to label a diskette. Doing so can permanently damage the diskette, preventing you from writing to or reading from it.

5. If you want to write-protect your diskette (protect the files on the diskette from changes or additions), cover the write-enable notch with a write-protect tab as shown in Figure 4-1.

When the write-enable notch is covered, you can *read* the files stored on the diskette, but you *cannot change* the files on it.

6. Store the diskette in its envelope.

Chapter 5
Using the CD-ROM Drive

This chapter tells you how to use the CD-ROM drive by describing the following:

- Configuring Domain/OS to communicate with the CD-ROM drive
- Handling the CD-ROM disk
- Inserting and ejecting the CD-ROM disk caddy
- Mounting and dismounting a CD-ROM disk
- Reading the drive's busy light

NOTICE: Domain/OS systems can only boot SR10.4 and later operating systems from a CD-ROM disk.

Configuring the Operating System To Communicate with the CD-ROM Drive

This section describes how to configure Domain/OS to communicate with the CD-ROM drive.

To enable a Domain/OS system to use a CD-ROM drive, you must create a device file for the drive. We recommend that you use a specific device file name according to the number of CD-ROM drives connected to your system. Table 5-1 lists these recommended names.

Table 5-1. Device File Naming Convention

Number of the CD-ROM Drive on the SCSI Bus	Device File Name
First Drive	**cdrom**
Second Drive	**cdrom_1**
Third Drive	**cdrom_2**
Fourth Drive	**cdrom_3**
Fifth Drive	**cdrom_4**
Sixth Drive	**cdrom_5**

NOTICE: The device file exists in the **/dev** directory as a matter of convention (for example, **/dev/cdrom**)

Perform the following steps to configure Domain/OS to communicate with the CD-ROM drive.

NOTICE: You must be logged in as a superuser (root) to perform these following steps.

1. Use the **mkdevno** command to create an entry in the device number table for CD–ROM drives, as shown in Figure 5–1:

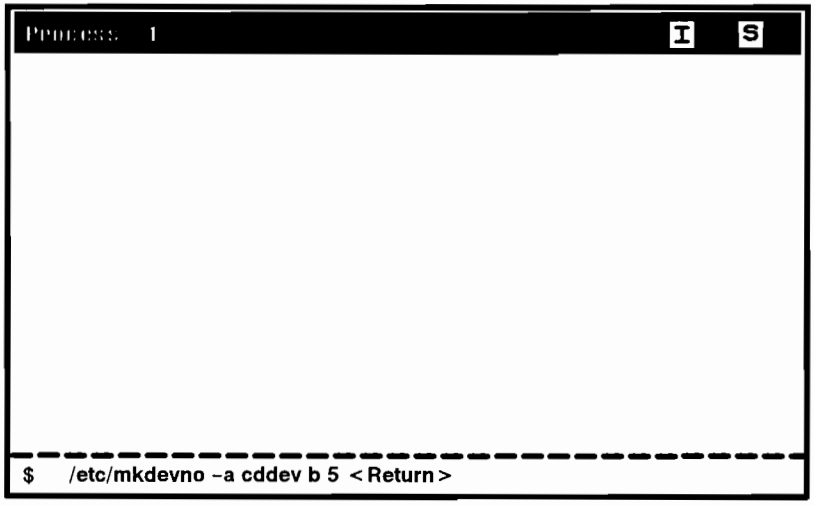


Figure 5–1. ***mkdevno*** *Command*

2. Use the **mknod** command to create a device file for the drive as shown in Figure 5–2:

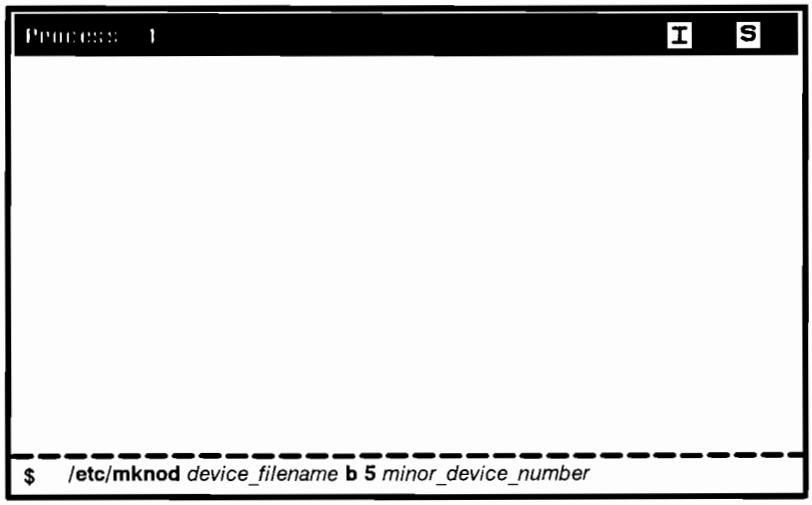


*Figure 5–2. **mknod** Command*

where

device_filename is the name of the device file (for example, **/dev/cdrom**).

minor_device_number specifies the following information:

- The system's SCSI controller number (always **0** for SR10.3 systems)
- The CD–ROM drive's target SCSI address that you selected with the drive's address switches

To find the *minor_device_number,* refer to Table 5–2 . For example, for a system with a CD–ROM **drive target address** = 3, the *minor_device_number* = 384.

Table 5–2. minor_device_numbers

Drive Target Address	minor_device_number
0	0
1	128
2	256
3	384
4	64
5	192
6	320

3. Make sure that the **llbd** and **cdfsd** files exist in the **/etc/daemons** directory by entering the following command as shown in Figure 5–3:

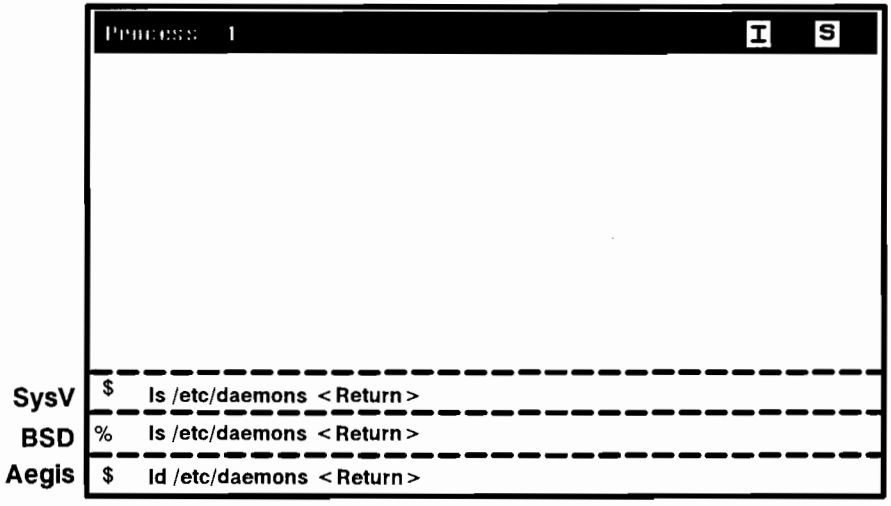


*Figure 5–3. Checking the /**etc/daemans** Directory*

If the files don't exist, create them, as shown in Figure 5–4. In the following example, *filename* is **llbd** or **cdfsd**.

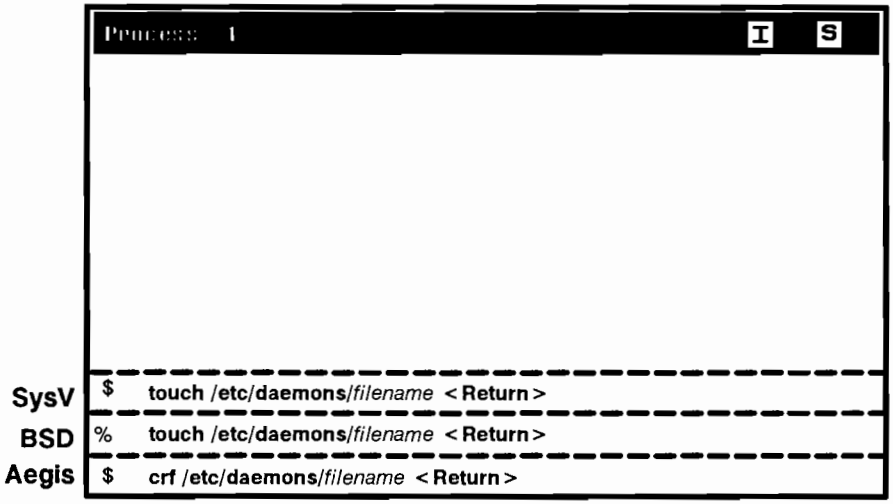


*Figure 5–4. Creating the **llbd** and **cdfsd** files*

4. To initialize the daemons, shut down and reboot your system. First log out of your system. Then shut down your system as shown in Figure 5-5:

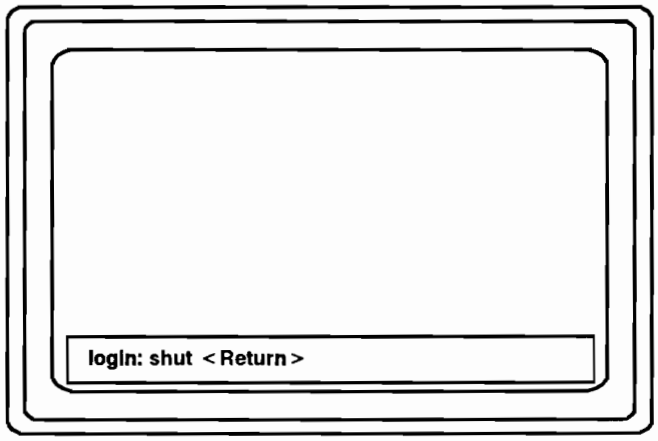


Figure 5-5. Shutting Down

Type the following commands to reboot your system as shown in FIgure 5-6:

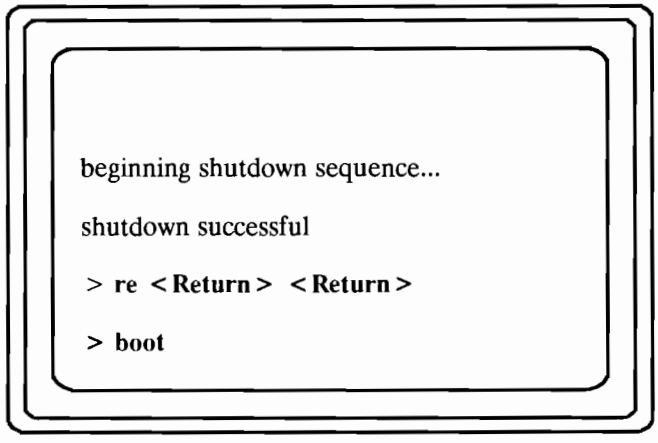


Figure 5-6. Booting System Software

CD-ROM Drive and Media Descriptions

The CD-ROM drive is an internal random access read-only mass storage device that uses removable CD-ROM disks. The drive contains a semiconductor laser for reading data optically, and includes an embedded controller with a SCSI interface.

The CD-ROM drive supports the ISO 9660 and High Sierra format standards. The CD-ROM is a drive is read-only drive; you cannot write to the drive.

CD-ROM disks are identical to audio compact disks (CDs), except that they store computer data. CD-ROM disks are 120mm (4.7 in.) in diameter, and use one data surface with a capacity of 599 megabytes. The data surface contains pits and flat spots arranged in a continuous spiral track, which is read at a constant speed.

A CD-ROM disk mounts into a rigid plastic caddy (part number C2293-80001), similar to a 3.5-inch floppy disk (see Figure 5-7). The drive accesses data on the CD-ROM disk through a shutter in the bottom of the caddy. When you insert the disk caddy into the drive, the shutter opens automatically to expose the disk surface. When you eject the disk caddy from the drive, the shutter closes to protect the disk surface.

NOTICE: CD-ROM drives are only compatible with a part number C2293-80001 disk caddy. You cannot use a disk caddy from other HP devices.

CAUTION: Do not open the shutter manually, as this exposes the disk surface to dust. Over time, dust reduces the reliability of the read head in the CD-ROM drive.

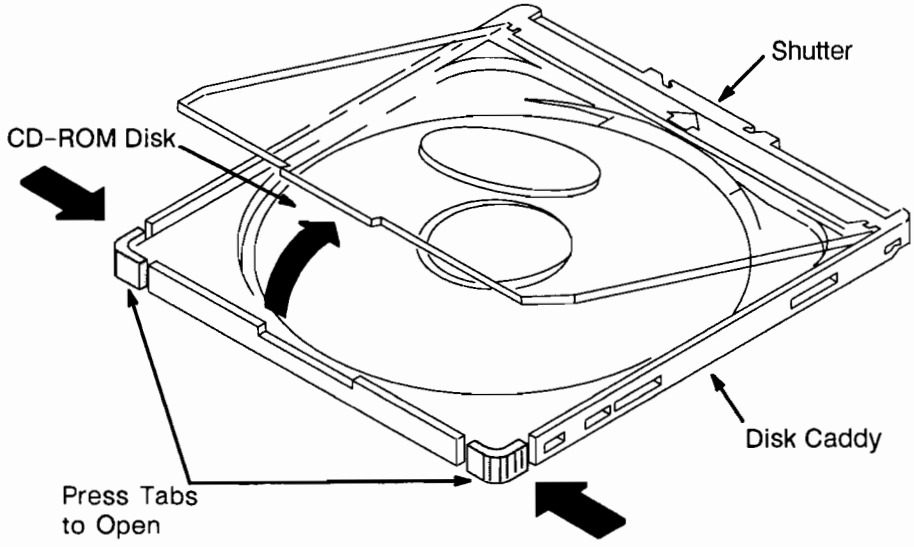


Figure 5–7. CD-ROM Disk and Disk Caddy

Inserting CD-ROM Disks into the Disk Caddy

Refer to Figure 5-7 as you perform the following steps to install a CD-ROM disk into a caddy:

1. Press the tabs on the outside edges of the CD-ROM caddy inward and open the top cover of the caddy.

2. Center the CD-ROM disk on the tray in the disk caddy, label side up.

3. Push the cover of the caddy down to close it.

Caring for CD–ROM Disks

Observe the following guidelines to help prevent data loss and prolong the life of your CD–ROM disks and drive:

- Use CD–ROM disks in a clean environment to prevent dust particles from scratching disk surfaces.
- Store CD–ROM disks in a cool, dry place to prevent moisture and heat damage.
- Don't try to clean the surface of a CD–ROM disk, as some cleaning solvents may damage the disk.

Features of the CD-ROM Drive

Figure 5–8 and Table 5–3 describe the operating controls and features of the CD-ROM drive.

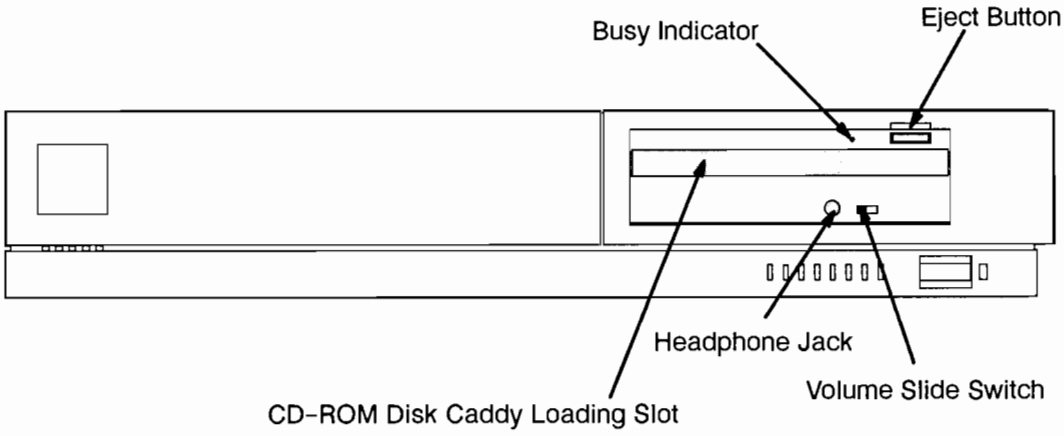


Figure 5–8. CD-ROM Drive Controls and Features

Table 5–3. CD–ROM Drive Operating Controls and Features

Control/Feature	Purpose
Busy Indicator	The Busy Indicator lights during a data access operation and blinks during a data transfer. The indicator blinks initially and then stays lit during the following conditions: • A defective disk • A disk insertion error (for example, an upside–down disk) • No disk present
Eject Button	Press the Eject Button to eject the disk caddy. When the drive is in use, pressing the eject button does not eject the caddy unless you press it for more than one second.
CD–ROM Disk Caddy Loading Slot	Slot for inserting the disk caddy. If you eject the disk caddy and want to reinsert it, you must pull the caddy out more than 5 mm (0.2 in.) from the ejected position before reinserting it. The slot does not accept a disk caddy if the drive's power is off.
Headphone Jack	The Headphone Jack is a 3.5 DIA miniature jack for stereo audio output. Not Supported on Domain/OS.
Volume Slide Switch	The Volume Slide Switch increases the volume for the headphones in three increments. Not Supported on Domain/Os.

Inserting a Disk

Perform the following steps to insert a disk into the CD-ROM drive:

1. Press the Power On/Off switch on the front of the Model 425e to power on the system.

2. Carefully insert the disk caddy in the direction of the arrow on the caddy about one third of the way into the loading slot until you hear a click (see Figure 5-9). The drive then automatically pulls the caddy the rest of the way into the slot.

CAUTION: Do not force the disk caddy into the drive's loading slot, as this may damage the drive's load mechanism.

NOTICE: The CD-ROM drive does not load a disk caddy if the drive's power is off.

If you eject the disk caddy and want to reinsert it, you must pull the caddy out more than 5 mm (0.2 in.) from the ejected position before reinserting it.

You must mount the disk after inserting it into the drive. Refer to the subsection "Mounting and Dismounting a CD-ROM Disk", later in this chapter, for instructions about mounting a disk.

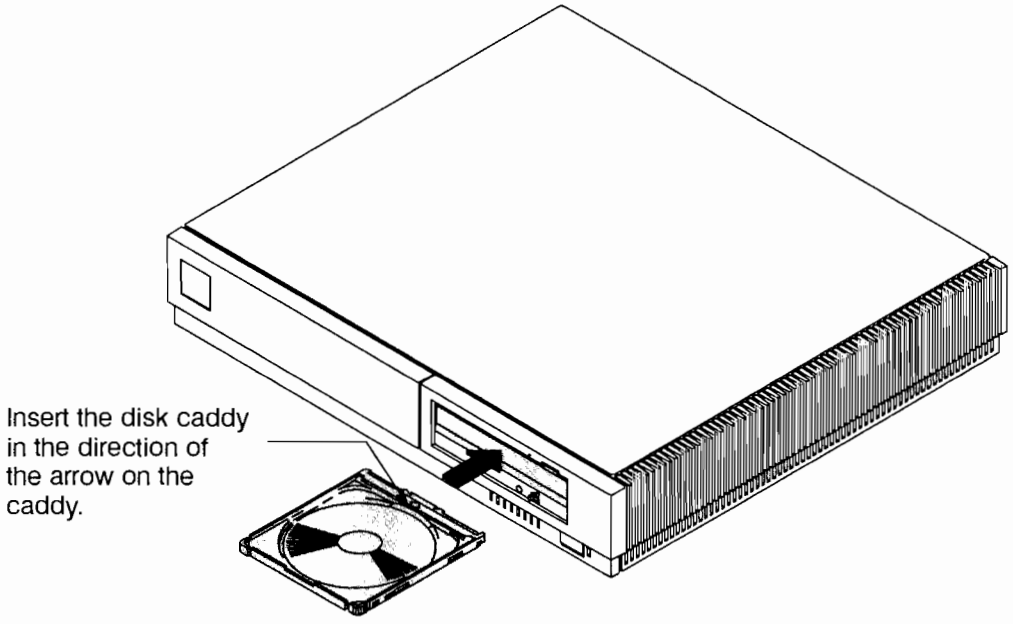


Figure 5–9. Inserting a CD-ROM Disk Caddy

Ejecting a Disk

Press the eject button to eject a disk caddy from the drive. If the drive is in use, you must press the eject button for more than one second to eject the disk caddy.

NOTICE: You must dismount the disk before ejecting it from the drive. Refer to the following subsection, "Mounting and Dismounting a CD-ROM Disk", for instructions about dismounting a disk.

Mounting and Dismounting a CD-ROM Disk

You must mount a CD-ROM disk every time you insert it into the drive, and dismount the disk before you eject it from the drive.

Perform the following steps to mount and dismount a disk for Domain/OS systems:

1. Mount the CD-ROM file system every time you insert a CD-ROM disk into the drive as shown in Figure 5-10. In the following example, *device_filename* is the device file of the CD-ROM drive (for example, **/dev/cdrom**), and *mount_directory* is the directory where you want the CD-ROM file system to appear (for example, **/cd_mountpoint**).

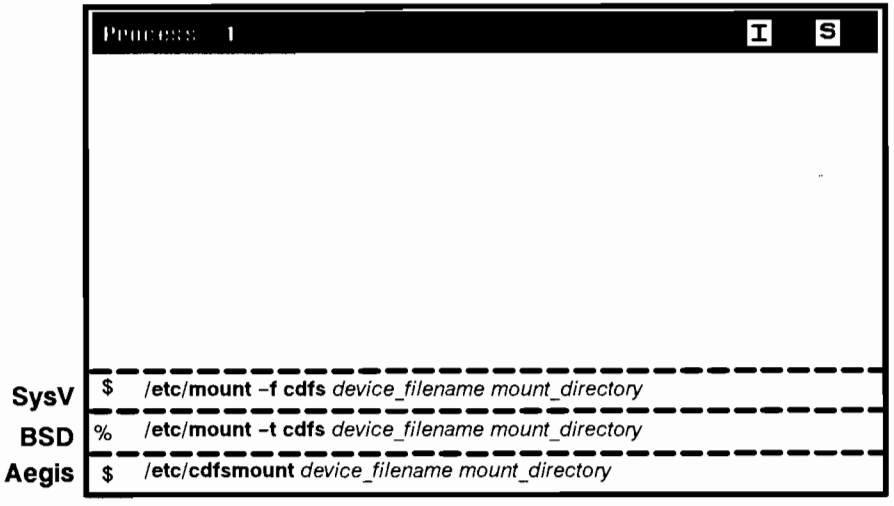


Figure 5-10. Mounting the CD-ROM

2. Now you can access the CD-ROM disk as you would any other disk, with the exception that you cannot write to the CD-ROM disk. For example, to list the contents of the CD-ROM disk, enter the following command as shown in Figure 5-11:

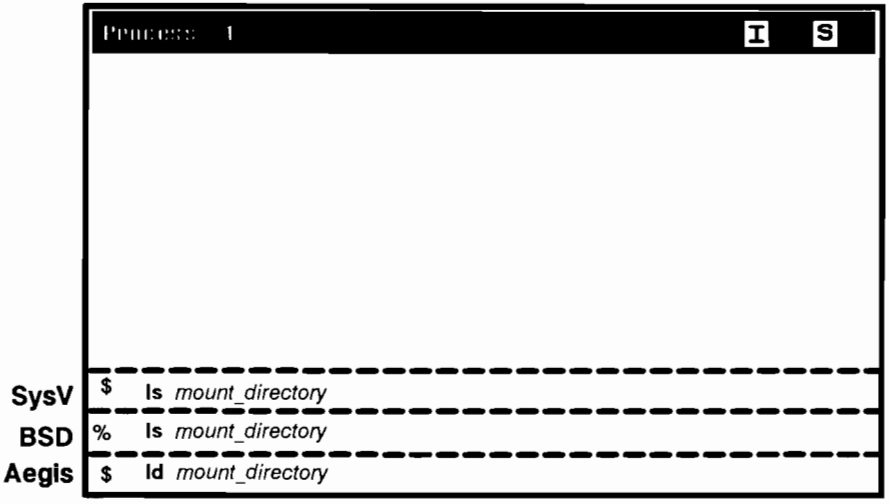


Figure 5-11. ld and ls Command

NOTICE: Domain/OS doesn't support the use of access rights for the CD-ROM drive.

3. Before you dismount the CD-ROM, you must change your working directory to another directory that is not on the mounted file system.

4. Dismount the CD–ROM disk before ejecting it from the drive. To dismount the CD–ROM disk, enter the following command as shown in Figure 5–12:

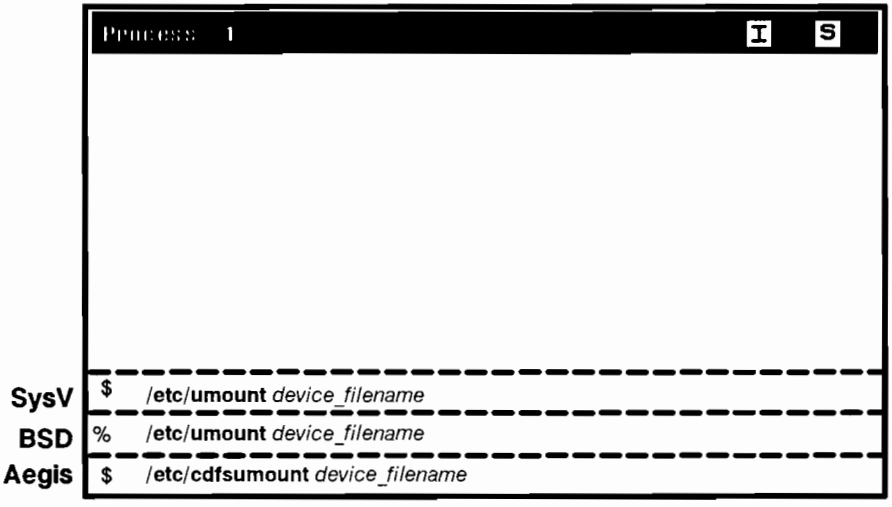


Figure 5–12. Dismounting the CD–ROM

Checking the Busy Light

The CD–ROM busy light shows the status of the drive during the self test and during activity with the host system.

The CD–ROM drive performs the self test during the following conditions:

- You insert a disk caddy into the drive's loading slot.
- You turn on the drive with a disk caddy already loaded.

For the self test, the busy light lights in the following sequence:

1. Light On
   The busy light goes on when the disk loads into the drive.
2. Light Flashing
   The light flashes six times while a read test is performed on the disk.
3. Light Off
   The light goes off when the self test is complete.

The busy light stays on after the self test when there is

- A defective disk
- A disk insertion error (for example, an upside–down disk)
- No disk present

The busy light goes off during the following conditions:

- A CD–ROM drive power failure exists.
- The drive is idle on the SCSI bus.

The busy light flashes during the following conditions:

- Normal activity with the system
- When the drive is set to continuous audio mode

Chapter 6
Using Multiple Disks

This chapter describes how to use multiple disks on the Model 425e workstation. It includes the following information:

- Initializing multiple disks
- Mounting multiple disks
- Using the second disk
- Dismounting multiple disks
- Salvaging multiple disks
- Creating multidisk disk sets (striping)

When you have two (or more) Winchester disk drives in a system, you can mount the second (or successive) drive in three ways:

- You can mount each disk every time you need to use it. Drives set up to function this way operate independently of one another. See the procedure in "Initializing Multiple Disks", for information on setting up independent disk drives.
- You can set up the drives to function as a single logical volume (disk striping). Drives set up to function this way are dependent on one another during operation. If one drive experiences a problem that causes it to function improperly, the other drive(s) cannot be used until the problem is corrected. See the procedure in "Creating a Multidisk Set" later in this chapter for information on disk striping.
- You can use a combination of the above. You can mount some disks independtly of each other as well as create a single logical volume on others.

In this chapter we use the second disk as our example. The procedures are similar for successive disk drives, but the controller and logical volume numbers that you would specify (explained later in this chapter) are different.

Intializing Multiple Disks

This section assumes that you have already run **invol** on your primary (first) disk drive and loaded your operating system software. Use the command shown in Figure 6–1 to see the help files for more information about the **invol** utility.

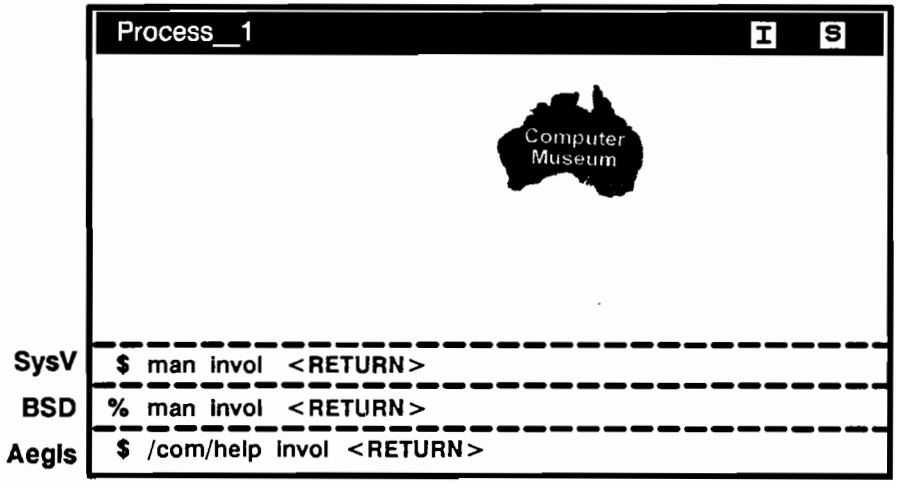


*Figure 6–1. Calling **invol** Help Files*

Before you can use the second (or successive) Winchester disk drive, you need to initialize it (them) using the **invol** utility. Perform Steps 1 through 6 in this subsection to run **invol** on the second disk drive.

NOTICE: In the process of initializing the disk, the **invol** utility also destroys any data on the disk. Be sure to archive any data you want to keep before you use the **invol** utility.

NOTICE: Our examples in this section are for mounting and using the second disk drive. The procedure is similar for successive disk drives, but the controller and logical volume numbers you would specify would be different.

1. Use the command shown in Figure 6–2 to start the **invol** utility.

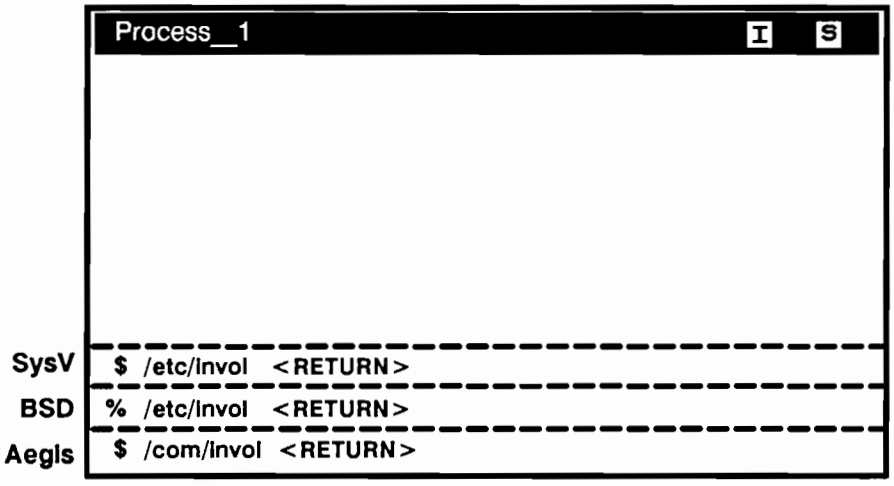


*Figure 6–2. Starting the **invol** Utility*

2. The **invol** utility returns the option information shown in Figure 6–3. If this is a new disk, do not use the **–f** flag (number 7 in Figure 6–3) when using invol to initialize the physical badspot list on each drive. Not using the **–f** flag increases initialization time, as the disk is formatted.

   If this is not a new disk drive (already formatted using **invol**), use the **–f** flag to initialize the disk.

3. The **invol** utility queries you for the option to perform. Enter the option as shown in Figure 6–4 to initialize the physical volume.

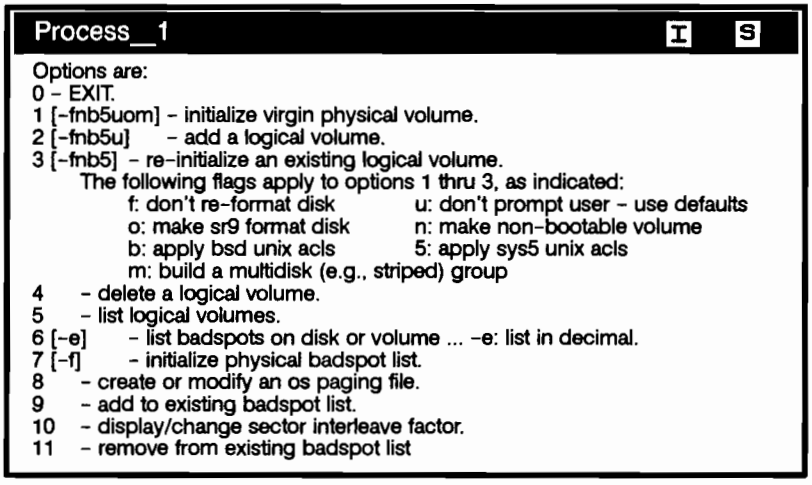


Figure 6–3. Options for ***invol*** *Utility*

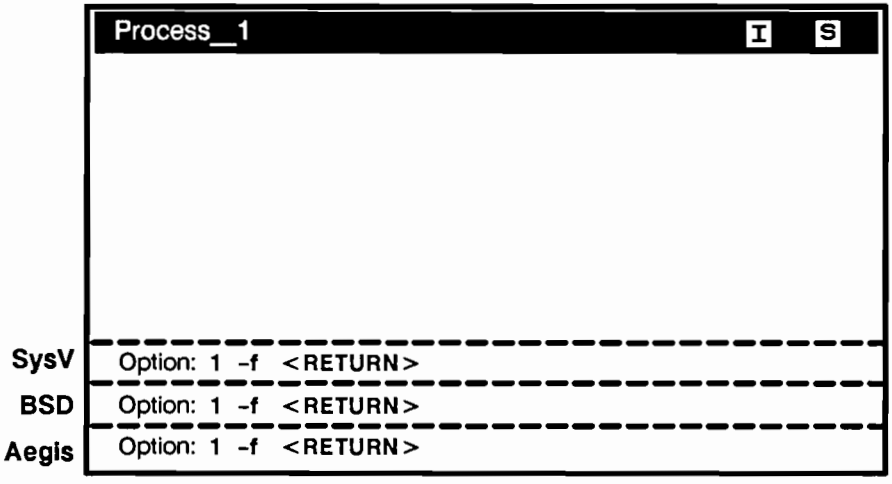


Figure 6–4. Specifying Options for ***invol*** *Utility*

4. The **invol** utility prompts for the identity of the disk drive volume to be initialized, as shown in Figure 6–5. In these examples, **w5** is used as the volume name.

   The drive that you specify (**w5:0**) is used as the second disk of the set. Specify this drive when you want to mount, dismount, **invol**, or **salvol** the second of the multiple drives in your system.

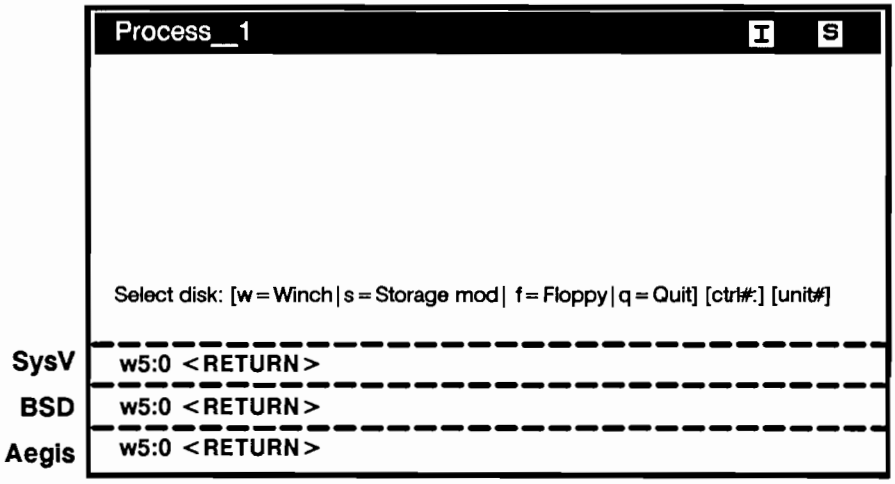


Figure 6–5. Specifying the Disk Drive Volume

5. The **invol** utility then prompts for the name of the physical volume as shown in Figure 6–6.

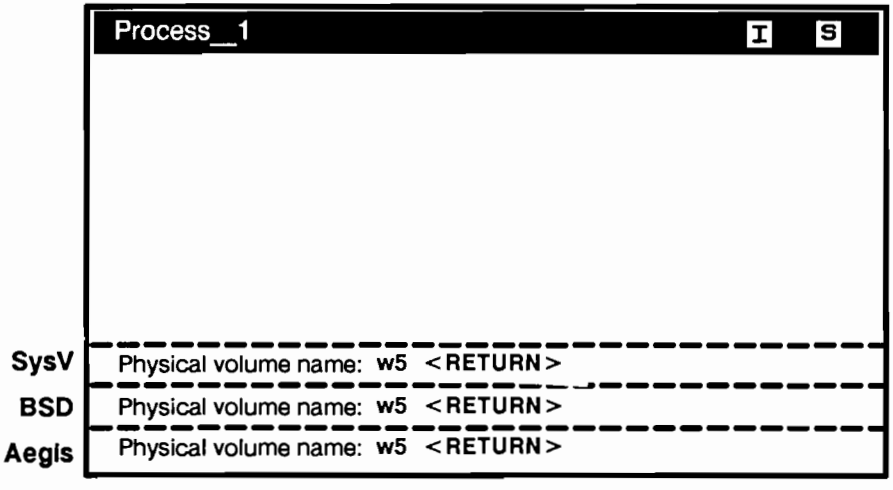


Figure 6–6. Specifying the Name of the Disk Drive Volume

6. When the **invol** utility asks if you have any more requests, as shown in Figure 6–7, type **n** to exit to the shell prompt.

If you are administering (or running) your system in a UNIX environment, you must perform Steps 7 and 8 before you can mount the second Winchester disk drive. If you are running your system in the Aegis environment, you do not have to perform Steps 7 and 8; go directly to Step 9.

7. At system start-up, the operating system automatically creates the device file for the first disk drive (highest target ID). If you have two Winchester drives, you must use the following commands to set up the device file for the second disk drive. To run the commands in Steps 7 through 9, you must be logged in as **root**. If you do not have a **root** login account, see your system administrator. Notice that the **root** account always has a **#** prompt.

   Figure 6–8 shows the command line that instructs the operating system to create a device file. Table 6–1 explains the options that you must enter on that command line.

Table 6–1. ***mkdsk*** *Command Line Options*

Options	Description
ctrl#	SCSI target ID
7	SCSI host
6	first Winchester disk
5	second Winchester disk
drv#	unit number (only 0 is valid)
lvol#	logical volume number

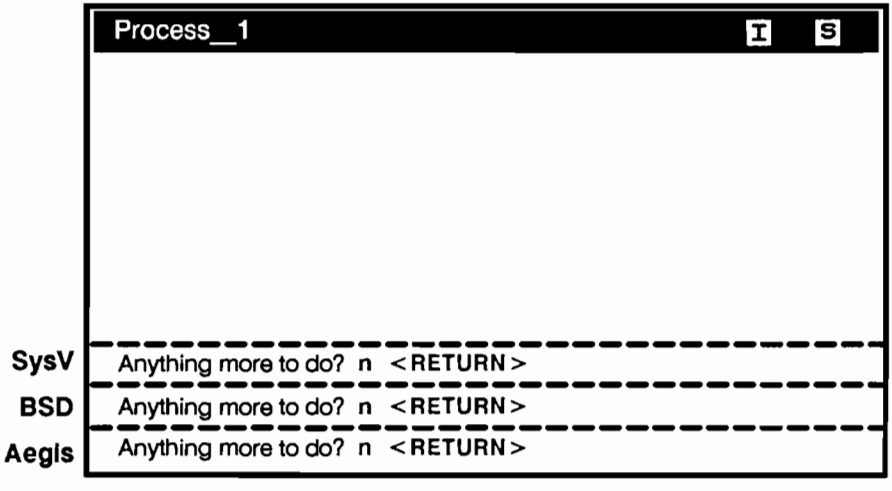


Figure 6–7. Exiting the ***invol*** *Utility*

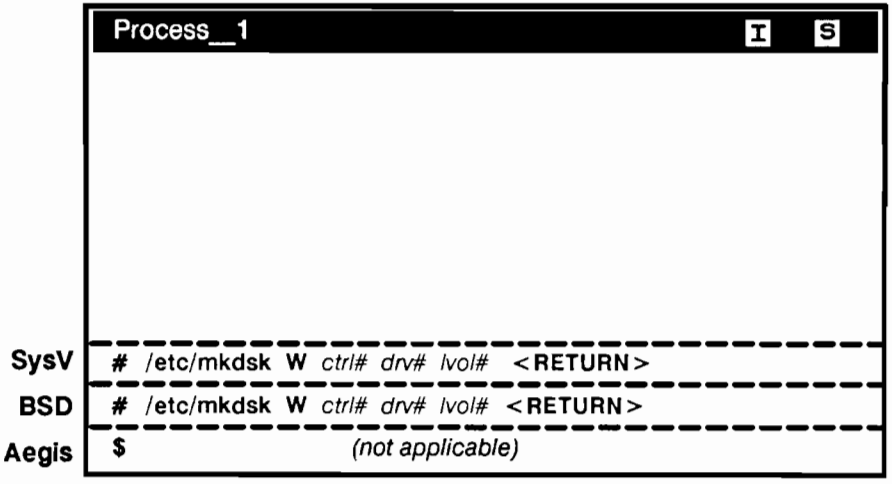


Figure 6–8. Creating a Device File in a UNIX Environment

Figure 6–9 shows an example of a command line using **ctrl# 5**, **drv# 0**, and **lvol# 1** to specify the second disk drive. Note the system's response.

8. The next step is to create a logical volume entry directory corresponding to the physical drive. In our example, we are creating a **/w5** directory as shown in Figure 6–10.

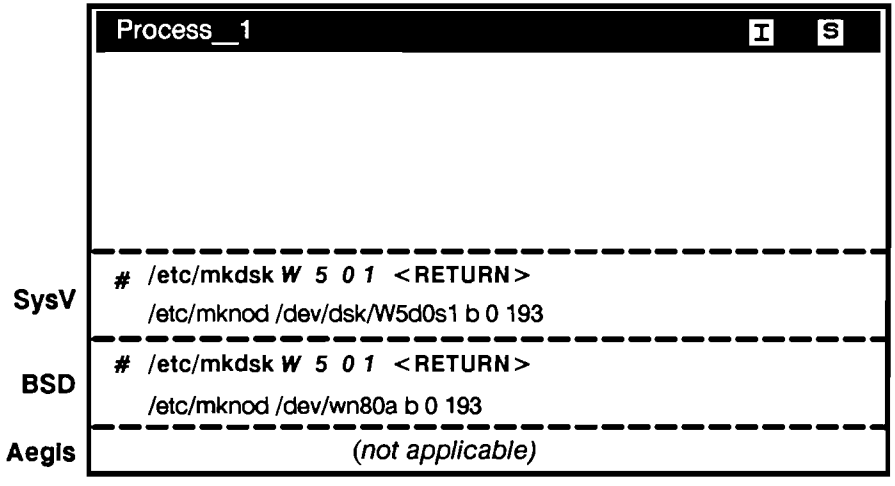


Figure 6–9. Specifying a Second Disk Drive in a UNIX Environment

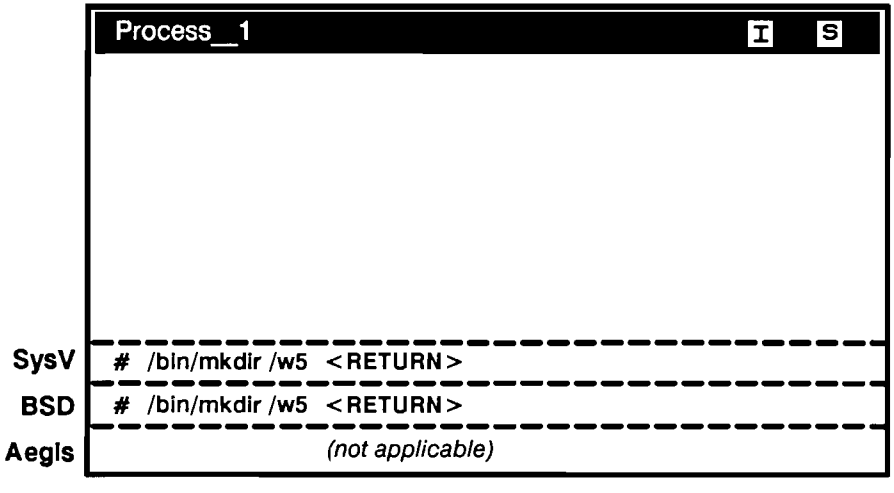


Figure 6–10. Creating a Logical Volume Entry Directory for the Drive in a UNIX Environment

Mounting Multiple Disks

9. Figure 6–11 shows the command to mount the second disk volume. Note that you do not have to be logged in as **root** in the Aegis environment to perform this step.

For the remainder of our examples, we use SCSI target ID **5** and unit number **0**.

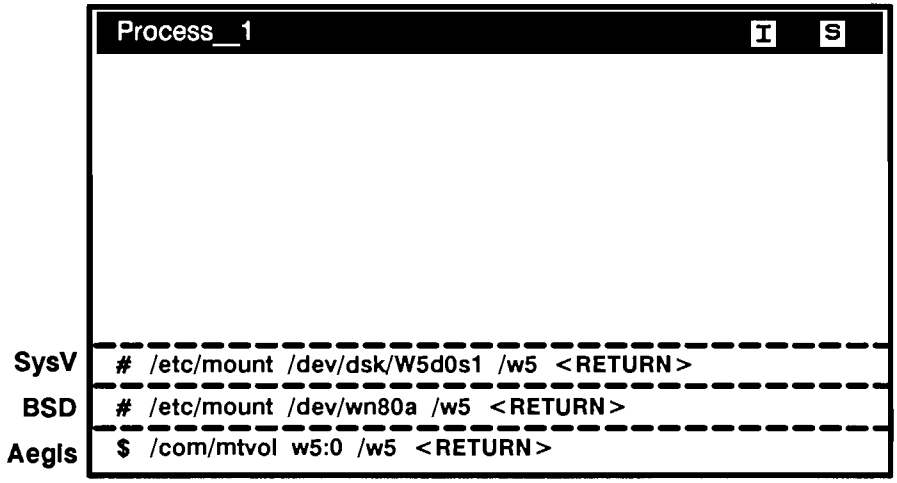


Figure 6–11. Mounting the Second Disk Volume

The disk is now mounted as **/w5**.

Logical volume entry directories may appear anywhere in the naming tree, with one exception: if a logical volume entry directory is also the node's entry (top-level) directory, it *must* appear just below the network root directory (//).

Do not omit the pathname argument when using **mount** (**mtvol** in the Aegis environment) because the command searches the file system (naming tree in the Aegis environment) for it. If **mount** finds the entry directory, it mounts the volume and prints the full entry directory pathname.

In the Aegis environment, if **mtvol** does not find the entry directory, it prints an error message, and does not mount the volume. The search may fail for any of the following reasons:

- The entry directory was never cataloged.
- The entry directory was uncataloged when the volume was last dismounted.
- The entry directory pathname exists on another node, for which directory information is currently unavailable.

An unsuccessful search does not mean you cannot mount the volume. It simply means that the volume entry directory pathname does not exist on your node. To mount the volume, issue the **mtvol** command and supply an entry directory pathname.

Even if the **mtvol** command finds the entry directory pathname, the mount may fail if the volume is corrupt and needs salvaging. In this case, **mtvol** asks permission to mount the volume. You usually respond **n** (no) to this request, then run the salvaging utility called **salvol**. (See "Salvaging Multiple Disks" later in this chapter.) Once the volume has been salvaged, you may try to mount it again. If you mount a corrupt volume without salvaging it first, damage to files in that volume could occur.

Using the Second Disk

Once the second disk is mounted, the system sees it as part of the directory structure. You can copy and move files and trees to the second disk as you would to any disk in your network. You can access and list the directories and files of the second disk. You can also edit, read, and execute files on it.

The command shown in Figure 6–12 sets the current directory (working directory in the Aegis environment) to **//node_name/w5**.

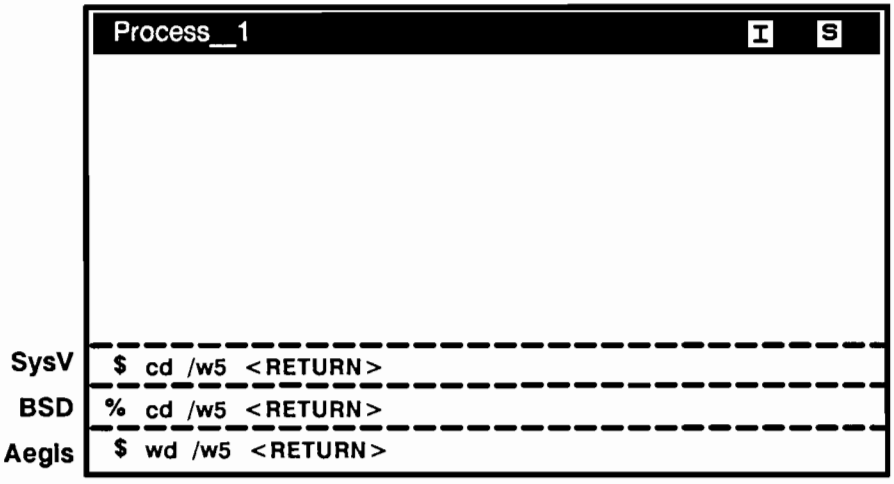


Figure 6–12. Setting the Current (Working) Directory

The command shown in Figure 6–13 lists the contents of the working directory with all of its attributes.

The second Winchester disk drive can be accessed as the **/w5** directory for other operations. Refer to the appropriate *Using Your Environment* manual for information about how to use directories.

Refer to the *Getting Started with Domain/OS* manual if you need assistance to continue working. See the Preface of this guide for a list of related manuals and order numbers.

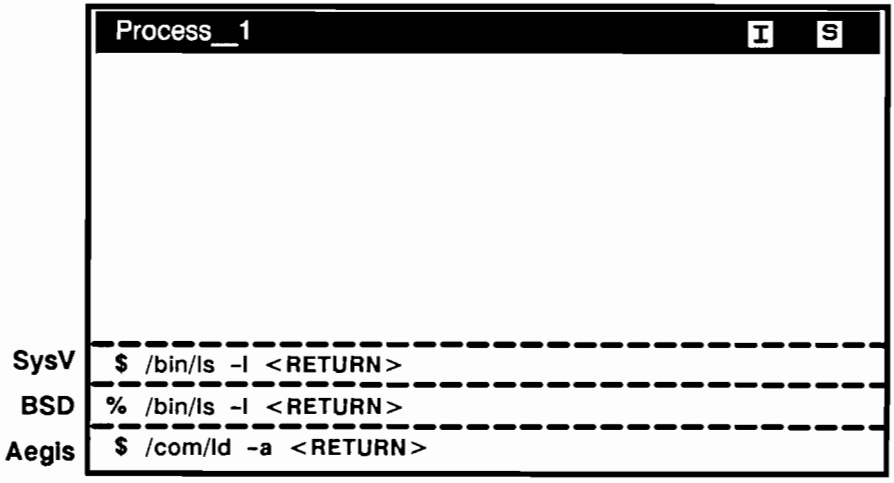


Figure 6–13. Listing the Current (Working) Directory

Dismounting Multiple Disks

The command shown in Figure 6–14 dismounts the second Winchester volume. Note that you must be logged in as **root** in either UNIX environment, but you don't need to be logged in as root in the Aegis environment. First, change your working directory to another directory that is not on the mounted file system. Then, enter the following command:

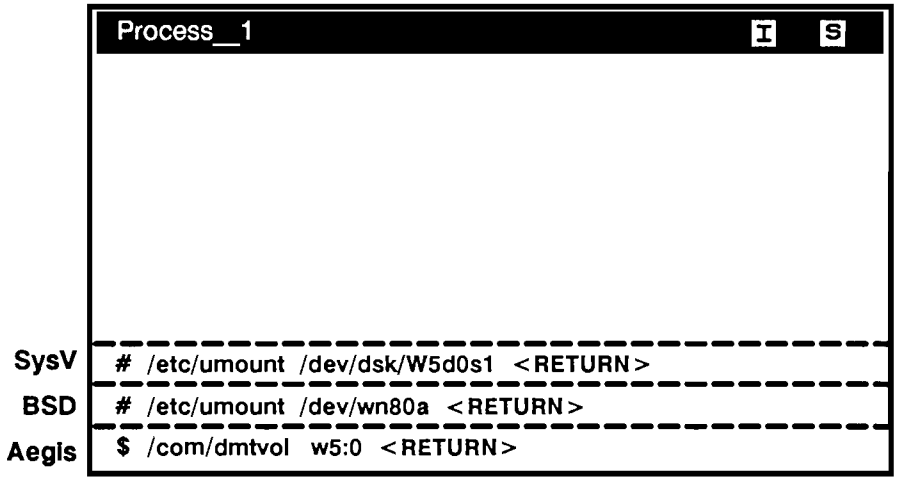


Figure 6–14. Dismounting Multiple Disks

Salvaging Multiple Disks

In the event of a node crash, the first bootable Winchester disk drive is automatically salvaged. Once the first disk has been salvaged by the system, you can salvage the other disk(s).

Mounting a corrupt volume without salvaging it first could damage files (including operating system files) in that volume.

Type the command shown in Figure 6–15 to select the second disk as the target of the salvage operation.

When you see the system prompt, the salvage operation is complete.

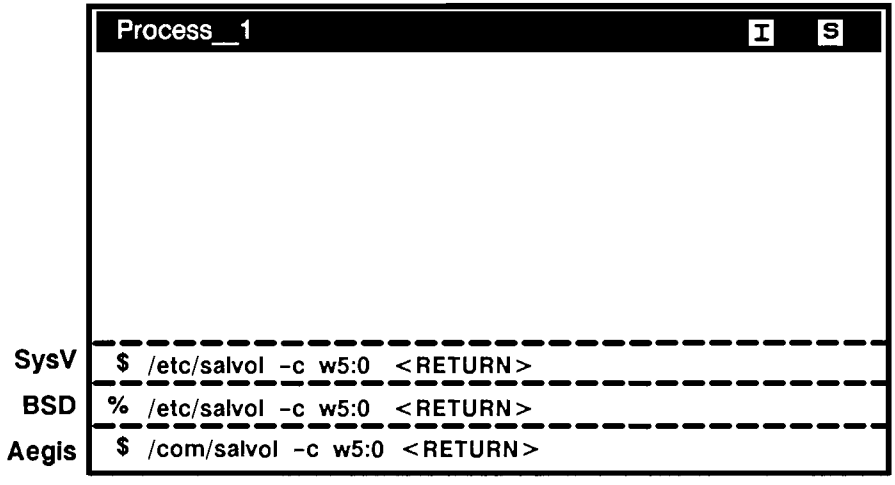


Figure 6–15. Salvaging a Second Disk Drive

Creating a Multidisk Set

When you have two (or more) Winchester disk drives in a system, you can set up the drives to function as a single logical volume. This is known as disk striping. Winchester disk drives set up to function this way are dependent on one another during operation. If one disk drive experiences a problem that causes it to function improperly, none of the disk drives can be used until the problem is corrected.

Use the following procedure to set up your disk drives to function as one logical volume. This procedure assumes that none of your disk drives have been initialized and that you haven't loaded your operating system software. Before beginning this procedure, you must be booted diskless from another workstation on your network. Go to Chapter 3 for instructions on booting diskless. Return to this procedure when you have successfully booted diskless.

Perform the steps in this subsection to run **invol** to create a multidisk set.

Start with Step 1 (and skip Step 2) if you are running **invol** from the Mnemonic Debugger (MD) (see Chapter 10).

Start with Step 2 (skipping Step 1) if you are running **invol** from a shell.

1. Enter the command shown in Figure 6–16 to invoke the **invol** utility from the Mnemonic Debugger (MD) environment.

2. Enter the command shown in Figure 6–17 to invoke the **invol** utility from an Aegis, BSD, or SysV command shell.

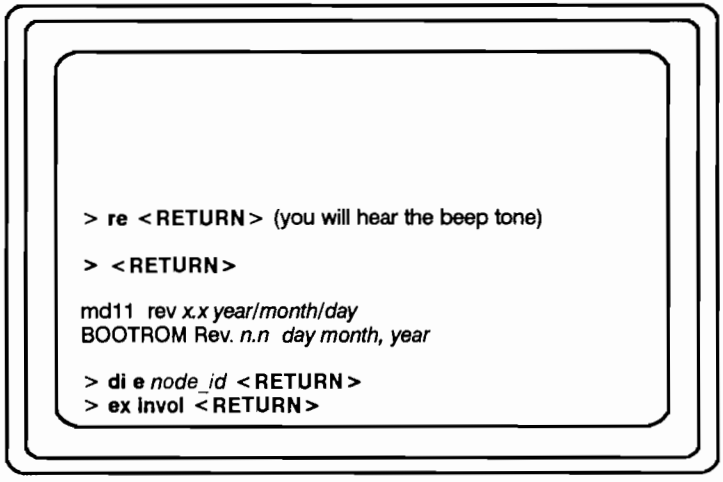


*Figure 6–16. Running **invol** from the Mnemonic Debugger*

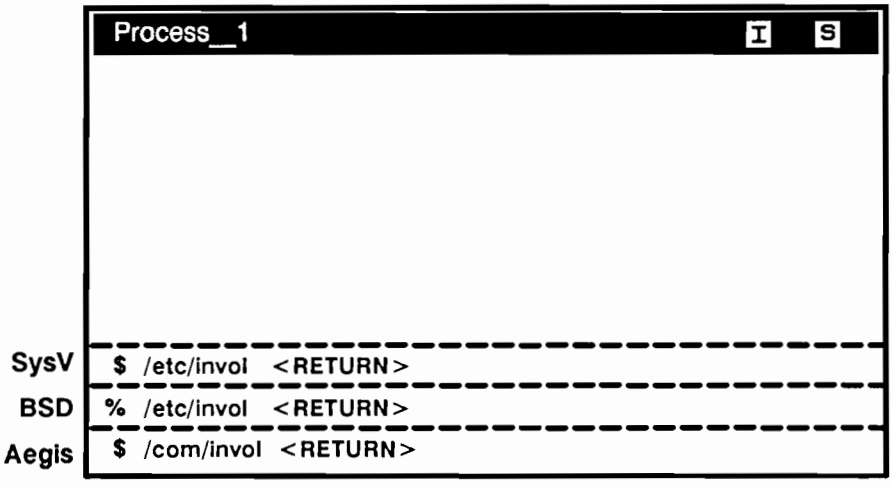


*Figure 6–17. Running **invol** from a Shell*

3. The **invol** utility returns the information shown in Figure 6–18 when run from either the MD or the shell. We continue this example with the **invol** utility in a shell environment. If you are running in the MD environment, your responses are the same.

   If this is a new disk, use **invol** without the **-f** flag (number 7 in Figure 6–18) to initialize the physical badspot list on each drive *before* you go to Step 4

4. The **invol** utility queries you for the option to perform. Enter the option as shown in Figure 6–19 to create a multidisk set without reformatting the drive.

```
Process_1                                    I   S
Options are:
0 - EXIT.
1 [-fnb5uom] - initialize virgin physical volume.
2 [-fnb5u]     - add a logical volume.
3 [-fnb5]  - re-initialize an existing logical volume.
     The following flags apply to options 1 thru 3, as indicated:
          f: don't re-format disk          u: don't prompt user - use defaults
          o: make sr9 format disk          n: make non-bootable volume
          b: apply bsd unix acls           5: apply sys5 unix acls
          m: build a multidisk (e.g., striped) group
4     - delete a logical volume.
5     - list logical volumes.
6 [-e]      - list badspots on disk or volume ... -e: list in decimal.
7 [-f]      - initialize physical badspot list.
8     - create or modify an os paging file.
9     - add to existing badspot list.
10    - display/change sector interleave factor.
11    - remove from existing badspot list
```

*Figure 6–18. **invol** Options*

```
Process_1                                    I   S
SysV  Option: 1 -mf  <RETURN>
BSD   Option: 1 -mf  <RETURN>
Aegis Option: 1 -mf  <RETURN>
```

*Figure 6–19. Running **invol** with the –**f** Option*

5. The **invol** utility prompts for the identity of the first disk in the multidisk set as shown in Figure 6–20.

The drive that you specify (for example, **w6:0**) becomes the primary disk of the set. Specify this drive when you want to mount, dismount, **invol**, or **salvol** a multidisk set.

6. Next, **invol** prompts for the number of disks to include in the set as shown in Figure 6–21.

Valid responses for Series 400 workstations are **2** through **7**.

NOTICE: On Series 400 workstations, the maximum size of each logcal volume is 8 GB.

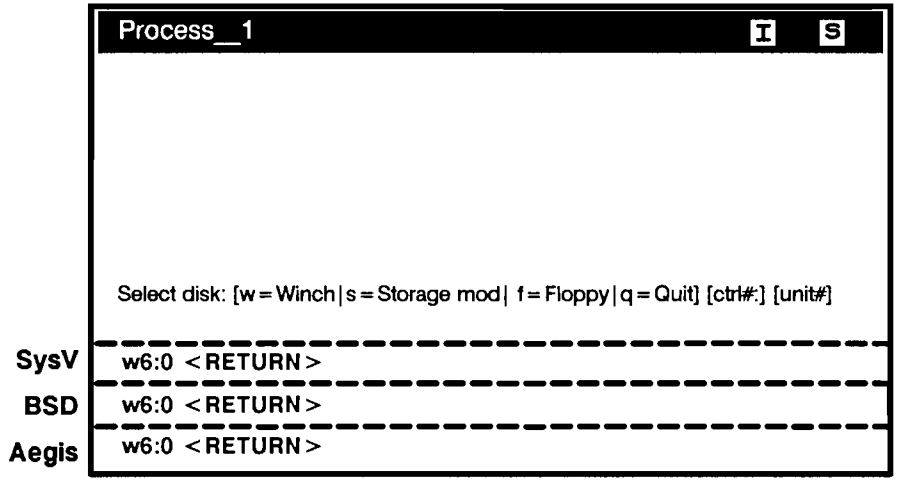


Figure 6–20. ***invol*** *Prompt for Identity of First Disk in Set*

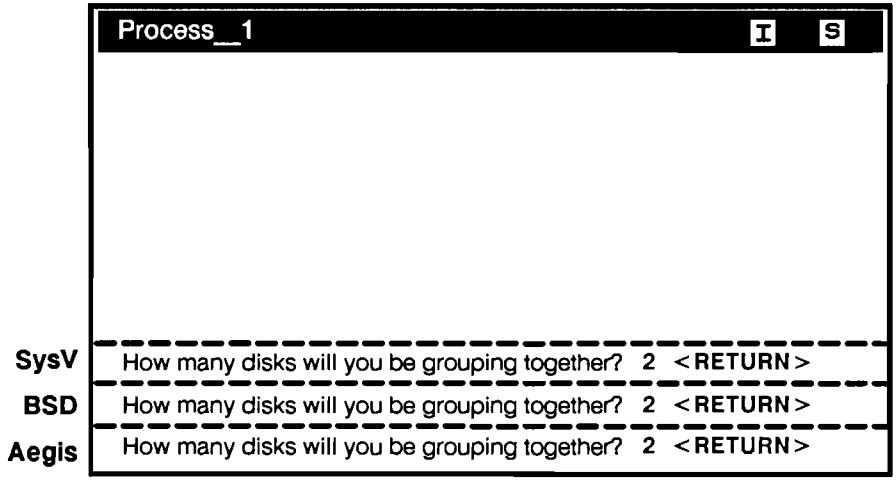


Figure 6–21. ***invol*** *Prompt for Total Disks in Set*

7. Then **invol** prompts for the algorithm to use to spread disk blocks across the multiple drives in a set as shown in Figure 6–22.

   For Series 400 workstations you have only one choice: volume striping (option 3).

   With volume striping, whole disk drives are connected together in a logical series (concatenated). Volume striping provides a larger logical volume with no change in disk performance.

8. The **invol** utility then prompts for the name of the physical volume as shown in Figure 6–23.

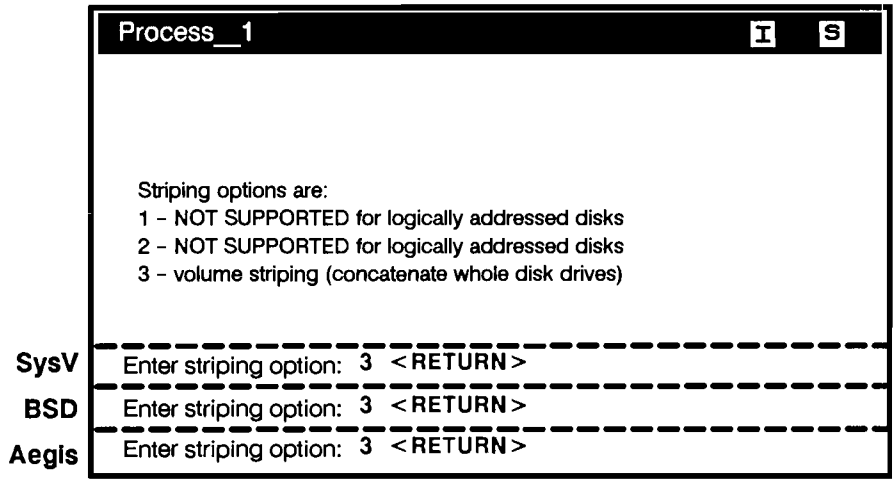


Figure 6–22. ***invol*** *Prompt for Striping Option*

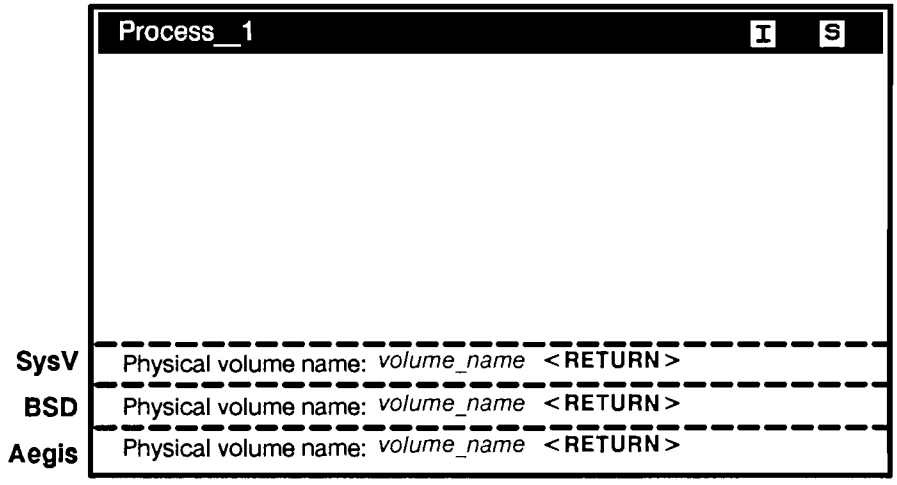


Figure 6–23. ***invol*** *Prompt for Physical Volume Name*

9. Finally, **invol** prompts for the identity of additional disk drives in the set as shown in Figure 6–24.

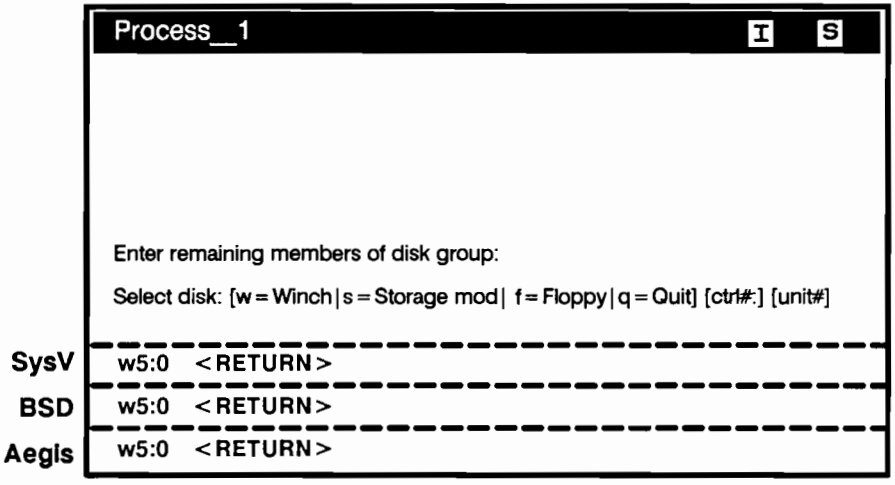


Figure 6–24. ***invol*** *Prompt for Additional Drive Identities*

10. The **invol** utility asks you to run option 2 to configure logical volumes on the multidisk set. Type **y** to return to the **invol** main menu. as shown in Figure 6–25.

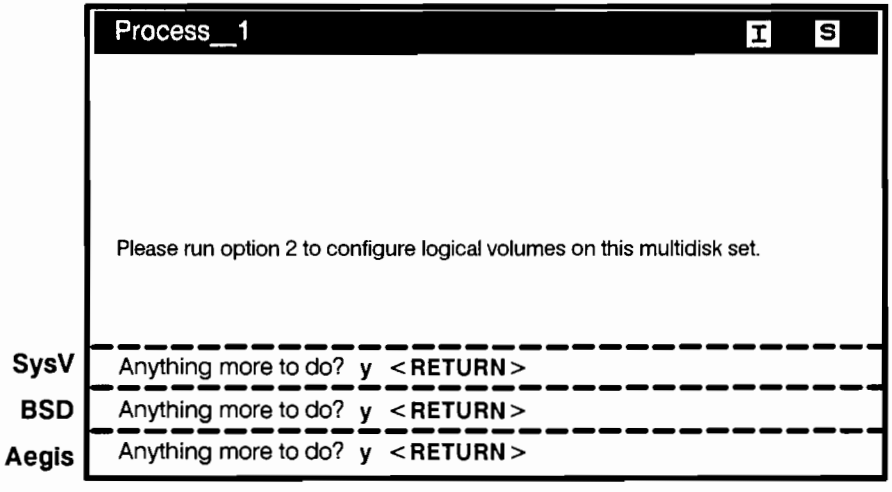


Figure 6–25. ***invol*** *Prompt To Return to* ***invol*** *Main Menu*

The **invol** utility returns you to its initial selection menu, as shown in Figure 6–26.

```
Process_1                                          I   S
Options are:
0 - EXIT.
1 [-fnb5uom] - initialize virgin physical volume.
2 [-fnb5u]     - add a logical volume.
3 [-fnb5] - re-initialize an existing logical volume.
      The following flags apply to options 1 thru 3, as indicated:
            f: don't re-format disk          u: don't prompt user - use defaults
            o: make sr9 format disk          n: make non-bootable volume
            b: apply bsd unix acls           5: apply sys5 unix acls
            m: build a multidisk (e.g., striped) group
4     - delete a logical volume.
5     - list logical volumes.
6 [-e]      - list badspots on disk or volume ... -e: list in decimal.
7 [-f]      - initialize physical badspot list.
8     - create or modify an os paging file.
9     - add to existing badspot list.
10    - display/change sector interleave factor.
11    - remove from existing badspot list
```

Figure 6–26. ***invol*** *Selection Menu*

11. The **invol** utility queries you for the option to perform. Enter the option as shown in Figure 6–27 to configure logical volumes on this multidisk set.

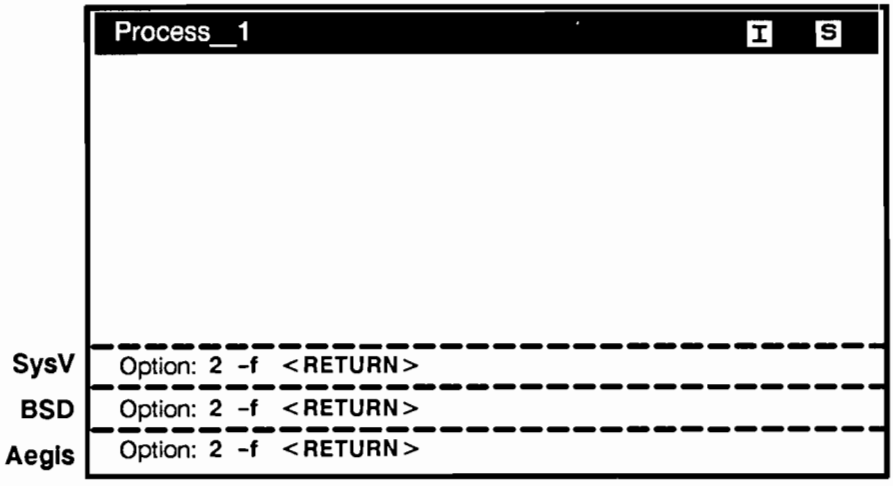


Figure 6–27. ***invol*** *Prompt To Configure Logical Volumes in Set*

12. The **invol** utility prompts for the identity of the first disk in the multidisk set as shown in Figure 6–28.

The drive that you specify (for example, **w6:0**) is the primary disk of the set. Specify this drive whenever you mount, dismount, **invol**, or **salvol** a multidisk set.

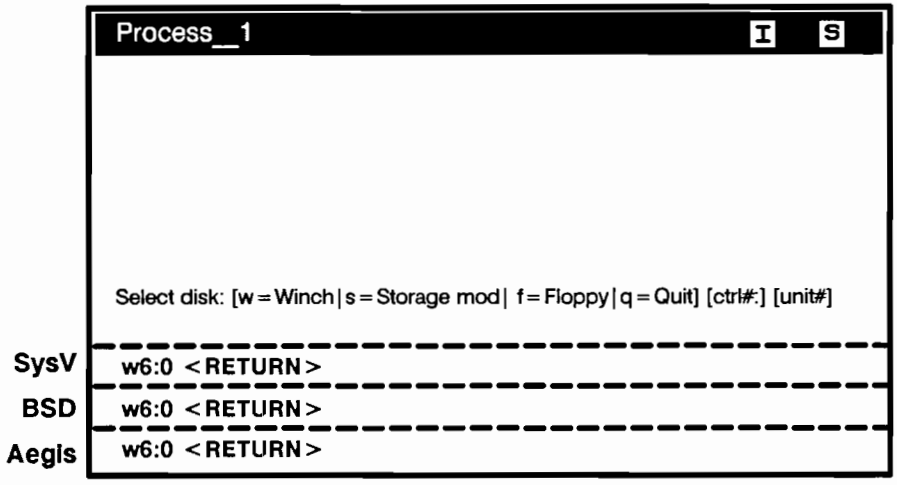


Figure 6–28. ***invol*** *Prompt for Primary Disk in Set*

13. Next, **invol** lists the physical and logical volume information and prompts you for the verification option as shown in Figure 6–29.

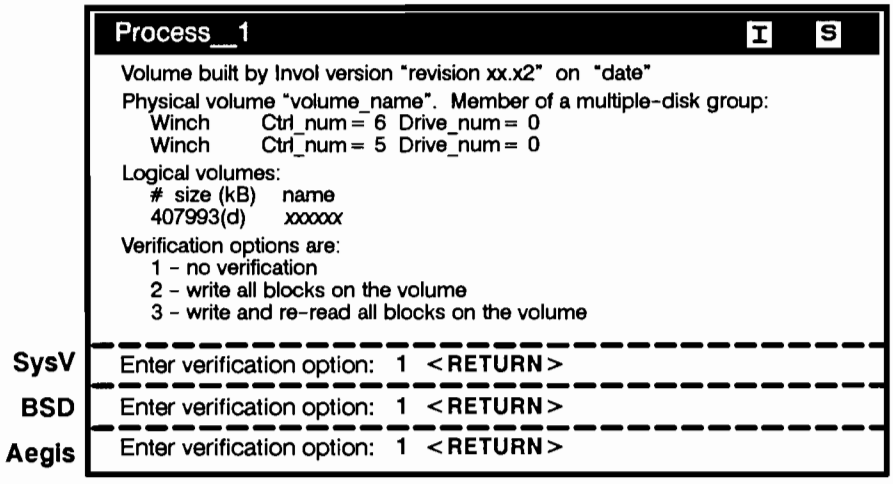


Figure 6–29. ***invol*** *Prompt To Verify Volume Information*

14. The **invol** utility then prompts for the logical volume size as shown in Figure 6–30.

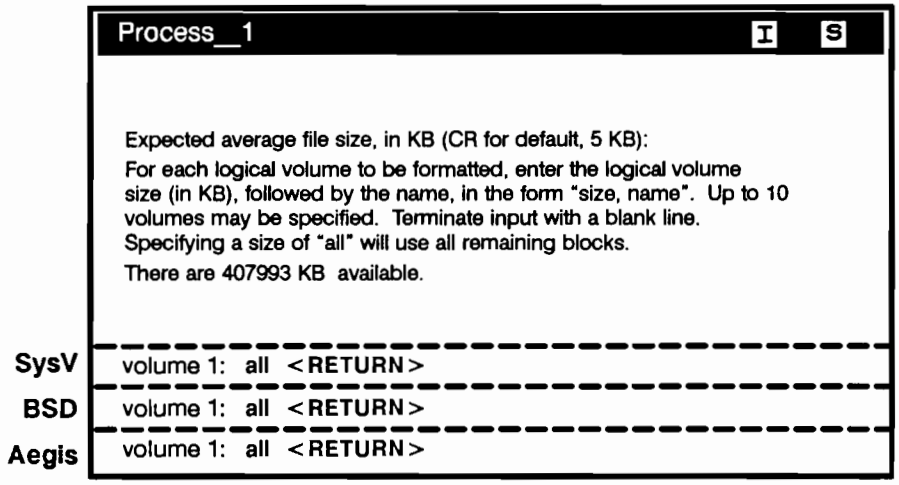


Figure 6–30. ***invol*** *Prompt for Logical Volume Size*

15. The **invol** utility then asks if you want to use the pre-recorded badspot information as shown in Figure 6–31.

Respond by typing **y** as shown in Figure 6–31. Do *not* answer **n** (no) to this prompt. If you do, **invol** overwrites any existing badspot list.

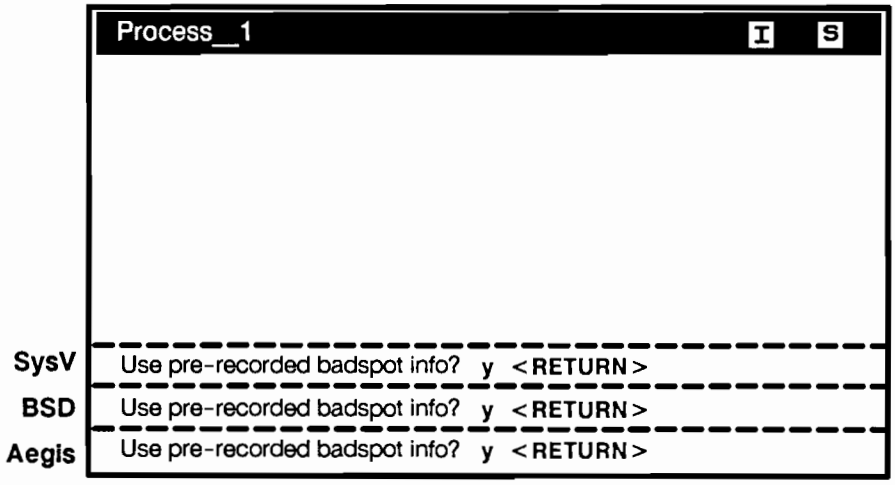


Figure 6–31. ***invol*** *Prompt To Use Pre-Recorded Badspot List*

16. The **invol** utility initializes the logical volume and then asks if you have any more requests. Type **y** as shown in Figure 6–32.

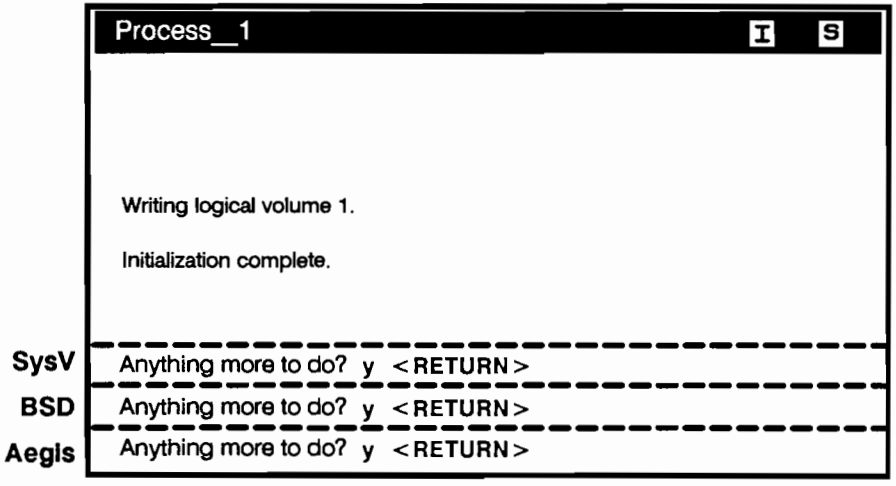


Figure 6–32. ***invol*** *Prompt for More Requests*

The **invol** utility returns to its initial selection menu, as shown in Figure 6–33.

Before you exit from the **invol** utility, you must create an OS paging file that allows this disk volume to be used as the system's boot device (as described in Step 17).

```
Process_1                                    I   S
Options are:
0 - EXIT.
1 [-fnb5uom] - initialize virgin physical volume.
2 [-fnb5u]   - add a logical volume.
3 [-fnb5] - re-initialize an existing logical volume.
     The following flags apply to options 1 thru 3, as indicated:
          f: don't re-format disk          u: don't prompt user - use defaults
          o: make sr9 format disk          n: make non-bootable volume
          b: apply bsd unix acls           5: apply sys5 unix acls
          m: build a multidisk (e.g., striped) group
4    - delete a logical volume.
5    - list logical volumes.
6 [-e]    - list badspots on disk or volume ... -e: list in decimal.
7 [-f]    - initialize physical badspot list.
8    - create or modify an os paging file.
9    - add to existing badspot list.
10   - display/change sector interleave factor.
11   - remove from existing badspot list
```

*Figure 6–33. **invol** Selection Menu*

17. The **invol** utility queries you for the option to perform. Enter the option as shown in Figure 6–34 to create the OS paging file.

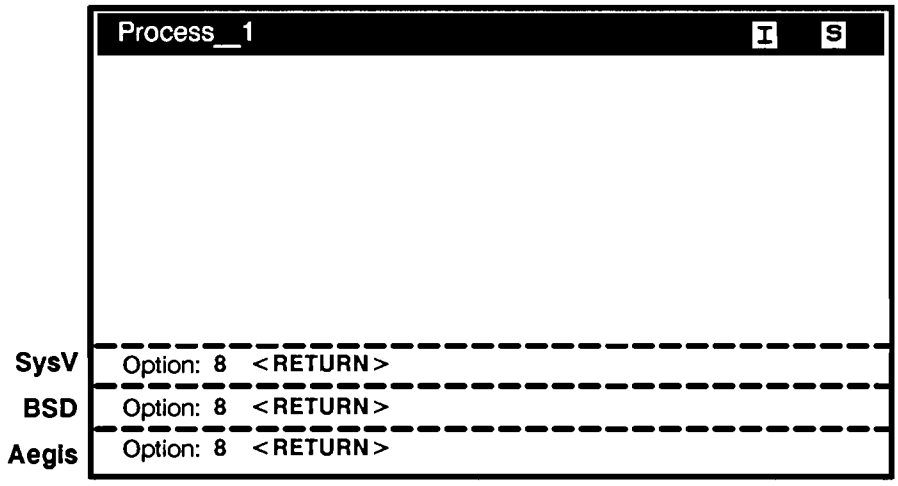


Figure 6–34. ***invol*** *Prompt To Create the OS Paging File*

18. The **invol** utility prompts for the identity of the first disk in the multidisk set as shown in Figure 6–35.

The drive that you specify (for example, **w6:0**) is the primary disk of the set. Specify this drive whenever you mount, dismount, **invol**, or **salvol** a multidisk set.

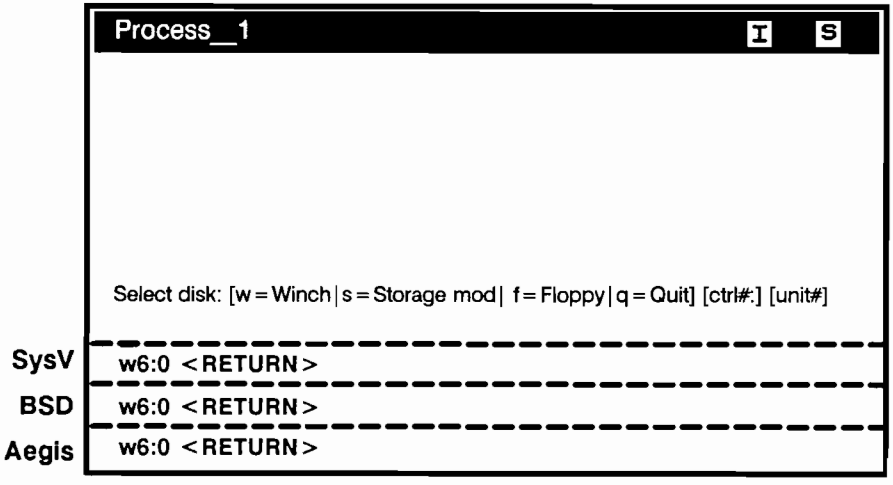


Figure 6–35. ***invol*** *Prompt To Identify Primary Disk in Set*

19. Next, **invol** lists the physical and logical volume information and prompts you for the logical volume number as shown in Figure 6–36.

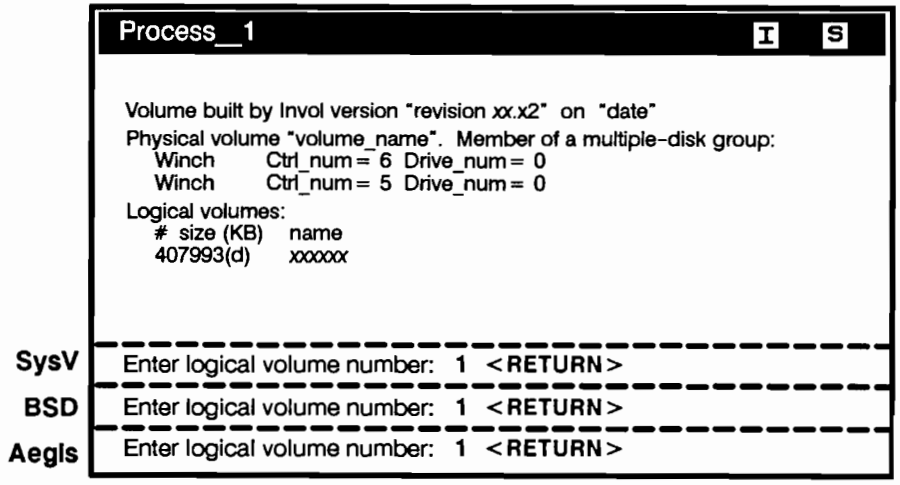


*Figure 6–36. **invol** Prompt for Volume Information*

20. Next, invol prompts you to confirm the default OS paging size. Press <RETURN> as shown in the screen Figure 6–37 to confirm the default size of 4000 KB.

21. The **invol** utility asks if you have any more requests as shown in Figure 6–37. Type **n** to return to the calling program (operating system or Mnemonic Debugger).

You must now load your system software using the procedures in the *Software Release Document* that you received with your system software. When you have finished the procedures in the *Software Release Document*, return to the beginning of Chapter 2 to start up your system.

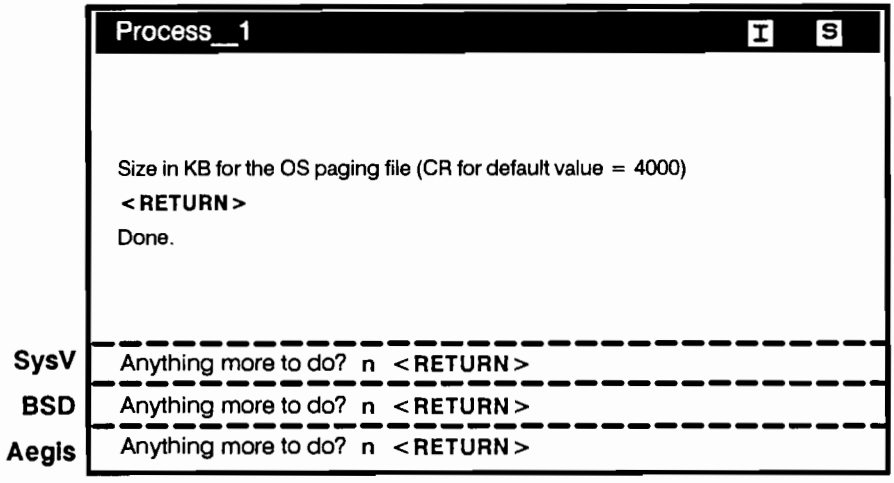


*Figure 6–37. **invol** Prompt for More Requests*

Chapter 7
Troubleshooting

This chapter contains information that help you determine what's wrong with your system when you have problems. It contains the following information:

- Problems and solutions tables
- LED error codes
- Boot PROM diagnotic LED error codes
- MD level LED status codes
- Running the SAX (System Acceptance Exerciser) tests
- Replacing the Real-Time Clock Battery

If you have a problem that isn't listed in this chapter, or if your problem persists, contact your designated service representative. When calling for service, always have your system's model and serial number ready.

Common Problems and Solutions

Table 7–1 through Table 7–10 list common problems you may encounter with your system. The tables also tell you what to do to help solve the problems.

Table 7–1. Problems Unpacking the System

Problem	Solution
Pieces are missing.	Call your designated HP Apollo Sales office.
The system unit is damaged.	Contact the freight carrier and insurer.
The model number on the carton and the model number on the system unit don't match.	Call your designated HP Apollo Sales office.

Table 7–2. Problems Powering Up the System

Problem	Solution
The power LED doesn't light.	Make sure the ac power cables are connected securely to the system unit. Make sure the power cord is plugged into a working ac outlet. Make sure the power switch is set to the **1** (ON) position
The power lights go on, but the screen is blank or flickers.	Turn the Brightness control clockwise. If the screen is still blank, turn off the power switches. When all LEDs are off, check the video cable connections. If problems persist, call your designated service representative.

Table 7–3. Problems with the 802.3. Network

Problem	Solution
No HP Apollo systems respond to the **lcnode** command.	Make sure that the network cable is connected to the system at one end and to the network connector at the other end. Log in at *another* workstation and type the **ctnode, –update,** and **lcnode** commands again. If no active HP Apollo systems respond on this attempt, most likely your network is not functioning properly. Tell your system administrator or call your designated service representative.

Table 7–4. General System Problem

Problem	Solution
Your system does not function properly after all other troubleshooting measures have been taken.	Run the SAX tests to verify that the system's hardware is functioning properly. (See "Running SAX Diagnostics Tests" later in this chapter.)

Table 7–5. Problems Starting Up the Workstation

Problem	Solution
You receive the message: `TEST FAILED`	Record the message. Press the system's Reset switch on the rear of the system unit. If you still receive an error message, contact your designated service representative.
`My network node ID:nnnn` `Error: Receive time-out`	Record the message. Make sure the Service switch is set to Normal mode. Press the Reset switch. Reboot the system.
`No boot program on this disk.`	The program that loads the Hardware Acceptance Program (HAP) software can't run or, system software has not been loaded on the disk. Record the message, and then press the Reset switch. If you still receive an error message, contact your designated service representative.
`Boot error:`	The system can't load the software. Record the message, and press the Reset switch. If you still receive this message, contact your designated service representative.
`System hardware failures listed above were detected by self-test. Do you wish to continue with the boot process (y,n)`	Type **y** to attempt booting the system. If booting fails, note the failure and check with your system administrator.
A random error message appears and the Mnemonic Debugger (MD) " > " prompt.	Type: **re <RETURN>** **<RETURN>** **boot** to start up the operating system.

Table 7–6. Problems Starting Up a Diskless Workstation

Problem	Solution
The partner node doesn't have the correct **/sau** directory.	Install the new software and the correct **/sau** directory on the partner node. For instructions, refer to *Installing Software with Apollo's Release and Installation Tools*; this manual ships with all standard software.

You receive the message:
`My network node ID:nnnn`
`Error: Receive time-out`
	Check your system's ID and re-enter it in the partner node's diskless list.

`My network node ID:nnnn` but nothing happens.	Check to see if the partner node is running properly. If not, choose another partner and repeat the booting procedure. Report the faulty partner node's problem to your system administrator.
`Error: Transmit request failed`	This error message suggests network problems. Check with your system administrator.

Table 7–7. Problems Using the Floppy Disk Drive

Problem	Solution
The floppy drive does not respond to commands.	Re-enter the commands to make sure that you have typed them correctly. IF this is an external peripheral, check the SCSI cables and terminator to ensure that they are connected securely. Run the SAX tests to verify that the floppy disk drive is functioning properly.

Table 7–8. Problems Using the CD-ROM Drive

Problem	Solution
The CD-ROM drive does not respond to commands.	Re-enter the commands to make sure that you have typed them correctly. IF this is an external peripheral, check the SCSI cables and terminator to ensure that they are connected securely. Contact your designated service representatives if the problems continue.

Table 7–9. Problems Running SAX Diagnostics Tests

Problem	**Solution**
You receive a message that states you don't have access rights to the **/systest** directory.	The system administrator's login-name and password must be appended to the **sax** command: **/systest/sax –on** *nnnnn* **–cit –login** *name_sys_admin password* **<RETURN>**
You receive SAX error messages.	Report the error messages to your designated service representative.

Table 7–10. Problems Configuring the Workstation in Service Mode

Problem	Solution
Configuration mode doesn't start.	Contact your designated service representative.
You receive the message:	
`Configuration EEPROM failed`	Contact your system administrator or your designated service representative to verify the workstation's System Mode and Interface Mode configurations.
`Too much data to save`	Contact your system administrator or your designated service representative to reconfigure the workstation with fewer interfaces.
`EEPROM has bad information`	Contact your designated service representative.
`EEPROM Load Section Missing`	Contact your designated service representative.
`EEPROM Defaults Section Missing`	Contact your designated service representative.
`Configure Mode Failed`	Contact your designated service representative.

LED Error Codes

This section contains information about the error codes displayed by the LEDs on the system's front panel.

Figure 7–1 shows the location of the system unit's front panel LEDs. There are nine LEDs on the front panel. The green LED is labeled "P" and indicates that the system is powered up. The amber LEDs labeled "A" through "H" indicate system status.

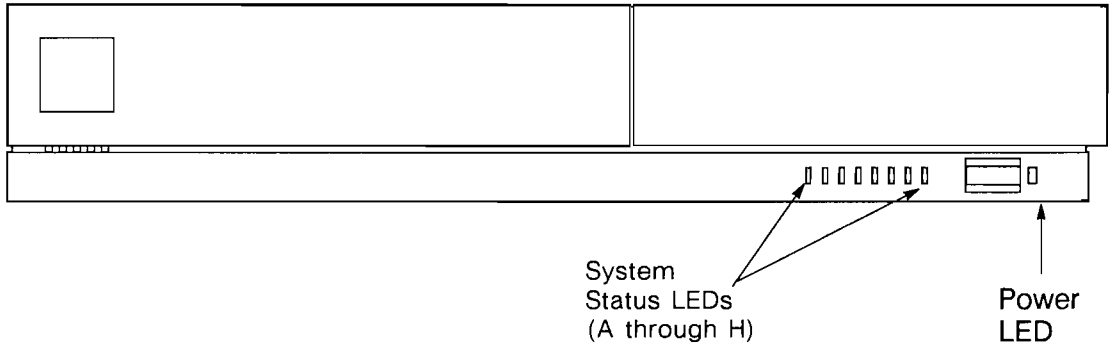
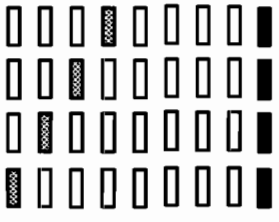


Figure 7–1. Front Panel LEDs

Table 7–11 shows the codes displayed by the LEDs during normal system operation. Note that the "Network Receive In Progress" and "Network Transmit In Progress" codes can flash so rapidly that they appear as a steady (not flashing) display.

Table 7–11. LED Codes

LED Display (A Through D Flashing)	**Message**
A B C D E F G H P	
	Operating System Running
	Disk Access In Progress
	Network Receive In Progress
	Network Transmit In Progress
P = Power-On Indicator  = LED On	

Boot PROM Diagnostics LED Error Codes

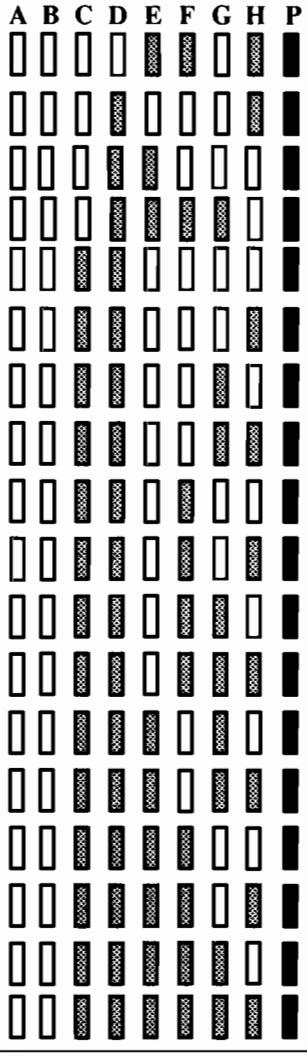
If an error occurs during the power-up diagnostics tests, the diagnostics use the front panel LEDs to display a code for the failing Field Replaceable Unit (FRU).

If the system is in Normal mode and an error occurs, you receive a prompt that asks if you wish to continue the tests and try to boot the operating system; the LEDs and the display screen show the failing FRU and system status. If the system is in Service mode and an error occurs, the tests halt, with the LEDs and the display screen showing the failing FRU and system status.

Table 7–12 shows the LED code display, FRU name, and hexadecimal numbers for the system as they appear on the front panel display. Use these LED codes to determine the failing FRU.

Once the CPU/Motherboard/Memory is tested, the diagnostics use the display screen to report the test status. The screen displays any failing FRUs.

Table 7–12. LED Codes for FRUs

LED Display	Field Replaceable Unit Name	Hex Code
	Boot ROM	0D
	EEPROM	21
	DMA	28
	EEPROM	2D
	SCSI Device 0	30
	SCSI Device 1	31
	SCSI Device 2	32
	SCSI Device 3	33
	SCSI Device 4	34
	SCSI Device 5	35
	SCSI Device 6	36
	SCSI Device 7	37
	SIO	3A
	Memory	3B
	CPU Board	3C
	System Bus	3D
	Domain Keyboard	3E
	CPU Board (Utility)	3F

P = Power–OK Indicator = LED On

Mnemonic Debugger Level LED Status Codes

At the Mnemonic Debugger (MD) level, while the system is in Service mode, the front panel LEDs display system status codes. Table 7–13 lists the MD status LED codes and their meanings.

Table 7–13. MD Level LED Status Codes

LED Display (E Through H Flashing)	System Status	Hex Code
A B C D E F G H P		
	Keyboard Wait Loop	08
	Waiting at MD Prompt	0C
	Waiting for Disk	02
	Waiting for Network Transmit	03
	Waiting for Volunteer Response	04
	Waiting for Network Receive	05

P = Power–OK Indicator
 = LED On

Running the SAX Diagnostics Tests

This section describes how to run the SAX diagnostics tests. Use the following procedure to run SAX:

1. If the system has a floppy drive, insert a floppy diskette in it (see Figure 7–2). If the system has a CD–ROM, SAX does not test the drive; ignore any error messages you receive.

NOTICE: Do *not* insert a diskette that contains valuable data. The SAX test will destroy data stored on the diskette.

If your system does not have a floppy drive, go to Step 3 to run the SAX tests.

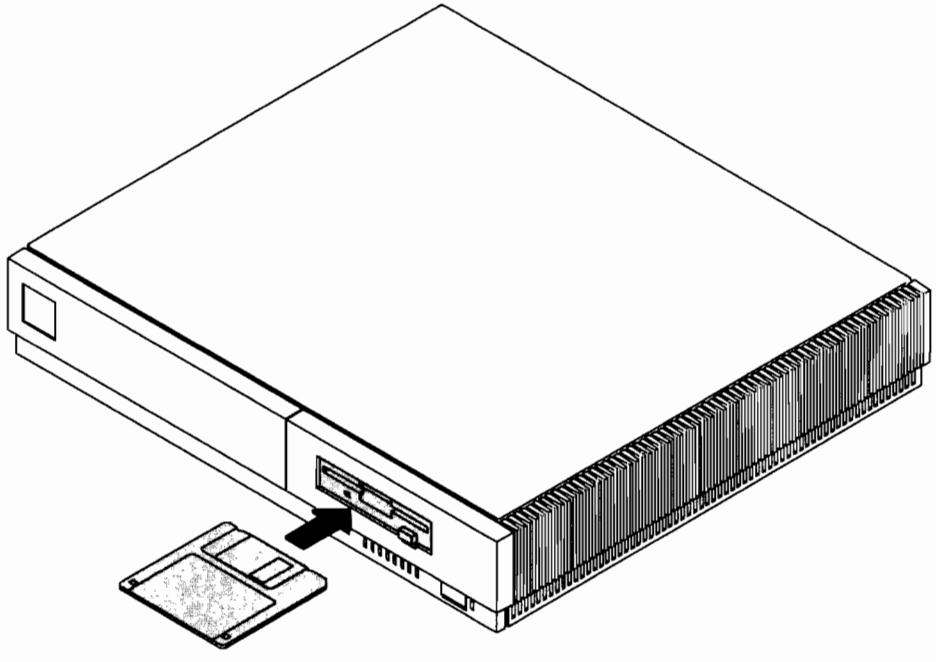


Figure 7–2. Inserting the Floppy Diskette

2. If the diskette you loaded has never been used for SAX testing, initialize the diskette according to directions in Appendix B.

NOTICE: SysV is the default operating system environment for the Hardware Acceptance Program (HAP) when the system initially boots. After you complete the system software installation procedure, the system administrator may change the default operating system environment to any of the three operating environments: SysV, BSD, or Aegis.

3. If you are testing a *disked* workstation, begin the SAX tests by typing the **sax** command shown in Figure 7–3.

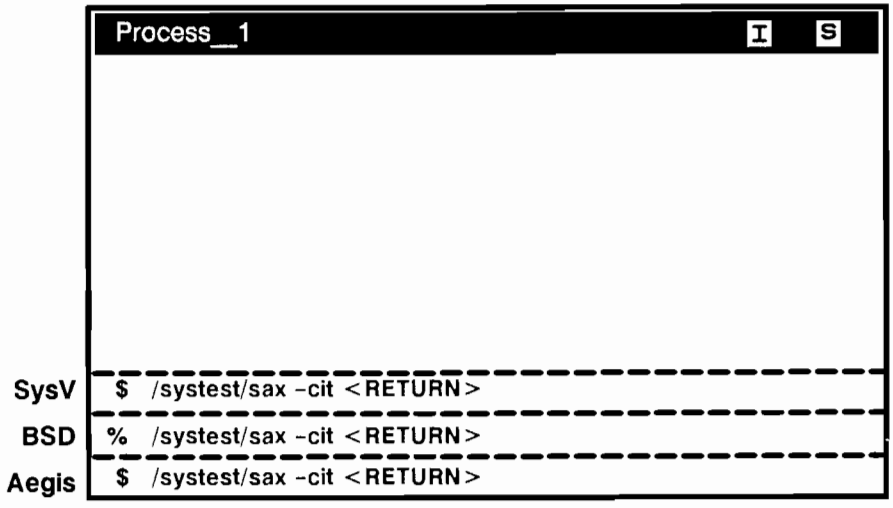


Figure 7–3. Starting the SAX Tests

If you are testing a *diskless* workstation, you must also start the **sax** program on its partner node (see Chapter 3). Use the command shown in Figure 7–4 to start **sax** on the partner node.

If your system is *diskless*, you or your system administrator should set up a permanent partner for it. For instructions, refer to the *Managing SysV System Software*, *Managing BSD System Software*, or *Managing Aegis System Software* manuals.

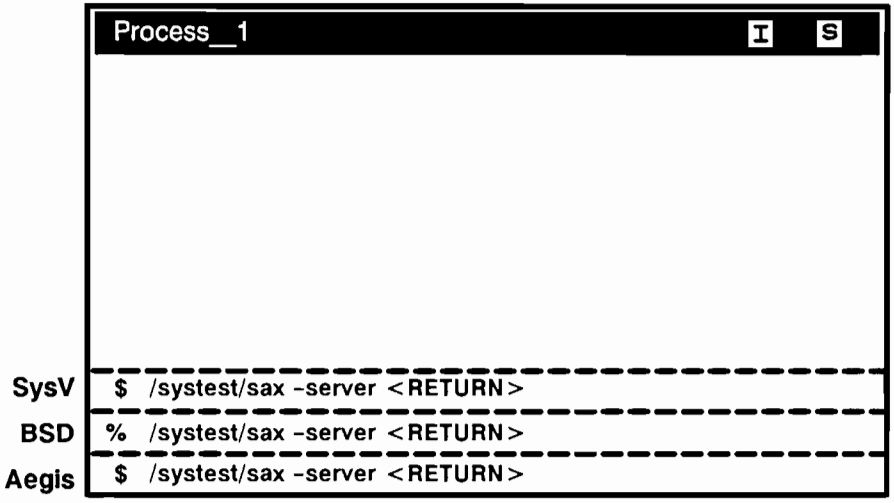


Figure 7–4. Starting the SAX Tests on a Partner Node

4. Your screen now displays multiple windows as concurrent tests run (see Figure 7–5).

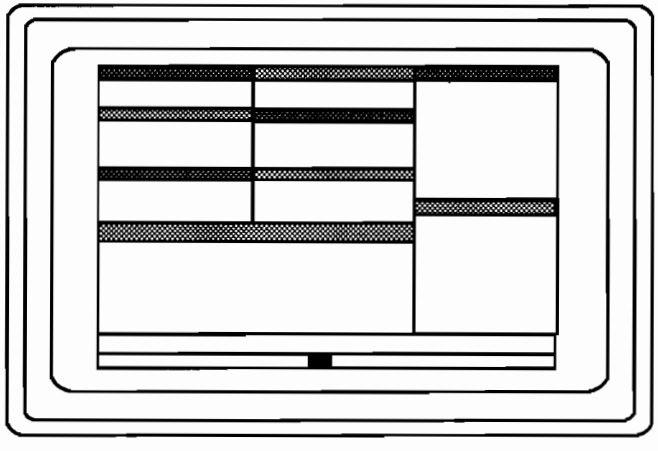


Figure 7–5. Multiple Window Display

The SAX tests take up to 20 minutes to run on a fully configured system. When the system passes the SAX test, you receive the following message:

```
End of pass 1, 0 errors
End Time: mm/dd/yyyy hh:mm:ss
Elapsed runtime: hhhh:mm:ss
```

If you receive an error message that has not been explained in the *Software Release Document(s)* you received with your system software, contact your designated service representative.

Replacing the Real–Time Clock Battery

Before you replace the real–time clock battery, make sure that you have performed the following:

- Shut down the operating system.
- Turn off the power to the workstation.
- Disconnect all power cords and external cables.

Perform the following steps to open the system unit:

WARNING: The lithium battery may explode if mistreated. Do not put lithium batteries in fires. Do not try to recharge or disassemble the batteries.

WARNING: Replace the battery with only a Matsushita Electric BR–2325, three–volt lithium battery (part number 1420–0314). Use of any other battery may cause fire or explosion.

1. Open up the system unit according to the directions in Appendix B.

2. Raise the tab holding the battery in place and remove the battery as shown in Figure 7–6.

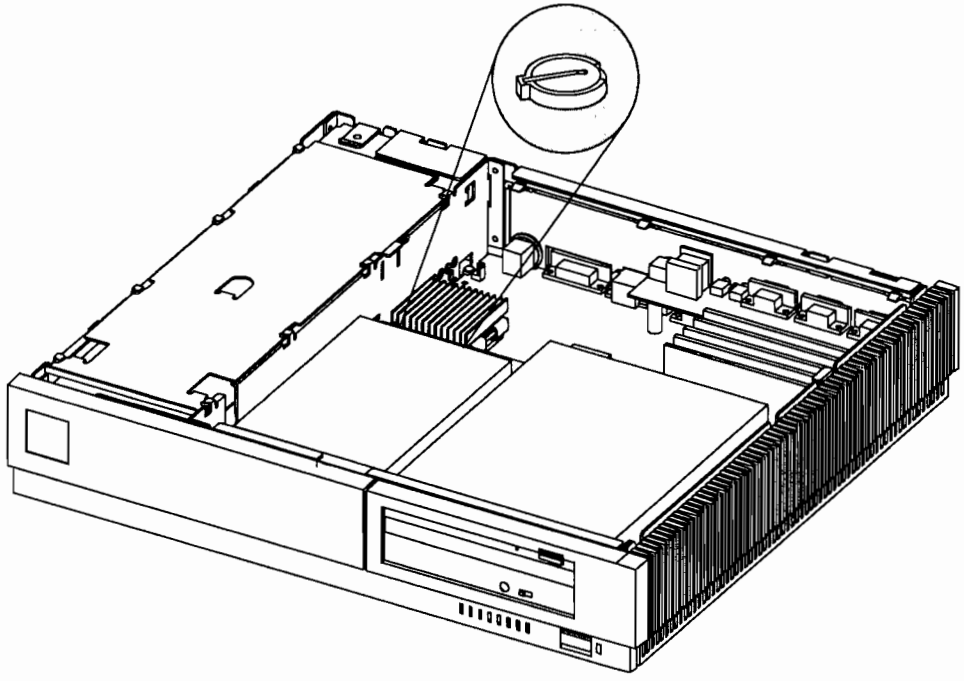


Figure 7–6. Removing the Real–Time Clock Battery

3. Install the new battery. Close the system unit.

Chapter 8
Recovering from a System Crash

This chapter tells you how to recover from a system crash (failure). It describes the following:

- Handling a system hang
- Handling a system crash
- Returning to Normal mode
- Dumping memory

Handling a System Hang

A system hang is caused by a hardware, software, or network failure. If a system hangs, it suddenly stops responding to keyboard input and the cursor stops flashing or disappears. This section describes several steps you can take to correct system hangs.

NOTICE: Use the following procedure only if your system was running the operating system when the hang occurred. If a hang occurs while you're starting up or running at the Mnemonic Debugger (MD) level, contact your designated service representative.

1. If the cursor disappears while you're executing a program, the program may have hung.

   Quit the program by typing **CTRL/c** in the SysV or BSD environments or by by typing **CTRL/q** in the Aegis environment. If your system still isn't working properly, go to Step 2.

2. If the problem continues, go to another node in your network and type the command shown in Figure 8–1.

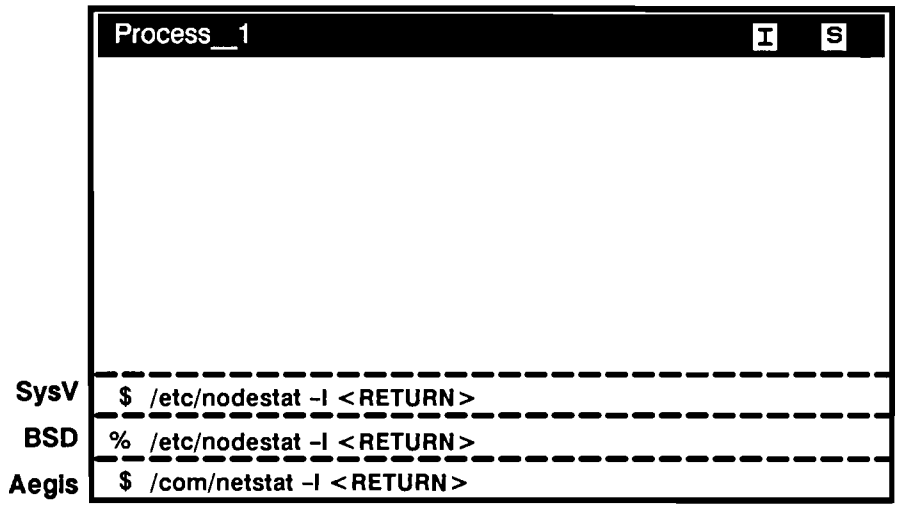


*Figure 8–1. Using the **nodestat** or **netstat** Command*

3. The screen now displays statistics about network communications. The last lines of the display contain the date and time of the last recorded network failure. Figure 8–2 shows a typical network reading regarding network failure.

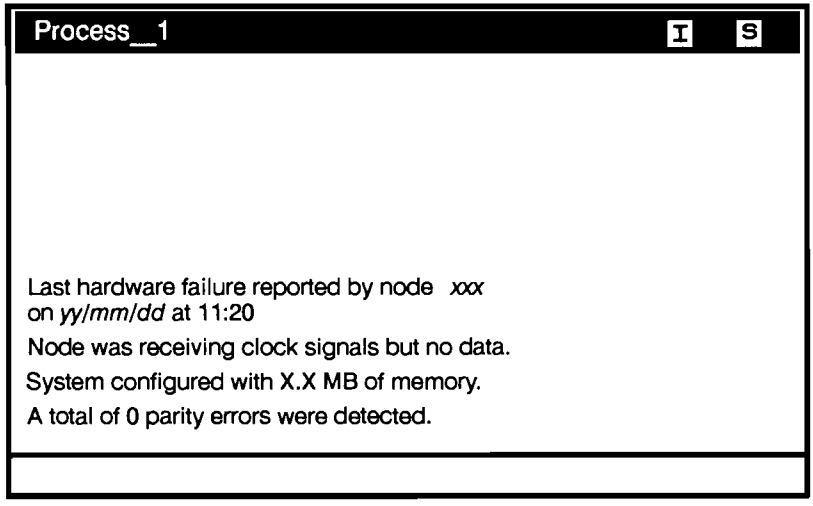


Figure 8–2. Network Communications Statistics

4. If the last network hardware failure was recent, your network may be the cause of the system hang. Report the possible network problem to your system administrator.

If the problem isn't your network, or no network hardware problems are listed, go to Step 5.

5. Go back to your system and press the Service mode switch to set the system to Service mode as shown in Figure 8–3.

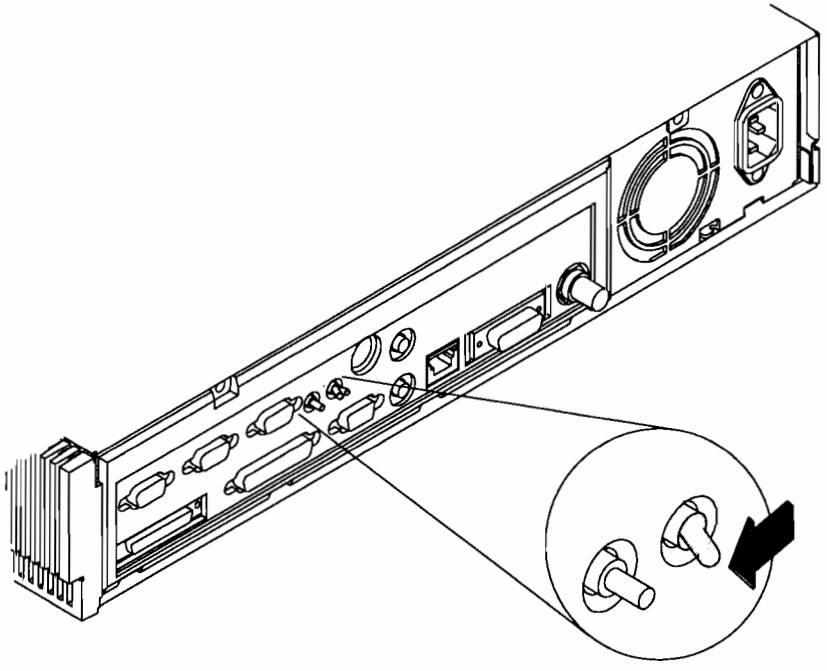


Figure 8–3. Setting the System to Service Mode

6. Now press **CTRL/ < RETURN >**.

Check to see if your screen displays a crash status message similar to the one shown in Figure 8–4.

The crash status message shows that you've stopped the operating system and given control to the MD.

NOTICE: If the crash status message appears, go to Step 7. If it doesn't, go to Step 8.

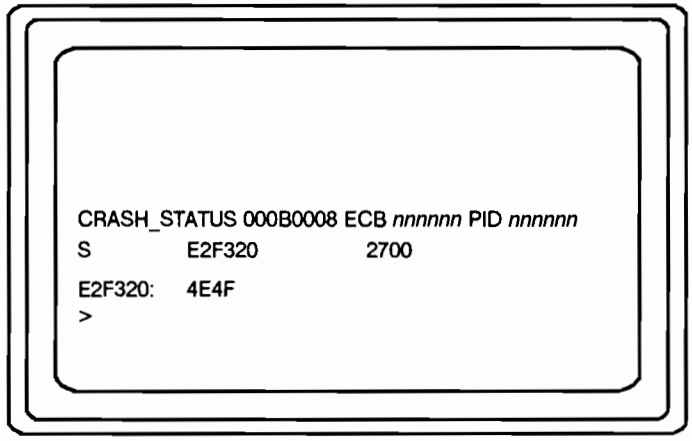


Figure 8–4. Sample Crash Status Message

7. Make a note for future reference of what program you were running when the hang occurred. Also note that you were able to give control to the MD by pressing **CTRL/<RETURN>**.

   Restart the operating system by typing the command line shown in Figure 8–5.

   Wait about 20 seconds. If your display resets and the flashing cursor appears, the node hang is fixed and you can continue normal operation. Set the Service/Normal mode switch to Normal mode and resume processing.

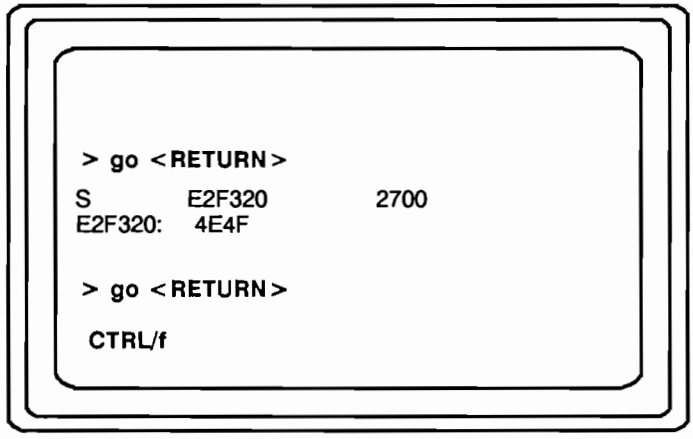


Figure 8–5. Restarting the Operating System

Follow the instructions in Steps 8 through 10 only if the crash status message shown in Step 6 *did not* appear.

8. Because the crash status message didn't appear, you must manually reset your system. To do this, press the Reset switch on the workstation's rear panel as shown in Figure 8–6.

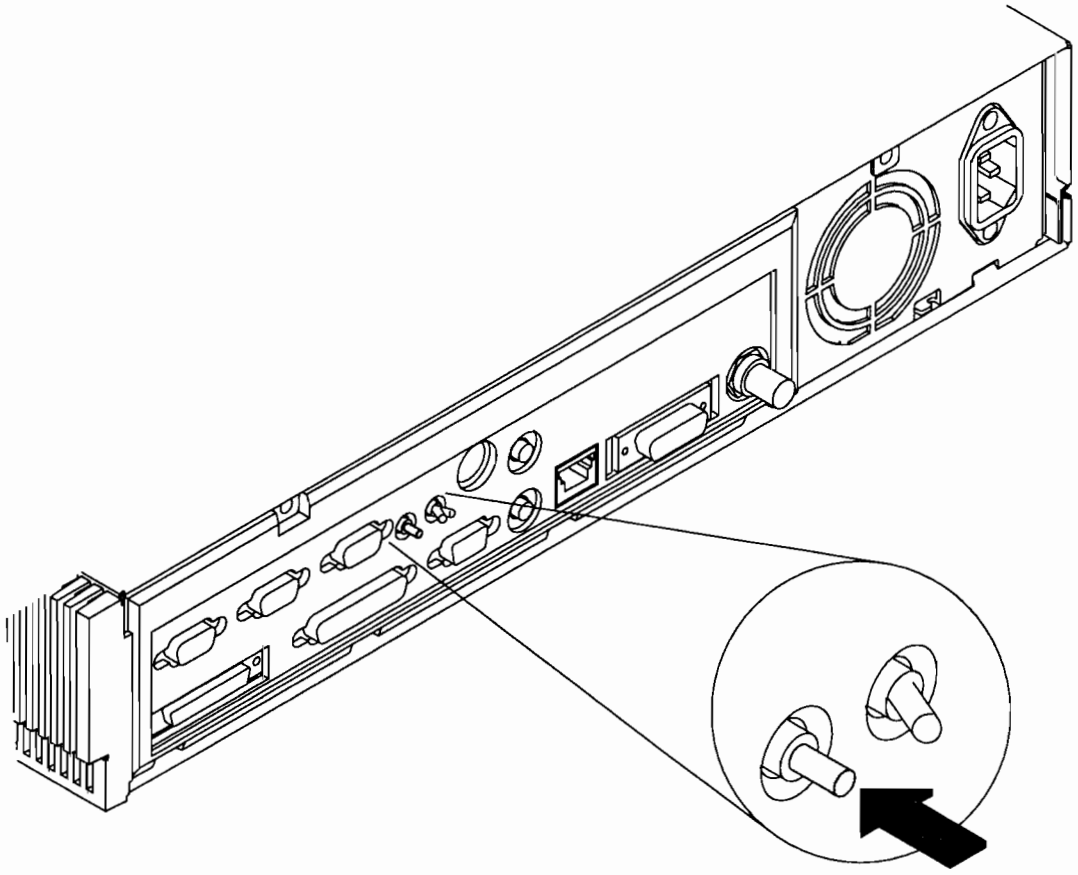


Figure 8–6. Resetting the System Manually

9. At the MD " >" prompt, type the lines shown in Figure 8–7.

Make a note for future reference of what program you were running when the system hang occurred. Also note that you were able to give control to the MD by pressing the Reset switch.

Figure 8–7. Responding to the MD Prompt

10. Report the system hang to your designated service representative. If your service representative asks you to perform a memory dump, go to the "Dumping Memory" section later in this chapter. If not, go to Step 11.

11. To restart the operating system, first set the Service/Normal mode switch to Normal mode and then press the Reset switch as shown in Figure 8–8.

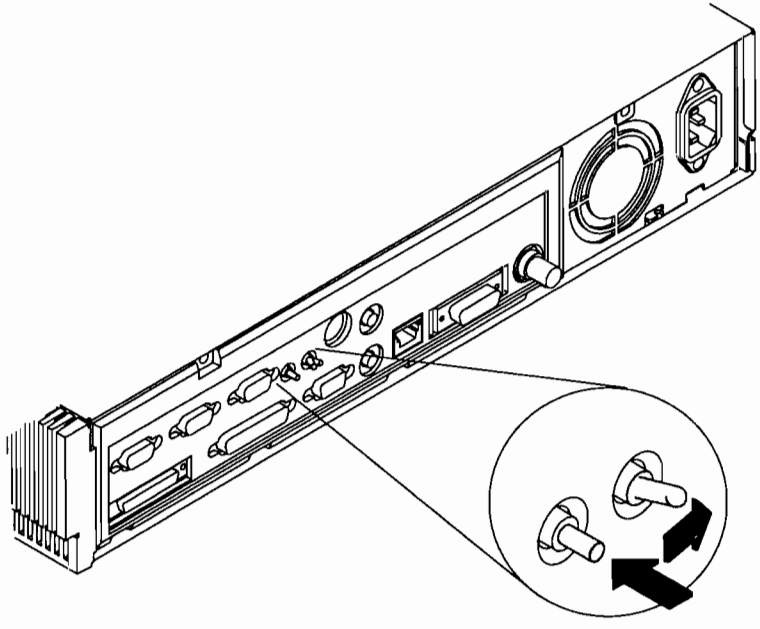


Figure 8–8. Resetting the Operating System

The system now runs the diagnostics. If the workstation boots from a storage device, and the storage device needs salvaging, the system automatically executes the **salvol** program and displays the "SALVAGING BOOT VOLUME" message. When **salvol** completes, the system loads the operating system.

12. Log in when the "login:" prompt appears. Your system has now recovered from the system hang.

Handling a System Crash

A crash is an unexpected exit from the operating system to the Mnemonic Debugger (MD) program. When a system crashes, all processes stop and a crash message appears at the bottom of your screen. The crash message is followed by the MD ">" prompt as shown in Figure 8–9.

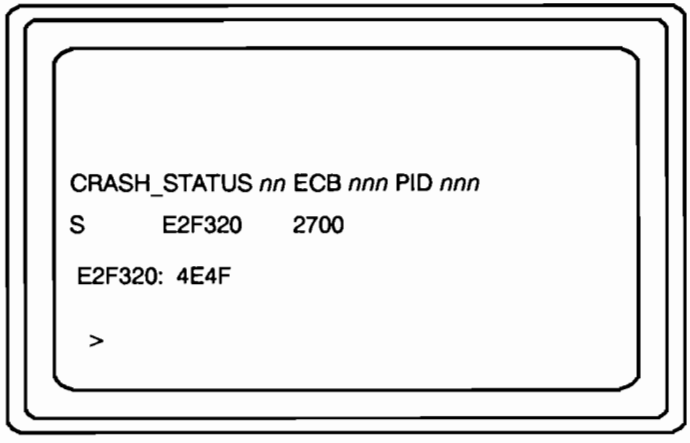


Figure 8–9. MD Prompt Following a Sample System Crash Message

After a crash, the operating system boots when certain conditions are met at the time of the crash. These conditions are as follows:

- The Service mode switch was set to Normal mode.
- System initialization is completed.
- A full disk didn't cause the crash.

When a disked system automatically reboots, your screen displays one of the messages shown in Figure 8–10.

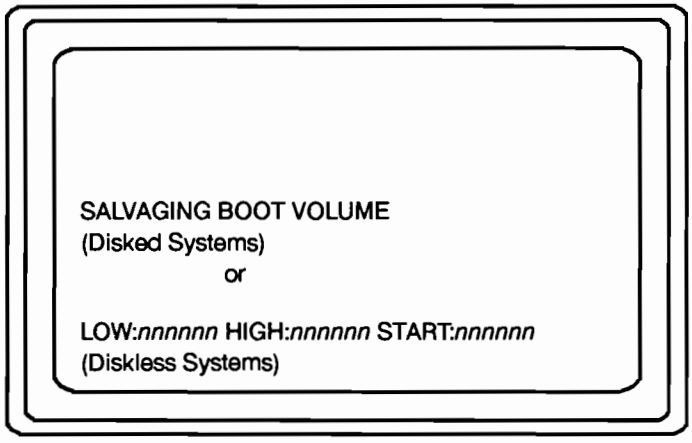


Figure 8–10. Sample Rebooting Messages

Then the system begins loading the operating system from its own disk or its partner node. When you see the "login:" prompt, log in and continue normal operations.

When the system automatically reboots, it *does not* perform a memory dump; it *does* record the error in its **sys_error_log** file.

Use the **lsyserr** utility to read the log file as shown in Figure 8–11.

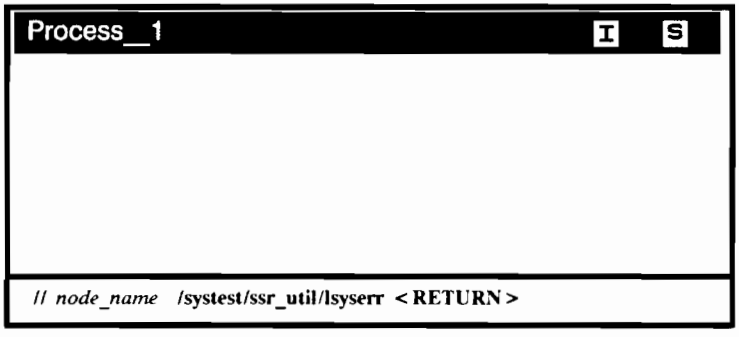


Figure 8–11. Running the lsyserr Utility

Because many different problems can cause crashes, we can't list all of the possibilities. However, the following three items initial actions to take when your system crashes and *does not* automatically reboot.

- Record the crash message. Check to see if the system has crashed before with the same status code.

  If your system has not previously crashed with the same status code, go to Step 1.

- If the same status code has appeared before, this may indicate a hardware problem. Report this to your designated service representative, then go to Step 3.

  If the status code has not appeared before, go to Step 1.

- Check Table 8–1 to see if it lists your crash status code. If it does, follow the instructions in the solution column of the table.

  Record the meaning of the status code, and go to Step 3.

  If your crash status code *is not* listed in Table 8–1, go to Step 1.

Table 8–1. Common Crash Status Codes and Solutions

Status Code	Meaning	Solution
000B0008	You pressed **CTRL/<RETURN>** when your node was in Service mode or an SIO port received a 1B (hexadecimal) character.	1. Enter the following command: **>go <RETURN>** 2. Type **CTRL/f** to reset your screen. 3. Make sure the Service mode switch is set for Normal operation 4. Resume Normal operation.
0008*nnnn*	Your node may have a disk problem (*nnnn* can be any hexadecimal character).	Report the problem to your designated service representative.
0012000F	Your node may have a memory hardware problem.	Report the problem to your designated service representative.

1. Find the meaning of your crash status code by going to another node in your network that is running the operating system and type the command shown in Figure 8–12.

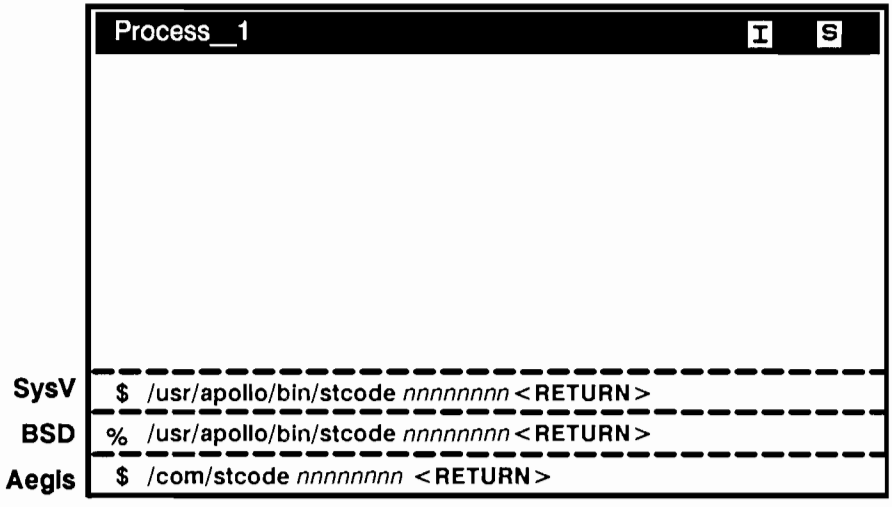


Figure 8–12. Entering the Crash Status Code

Substitute the actual crash status code that you received for *nnnnnnnn*, starting with the leftmost, nonzero character. For example, crash status code 0008001B would be entered as 8001B.

2. Record the meaning of the status code and report the crash to your designated service representative. If your service representative asks you to perform a memory dump, go to the "Dumping Memory" section later in this chapter. If not, go to Step 3.

3. To restart the operating system, first set the Service/Normal mode switch to Normal and then press the Reset switch as shown in Figure 8–13.

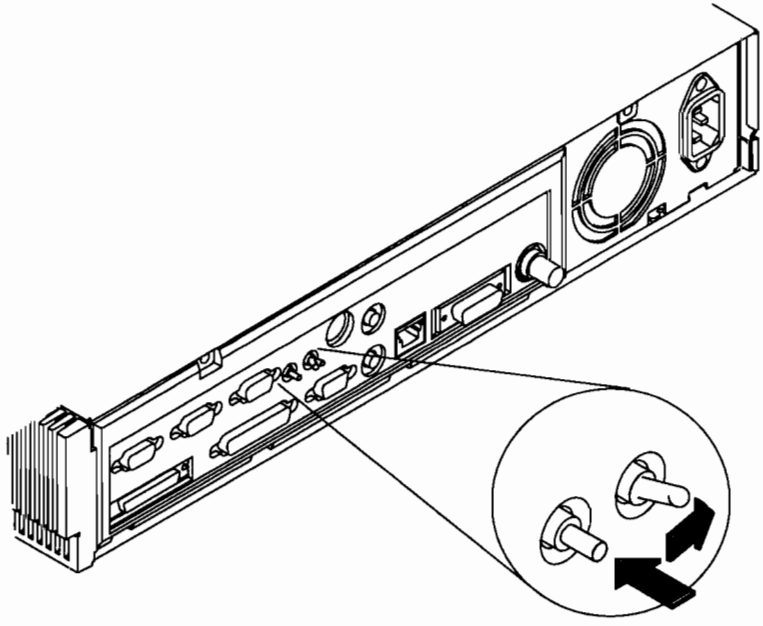


Figure 8–13. Restarting the Operating System

The system now runs the diagnostics. If the workstation boots from a storage device and the storage device needs salvaging, the system automatically executes the **salvol** program and displays the "SALVAGING BOOT VOLUME" message. When **salvol** completes, the operating system is booted.

4. Log in when the "login:" prompt appears. Your system has recovered from the crash.

Salvaging the Second Disk

In the event of a node crash, the second disk is not automatically salvaged when the first one is. You can only salvage the second disk only after the first one has been salvaged by the system.

To restart the operating system, first press the Service/Normal mode switch to set Service mode and then press the Reset switch as shown in Figure 8–14.

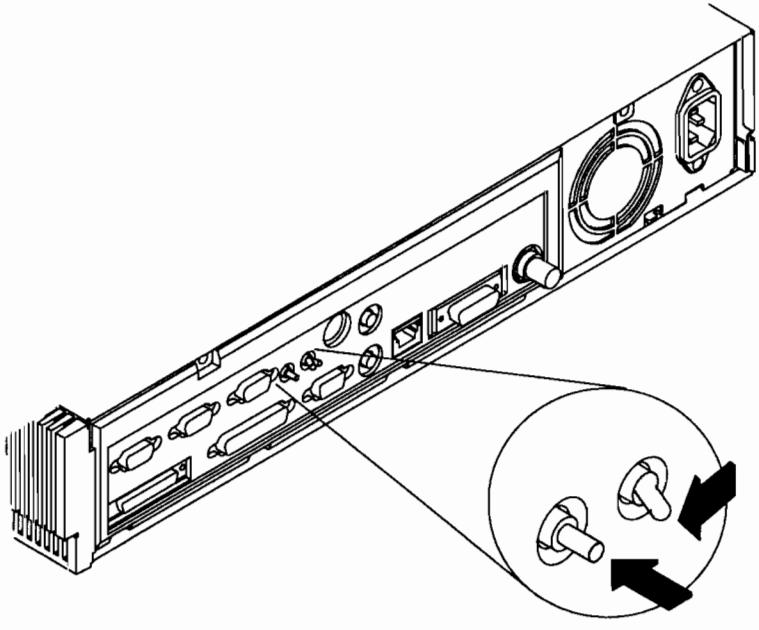


Figure 8–14. Restarting in Service Mode

Press **<RETURN>**. After a short pause, the MD (Mnemonic Debugger) prompt ">" appears on the screen. Type the **ex salvol** command shown in Figure 8–15 to begin salvaging the second disk.

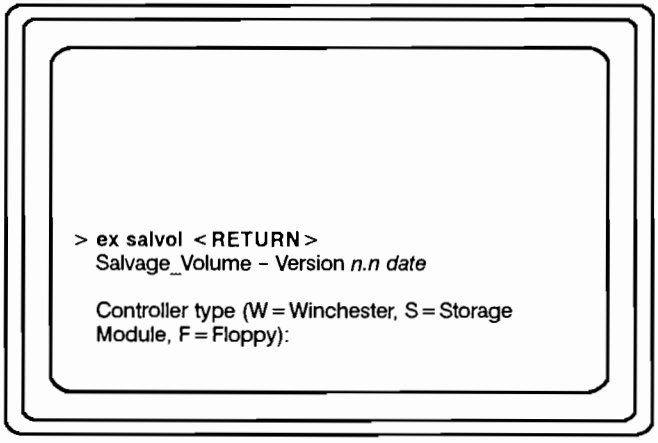


Figure 8–15. Salvaging a Second Disk from the MD

Type the command shown in 8–16 to select the second disk as the target of the salvage operation, where:

w specifies a Winchester disk drive.

c specifies the disk controller number.

u specifies the disk unit number.

When prompted with "lv_num -option" as shown in Figure 8–16, enter the logical volume number and options. For more detailed information concerning **salvol**, refer to the appropriate *Command Reference* manual. The **salvol** command runs the salvage routine, and displays disk information when finished.

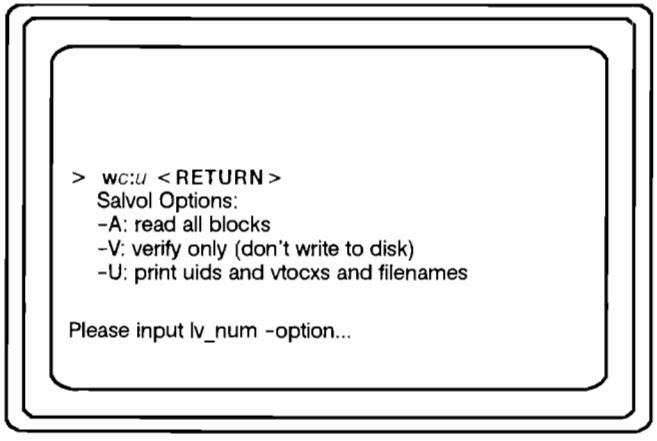


Figure 8–16. Selecting the Second Disk for Salvaging

Returning to Normal Mode

To return to Normal mode operation, first set the Service/Normal mode switch to Normal mode and then press the Reset switch to reboot the system as shown in Figure 8–17.

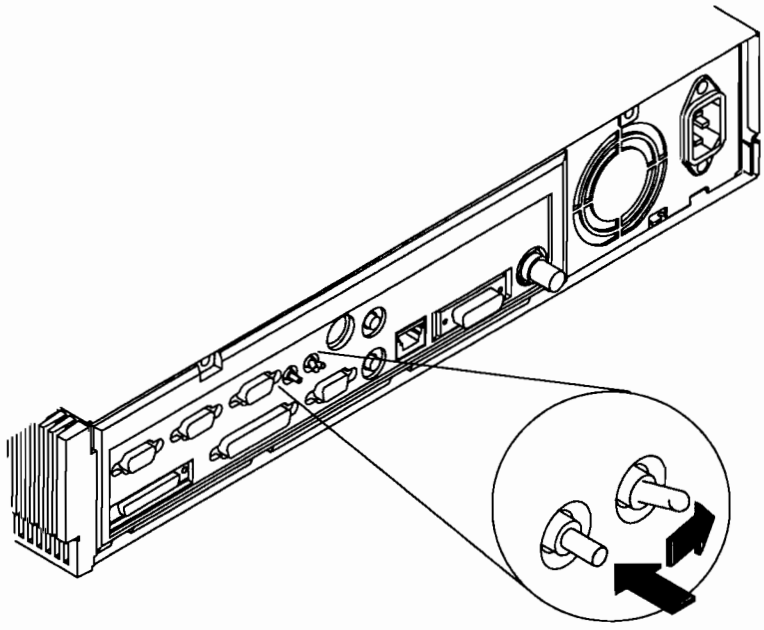


Figure 8–17. Restarting in Normal Mode

Dumping Memory

A memory dump makes a copy of the system memory contents at a particular time. Memory dumps are especially useful for analyzing the cause of a hang or crash. This section describes two memory dump procedures:

- Dumping memory to a cartridge tape — Use this procedure if your system has an external cartridge tape drive.
- Dumping memory across the network — Use this procedure if your system does not have a cartridge tape attached to it.

NOTICE: Do *not* perform a memory dump unless your designated service representative requests it.

Dumping Memory to a Cartridge Tape

This section describes how to dump the system memory contents to the cartridge tape drive. Before beginning this procedure, make sure that the following conditions have been met;

- Your system has an external cartridge tape unit.
- The Service mode switch is set to Service mode.
- The system is under the control of the Mnemonic Debugger (MD). Your screen should display the MD " > " prompt.

Perform the following steps to dump memory to a cartridge tape.

1. Reset the MD as shown in Figure 8–18. The system now displays the revision date of the CPU PROM.

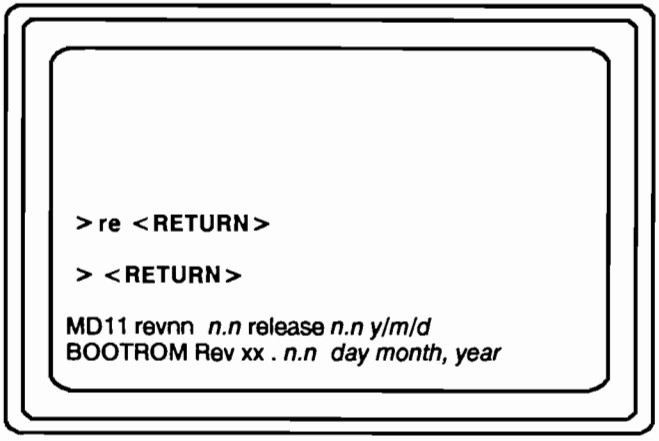


Figure 8–18. Resetting the MD

2. Insert a write–enabled cartridge tape into the drive.

3. Type the command shown in Figure 8–19 to direct the memory dump to the cartridge tape.

   Using **di c** instructs the system to look for the default (highest target ID) tape boot device. If you have more than one tape drive, you can select a specific tape drive boot device by using the following command:

   di st*n:n*

   where:

   st specifies the SCSI tape drive.
   n:n specifies the drive's target *ID:unit number.*

NOTICE: The *unit number* specified in the **di** command is always 0.

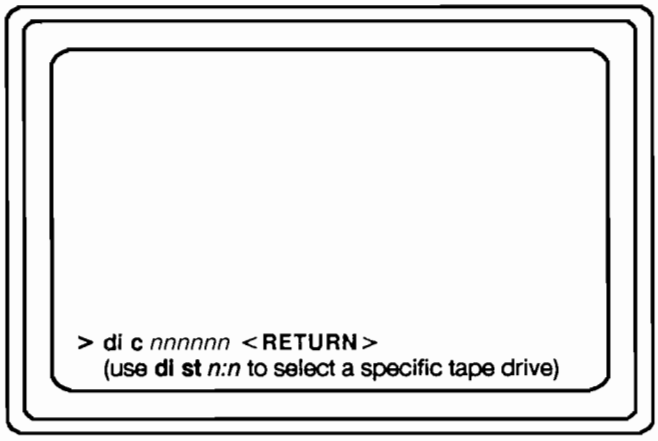


Figure 8–19. Directing a Memory Dump to a Cartridge Tape

4. Start the memory dump by typing the command shown in Figure 8–20.

Your system now displays a count of the pages dumped. Each exclamation point (!) represents 32 pages of memory.

NOTICE: If your system hangs during the memory dump procedure, press the Reset switch and go back to Step 1.

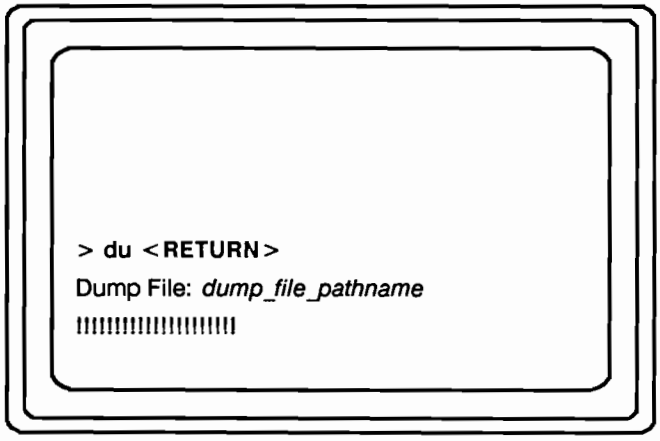


Figure 8–20. Starting the Memory Dump to a Cartridge Tape

5. When the memory dump is completed, the word "Done" appears at the bottom of your screen. Remove the cartridge tape from the drive and label it.

6. To restart the operating system, first set the Service/Normal mode switch to Normal and then press the Reset switch as shown in Figure 8–21.

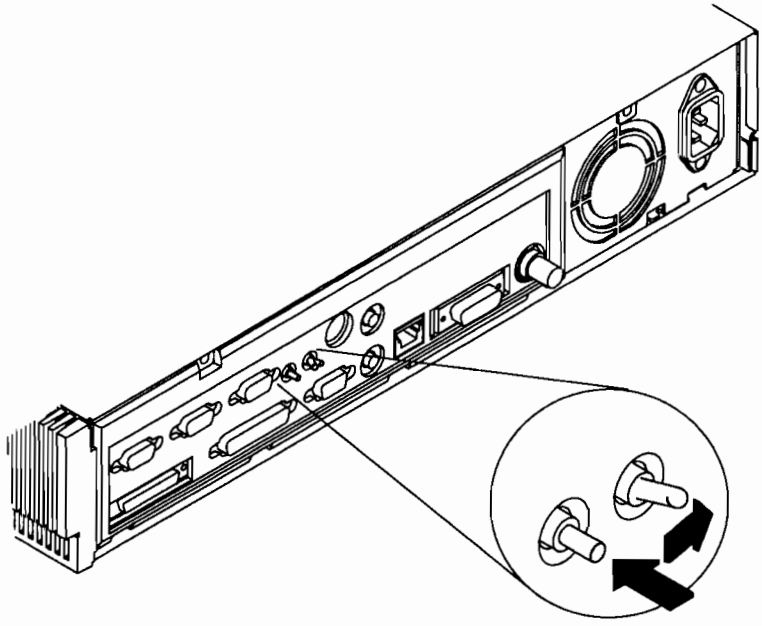


Figure 8–21. Restarting the Operating System

The system now runs the diagnostics. If the workstation boots from a storage device and it needs salvaging, the system automatically executes the **salvol** program and displays the "SALVAGING BOOT VOLUME" message. When **salvol** completes, the operating system is booted.

7. When the "login:" prompt appears, log in and set your working directory to the **/sau11** directory for your workstation as shown in Figure 8–22.

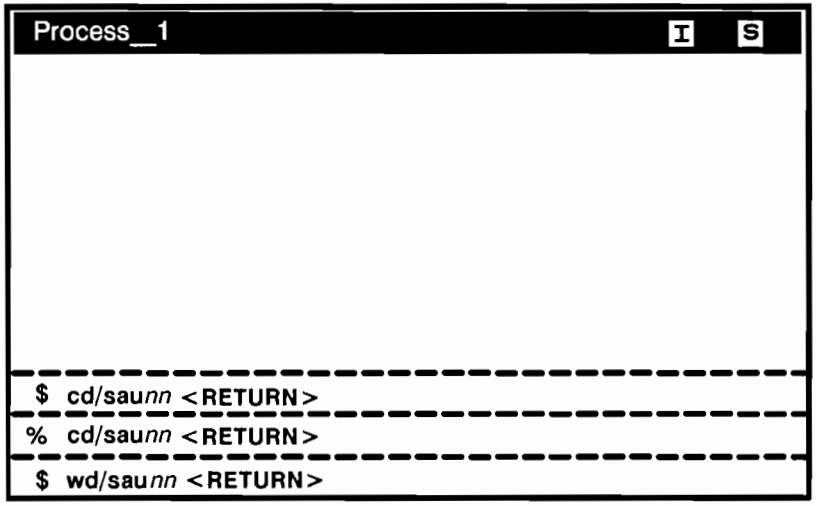


Figure 8–22. Setting the Correct Working Directory

8. Insert a blank, write–enabled cartridge tape into the drive and copy the **/sau11/domain_os.map** file by typing the command shown in Figure 8–23.

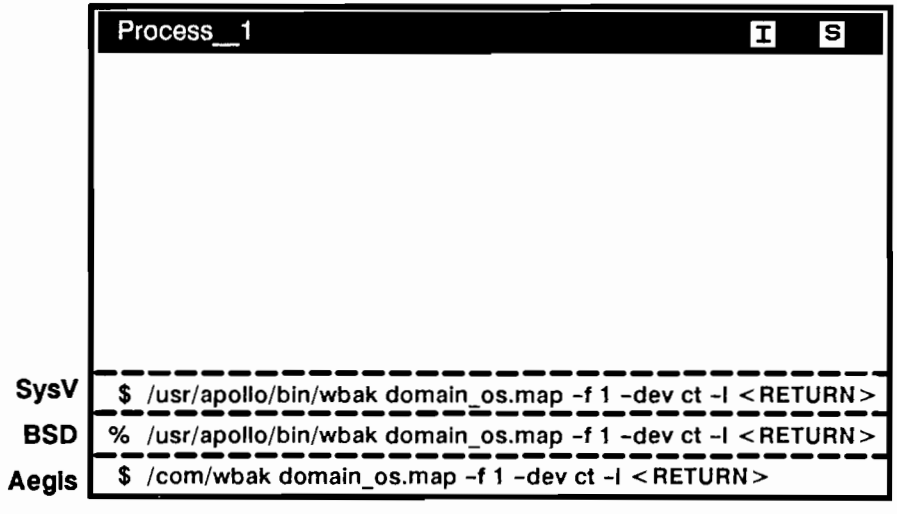


*Figure 8–23. Copying the /saunn/**domain_os.map** File*

As **wbak** proceeds, your screen displays several messages similar to those shown in Figure 8–24.

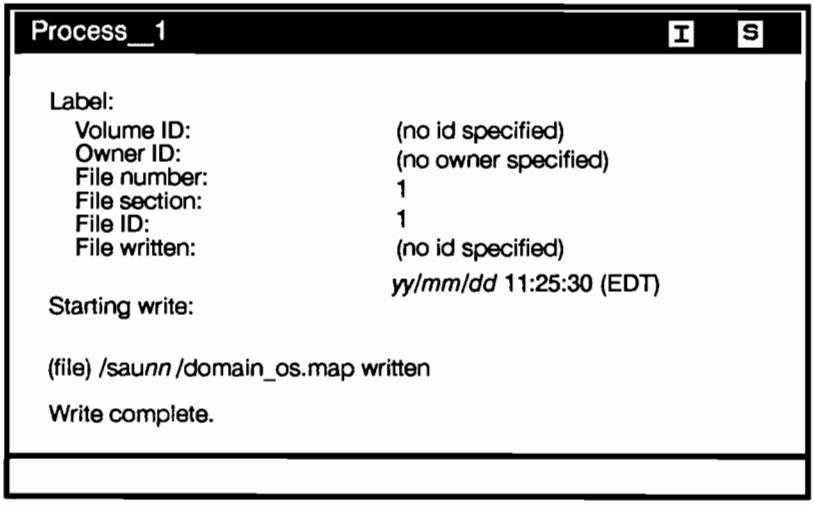


Figure 8–24. ***wbak*** *Messages*

9. When **wbak** completes, remove the cartridge tape from the drive and label it as follows:

/sau11/domain_os.map, *system_node_id*, *date*

Your designated service representative may ask for this tape to verify the system diagnosis.

Dumping Memory Across the Network

This section describes how to send a memory dump across the network and store it on another node's Winchester disk (the "dump storage node"). After storing the dump on the Winchester disk, you can then copy it a cartridge tape.

Before beginning this procedure, make sure that the following conditions have been met:

- The Service/Normal mode switch is set to Service mode.
- The system is under the control of the Mnemonic Debugger (MD). Your screen displays the MD " > " prompt.
- The dump storage node does have a cartridge tape drive.
- The dump storage node is running SR9.5 or a later software release. Use the **bldt** shell command to determine the node's software release.
- The dump storage node is running the **netman** process. (Type the command shown in Figure 8–25 at the dump storage node to see if **netman** is running. See your system administrator or the appropriate *Managing System Software* manual for more **netman** information.)
- You know the node ID of the dump storage node. To find it, type the command shown in Figure 8–26 from the dump storage node.

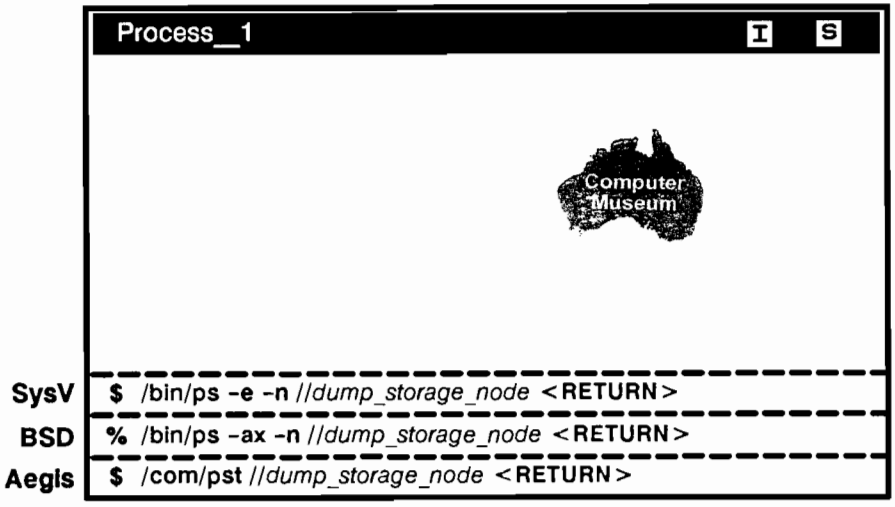


Figure 8–25. Checking for ***netman*** *Process on the Dump Storage Node*

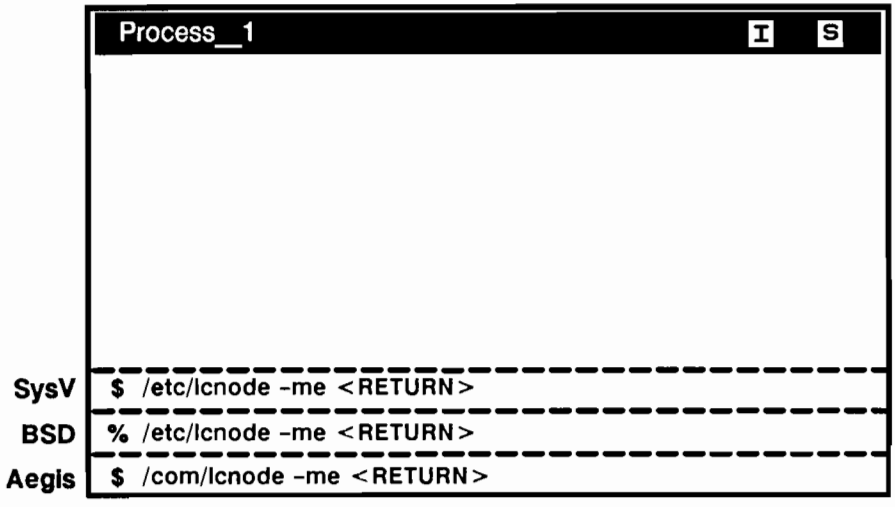


Figure 8–26. Finding the Node ID on the Dump Storage Node

- You also need to know if the dump storage node has enough free space on its Winchester disk to accept the memory dump information. To verify this, type the command shown in Figure 8–27 from the dump storage node.

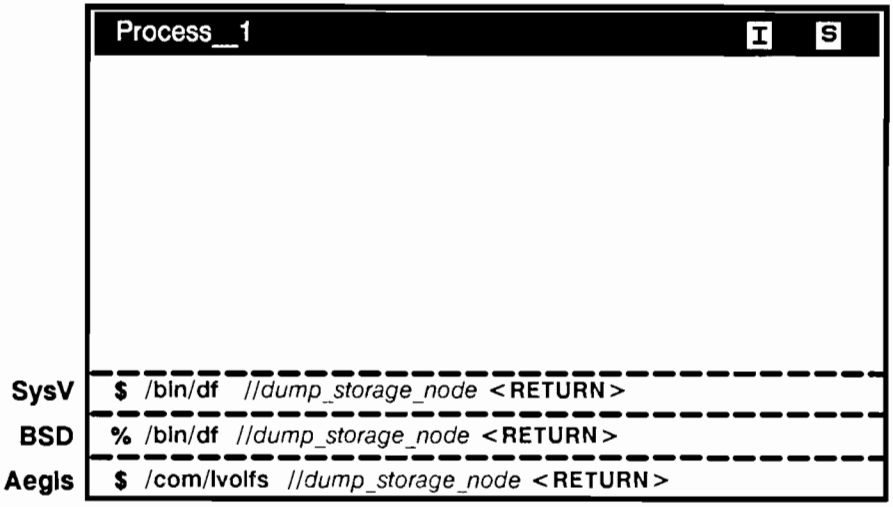


Figure 8–27. Verifying Free Space on the Dump Storage Node

If your system has 8 MB of memory, the dump storage node must have about 8000 free blocks on its Winchester disk. If your system has 16 MB of memory, the dump storage node must have about 16000 free blocks, and so forth.

If the dump storage node you've chosen doesn't have enough free space, either create more free space on its disk or choose another node.

Perform the following steps to dump memory across the network onto another node's Winchester disk.

1. Go to the system from which you are dumping memory. Reset the MD as shown in Figure 8–28. The system displays the revision date of the CPU PROM.

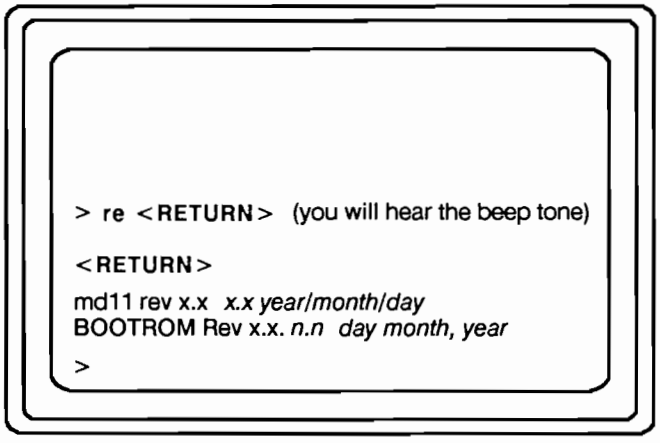


Figure 8–28. Resetting the MD on Your Workstation

2. Type the command shown in Figure 8–29 to direct the memory dump across the network.

   Replace *nnnnnn* with the dump storage node ID.

Figure 8–29. Directing the Memory Dump Across the Network

3. Start the memory dump by typing the command shown in Figure 8–30.

Your system now displays the name of the dump file and a count of the pages dumped. Each exclamation point (!) represents 32 pages of memory.

Record the *dump_file_pathname*, since you need it in Step 4.

The memory dump is complete when the word "Done" appears.

NOTICE: If your system hangs during the memory dump procedure, press the Reset switch and go back to Step 1.

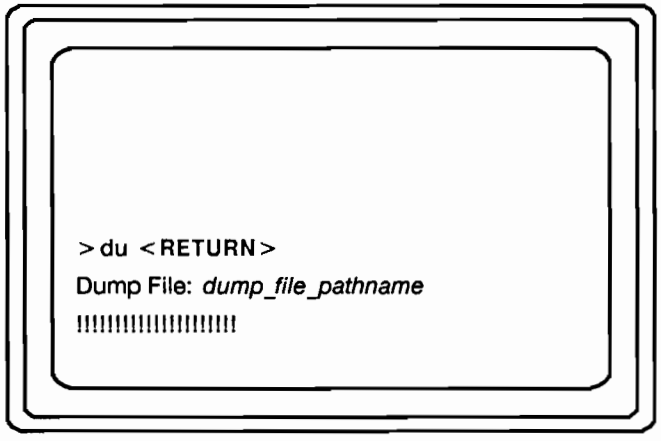


Figure 8–30. Starting the Memory Dump

4. Go to the dump storage node and copy the dump file onto a cartridge tape by typing a command as follows:

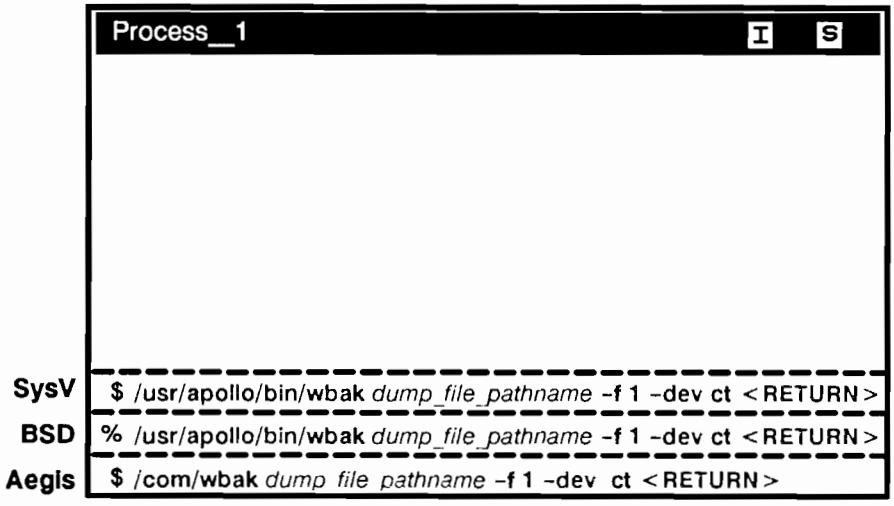


Figure 8–31. Copying the Dump File to a Cartridge Tape Drive

5. As **wbak** proceeds, your screen displays several messages similar to the ones shown in Figure 8–32.

```
Process__1                                          I   S

   Volume ID:              300_1
   Owner ID:               (no owner specified)
   File number:            1
   File section:           1
   File ID:                (no id specified)
   File written:           yy/mm/dd 11:30:30 (EDT)

Starting write:

** Floppy swap:  unit 0, volume "300_1"
   Please mount the next volume for writing.
   Press <RETURN> to continue

** The new volume id is "300_2".

(file) "dump.27fe.01.31" written.

Write complete.

:
```

*Figure 8–32. Sample **wbak** Messages*

6. Copy the map associated with the dump onto a cartridge tape by typing the command shown in Figure 8–33.

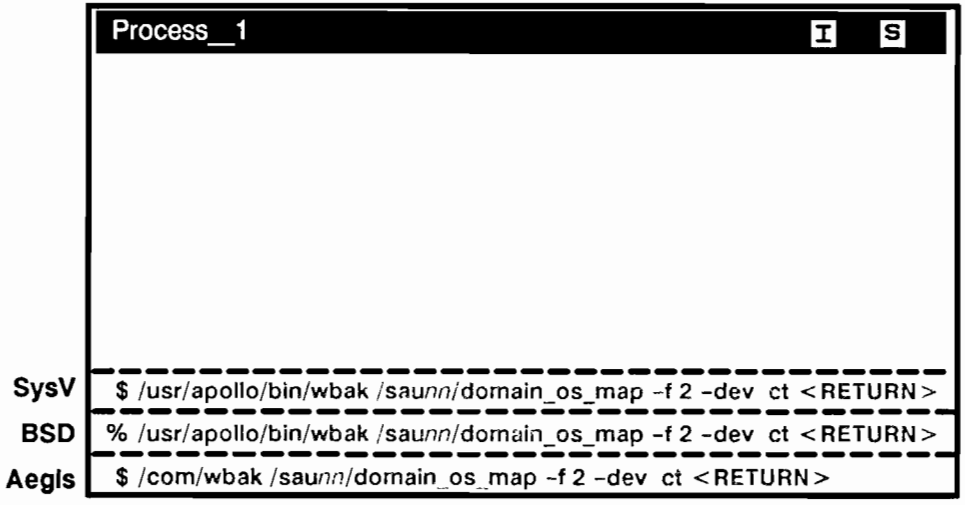


Figure 8–33. Copying the Dump Map to Cartridge Tape

7. When **wbak** has completed, remove the tape from the drive and label it to show the following names of *both* the files you have copied to it:

   - *dump_file_pathname*
   - **/sau11/domain_os_map**

8. To restart the operating system, first set the Service/Normal mode switch to Normal mode and then press the Reset switch as shown in Figure 8–34.

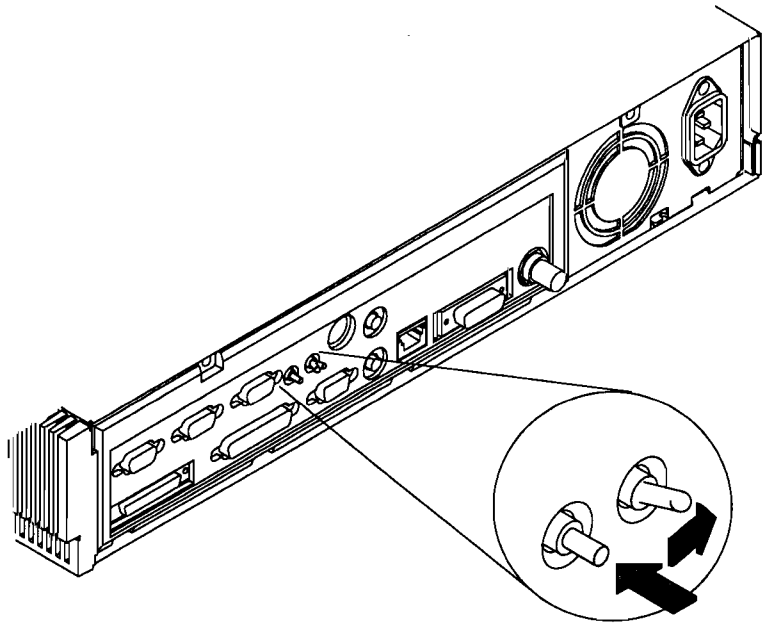


Figure 8–34. Restarting the Operating System in Normal Mode

The system now runs the diagnostics. If the workstation boots from a storage device and it needs salvaging, the system automatically executes the **salvol** program and displays the "SALVAGING BOOT VOLUME" message. When **salvol** completes, the operating system is booted.

9. When the "login:" prompt appears, go to a node in your network that contains a floppy diskette or cartridge tape drive.

10. If your system (referred to as *//problem_node*) has a Winchester disk, set your working directory to **/sau11** as shown in Figure 8–35.

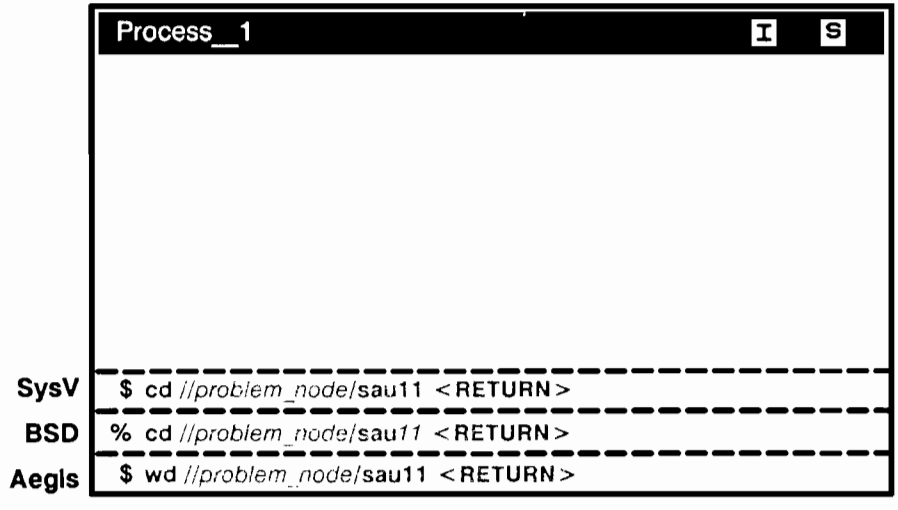


Figure 8–35. Setting the Working Directory on a Node with an Internal Disk

If your system does not have a Winchester disk, set your working directory as shown in Figure 8–36 (where *//partner_node* is the name of your node's partner).

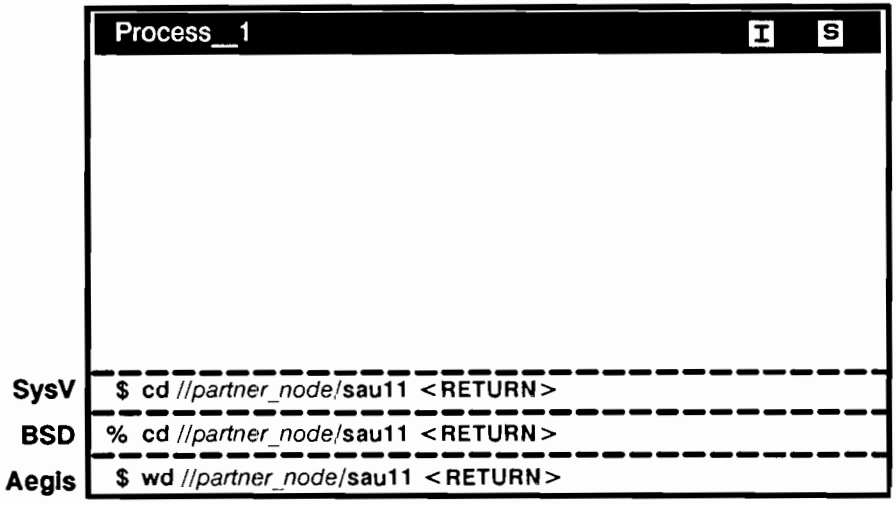


Figure 8–36. Setting the Working Directory on a Diskless Node

11. Copy the **domain_os.map** file onto the cartridge tape. Insert a blank, write-enabled cartridge tape into the drive and type the command shown in Figure 8–37.

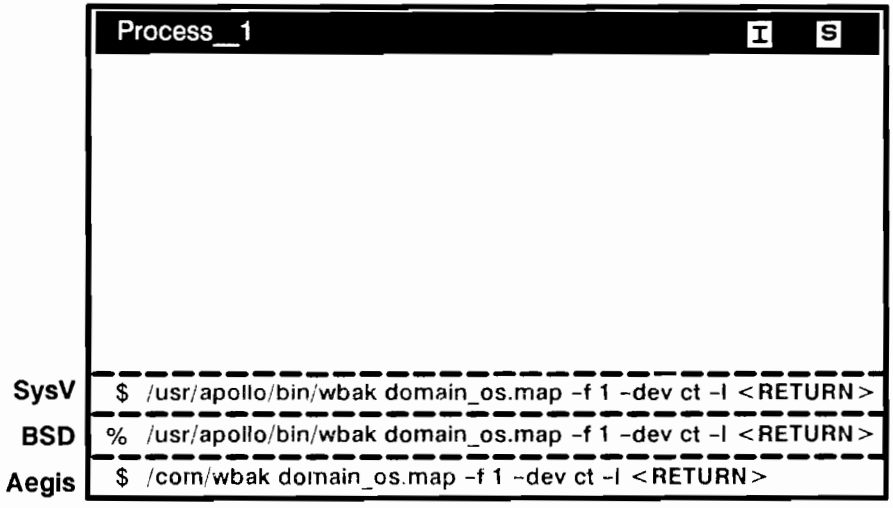


*Figure 8–37. Copying the **domain_os.map** File onto a Cartridge Tape Drive*

12. When **wbak** completes, remove the tape from the drive and label it as follows:

/sau11/domain_os.map, *system_node_id*, *date*

Chapter 9
Checking the 802.3 Network

This chapter describes how to verify the operation of the 802.3 (ETHERNET) network. It includes information about the following:

- Verifying the 802.3 network operation
- Connecting to the 802.3 network
- Verifying the network from the newly installed ssystem

Verifying the 802.3 Network Operation

Perform the following steps to install your workstation in the 802.3 network or when you need to verify that the network is functioning properly.

NOTICE: For new installations, perform Step 1 from *another* node already installed in the *same* network as the system that you are installing.

1. Log in at a node already installed in your network.

2. Verify the network of the node you chose in Step 1 by typing the **rtsvc** command as shown in Figure 9–1.

3. The screen displays a listing of the networks supported on the node as shown in Figure 9–2. The principal network is the *first* network listed.

   If the 802.3 network is not the principal network on the node, select another node where the principal network is the 802.3 network, or change the principal network selection on the node.

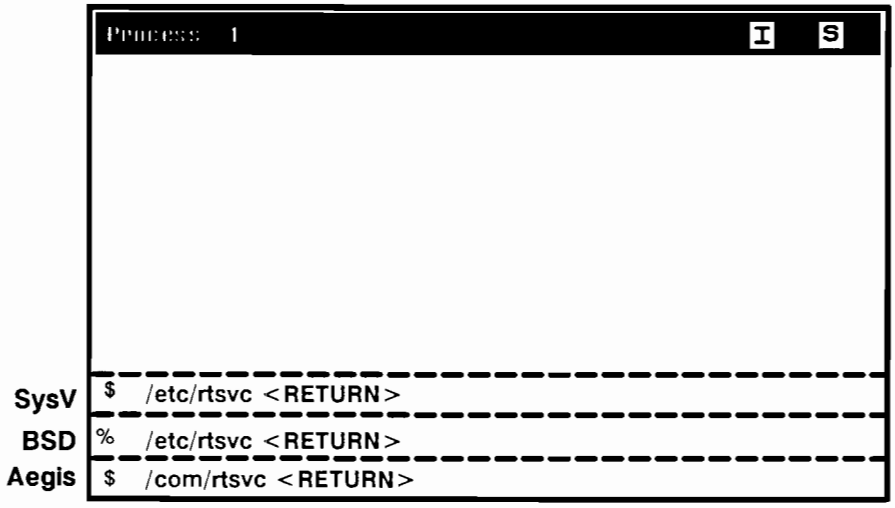


Figure 9–1. Checking the Principal Network on Another Node

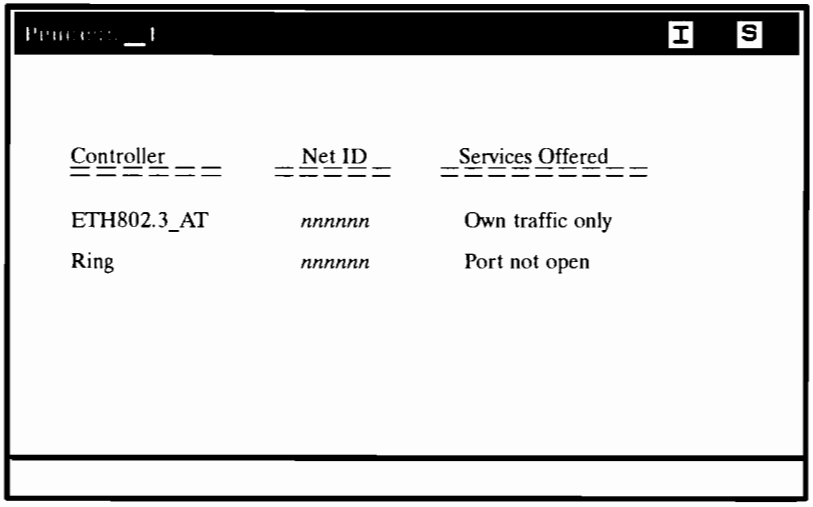


Figure 9–2. Sample Listing of Supported Networks

4. Catalog all new HP Apollo systems on the 802.3 network by typing the **ctnode** command as shown in Figure 9–3.

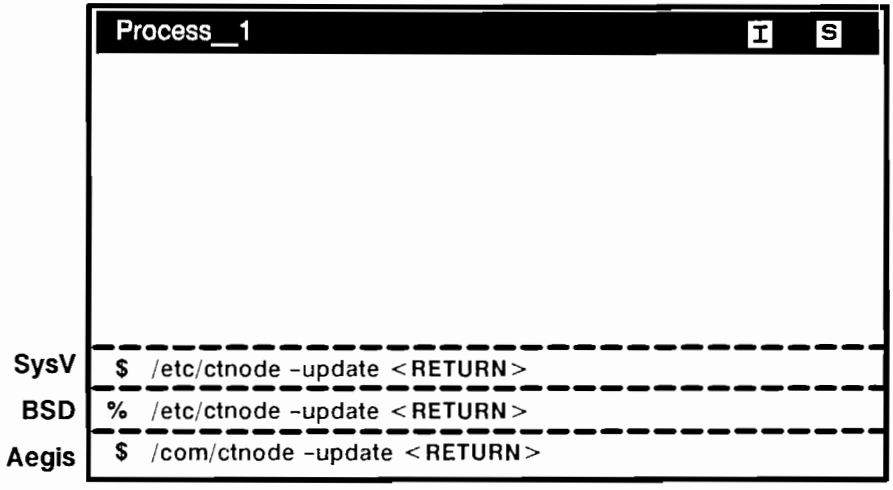


Figure 9–3. Cataloging New Systems on the 802.3 Network

5. Verify that the 802.3 network functions properly by typing the **lcnode** command as shown in Figure 9–4.

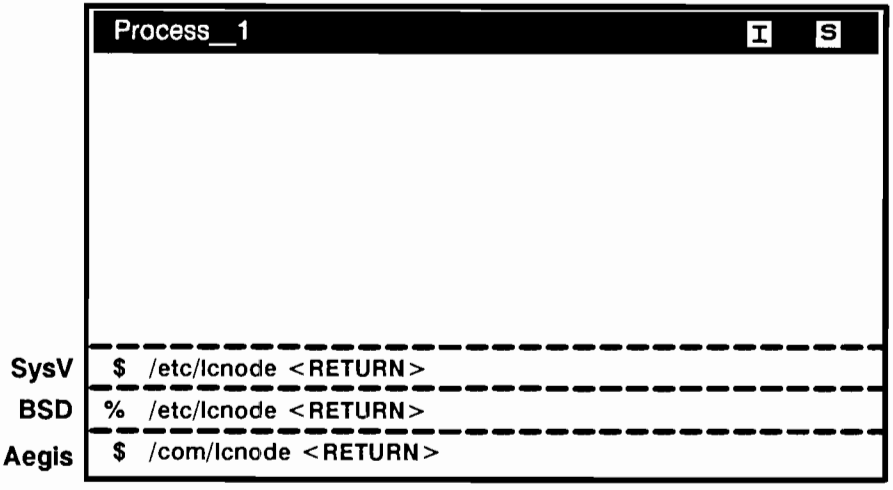


Figure 9–4. Verifying 802.3 Network Functionality

6. You see a screen similar to the one shown in Figure 9–5.

```
Process__1                                                    I   S

$ lcnode

      The node ID of this node is nnnn.
      3 other nodes responded in random order.

Node ID      Boot time                Current Time             Entry Directory
145BF        yy/mm/dd  9:21:44        yy/mm/dd  16:06:22       //DOLLAR
1977D        yy/mm/dd  13:52:02       yy/mm/dd  16:06:13       //QUARTER
A511         yy/mm/dd  12:53:28       yy/mm/dd  16:06:07       //NICKEL
1C07         yy/mm/dd  12:03:39       yy/mm/dd  16:06:15       **DISKLESS** partner node:A511
```

Figure 9–5. Sample ***lcnode*** *Response*

7. Examine the following choices based on the response from the **lcnode** command

   - If any of the active HP Apollo systems running Domain/OS on the 802.3 network respond to the **lcnode** command, you have verified that the system can communicate over the network. This system is not the cause of network problems.
   - If no active HP Apollo systems running Domain/OS on the 802.3 network respond to the **lcnode** command, log in at another workstation and enter the **ctnode** and **lcnode** commands again. If no active HP Apollo systems running Domain/OS respond on this attempt, you can be reasonably sure that the 802.3 network is probably not functioning properly. Tell your system administrator or contact your designated service representative.
   - If any active HP Apollo systems running Domain/OS respond on the attempt from the second workstation, the system that you just installed could not accept any **lcnode** responses and may not be functioning properly. Tell your system administrator or contact your designated service representative.
   - If this is the *first* workstation in your network, test the network cables to verify continuity from one end of the network to the other.

Connecting to the 802.3 Network

You can connect the system to an 802.3 network by using an *external transceiver* (thick cable) to connect to the workstation's AUI connector, or by using an *on-board (internal) transceiver* (thin cable) to connect to the workstation's LAN connector. The type of connection you use depends on the cabling used at your location.

The system's LAN configuration was set during manufacturing to either an *external transceiver* to use the EtherLAN AUI configuration or to the *on-board transceiver* to use the EtherLAN LAN configuration (depending upon your order). To connect the system to an 802.3 network by using an *on-board transceiver*, follow the directions in the "Connecting to the 802.3 Network Using the Thin LAN Configiuraiton (On-Board Transceiver)" later in this chapter. To connect to the system using an 802.3 network by using an external transceiver, follow the directions in the "Connecting to the 802.3 Network Using the LAN AUI Confguration (External Transceiver)" section.

If you need to change the LAN configuration, follow the directions in the "Changing the LAN Configuration" section in Appendix B.

Connecting to the 802.3 Network Using the LAN AUI Configuration (External Transceiver)

Perform the following steps to connect to the 802.3 network using the LAN AUI configuration:

1. Connect the network cable to the system unit's AUI connector as shown in Figure 9–6. Slide the lock clossed to secure the connection.

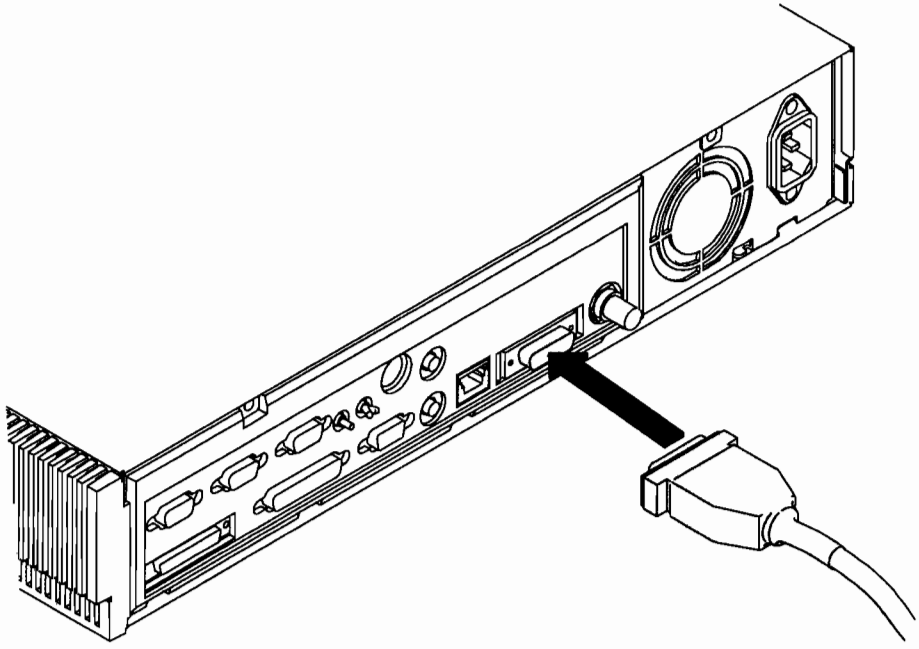


Figure 9–6. Connecting the 802.3 Cable to the AUI Connector

2. Connect the other end of the transceiver cable to the external transceiver at your site. Slide the lock closed to secure the connection.

You've now finished connecting the system to the 802.3 network by using the external transceiver.

Connecting to the 802.3 Network Using the Thin LAN Configuration (On-Board Transceiver)

Perform the following steps to connect to the 802.3 network using the Thin LAN configuration:

1. To connect the system to an 802.3 network by using an on-board transceiver, you'll need to connect the network cable to the T-connector that attaches to the system unit's EtherLAN BNC connector. Push the T-connector onto the system unit's BNC connector as shown in Figure 9-7. Turn the sleeve clockwise one quarter turn until it stops.

If the system that you are connecting is at the end of the network cable, go directly to Step 3; otherwise, continue on to Step 2.

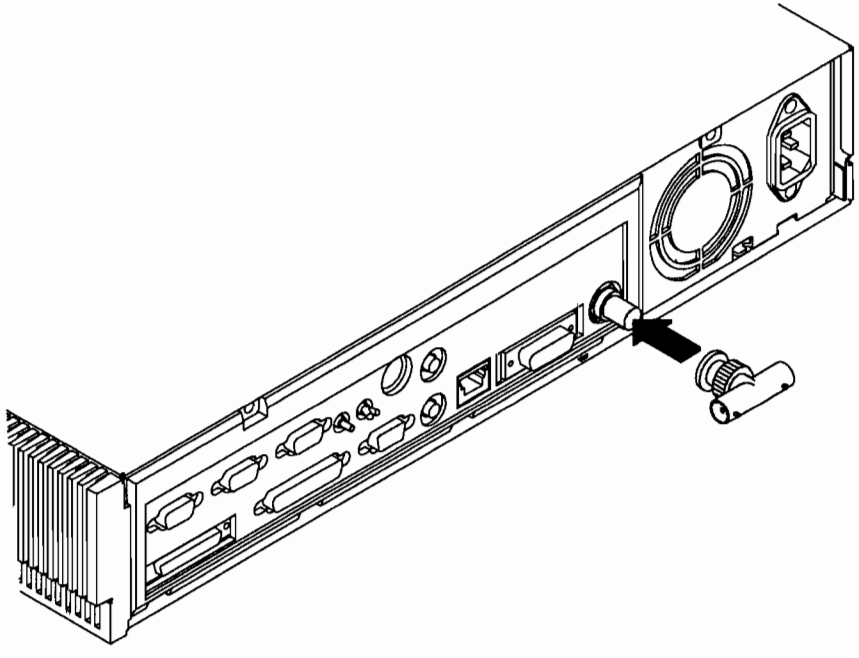


Figure 9–7. Connecting the 802.3 Cable to the LAN Connector

2. Connect the ends of the network cable onto the T-connector as shown in Figure 9–8. Turn the sleeves clockwise one quarter turn until they stop. Attach the velcro pad as shown.

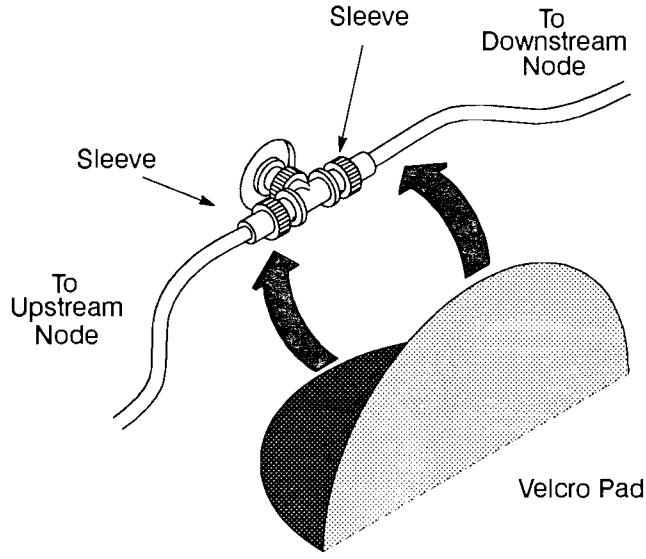


Figure 9–8. Connecting 802.3 Network Cable Ends to the T-Connector

3. Connect the network cable to the network side of the T-connector. If the system is at the end of the network segment, use a network cable terminator cap on the terminal end of the T-connector as shown in Figure 9-9. Attach the velcro pad.

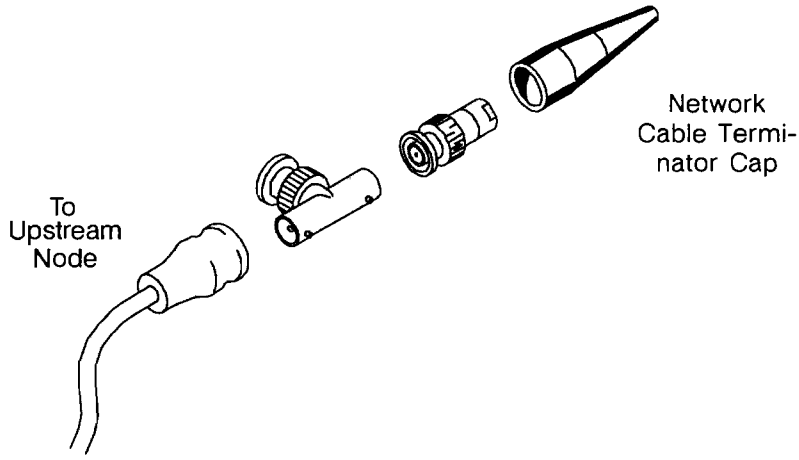


Figure 9-9. Connecting a Node at the End of an 802.3 Network Segment

You've now finished connecting the system to the 802.3 network by using the external transceiver.

Verifying the Network from the Newly Installed System

Now that you have connected your new workstation to the 802.3 network, verify that the network is functioning properly.

Perform the following steps to install your workstation in the 802.3 network or when you need to verify that the network is working properly.

1. Log in at the workstation that you have just installed in this network.

2. Catalog all new HP Apollo systems on the 802.3 network by typing the **ctnode** command as shown in Figure 9-10.

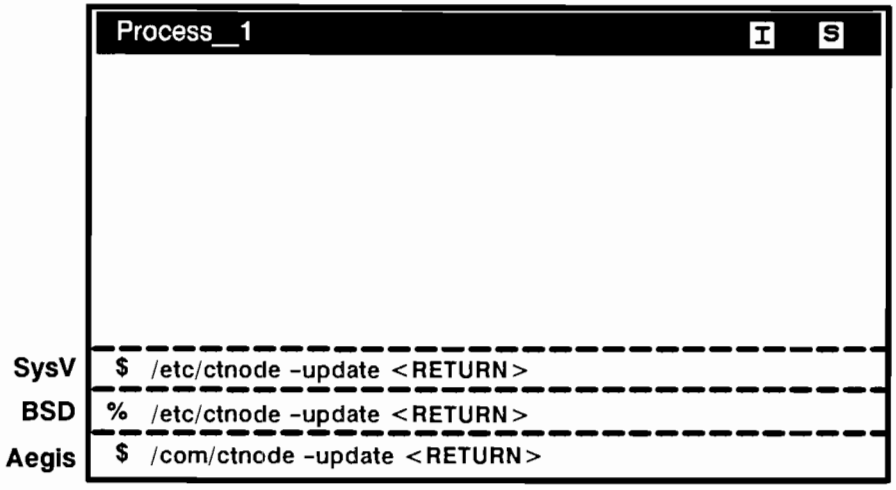


Figure 9–10. Cataloging All New Systems on the 802.3 Network

3. Verify that the 802.3 network functions properly by typing the **lcnode** command as shown in Figure 9–11.

4. You see a screen similar to the one shown in Figure 9–12.

5. Examine the following choices based on the response from the **lcnode** command:

   - If any of the active HP Apollo systems running Domain/OS on the 802.3 network respond to the **lcnode** command, you have verified that the system can communicate over the network. This system is not the cause of network problems.
   - If no active HP Apollo systems running Domain/OS on the 802.3 network respond to the **lcnode** command, log in at another workstation and enter the **ctnode** and **lcnode** commands again. If no active HP Apollo systems running Domain/OS respond on this attempt, the 802.3 network is probably not functioning properly. Tell your system administrator or contact your designated service representative.
   - If any active HP Apollo systems running Domain/OS respond on the attempt from the second workstation, the system that you just installed could not accept any **lcnode** responses and may not be functioning properly. Tell your system administrator or contact your designated service representative.
   - If this is the *first* workstation in your network, test the network cables to verify continuity from one end of the network to the other.

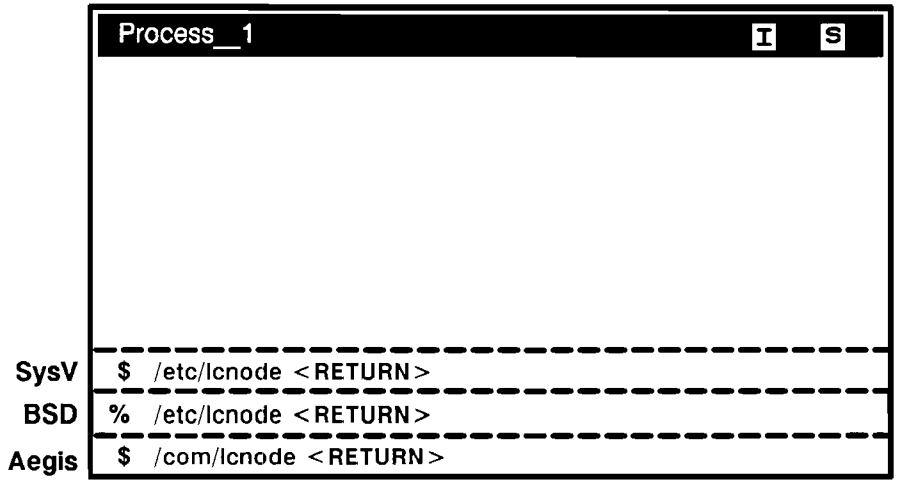


Figure 9–11. Running ***lcnode*** *to Verify 802.3 Network Functionality*

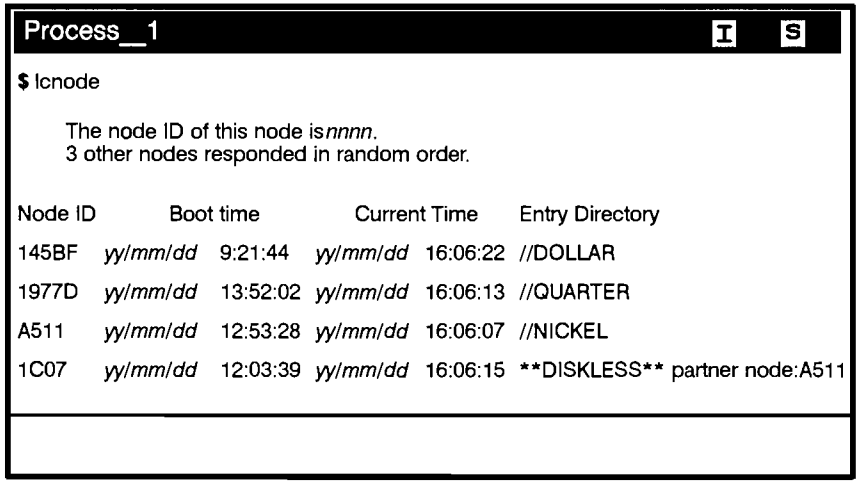


Figure 9–12. Sample ***lcnode*** *Response*

Chapter 10
Starting Up in Service Mode

This chapter describes the steps to start up your system in Service mode. You operate in Service mode when your service representative instructs you to run some diagnostic tests and various utility programs. When the workstation is in Service mode you do not see the normal Domain/OS system prompt. Instead, you see the Mnemonic Debugger (MD) ">" prompt.

This chapter includes the following information:

- Starting up a *disked* workstation in Service mode
- Starting up a *diskless* workstation in Service mode
- Configuring your workstation in Service mode to run Domain/OS

Starting Up a Disked Workstation in Service Mode

Follow these steps to start up your disked workstation in Service mode. These steps assume that the system is powered on in Normal mode.

1. Before the system finishes the self tests, first set the Service/Normal mode switch to Service mode and then press the Reset switch as shown in Figure 10–1. Press the <**RETURN**> key until the screen displays the Mnemonic Debugger (MD) "**>**" prompt as shown in FIgure 10–2.

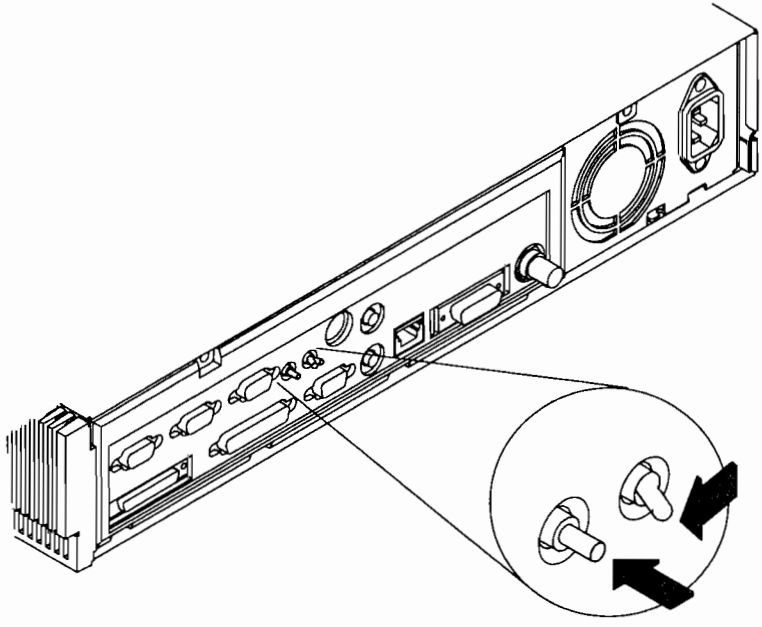


Figure 10–1. Starting a Disked Workstation in Service Mode

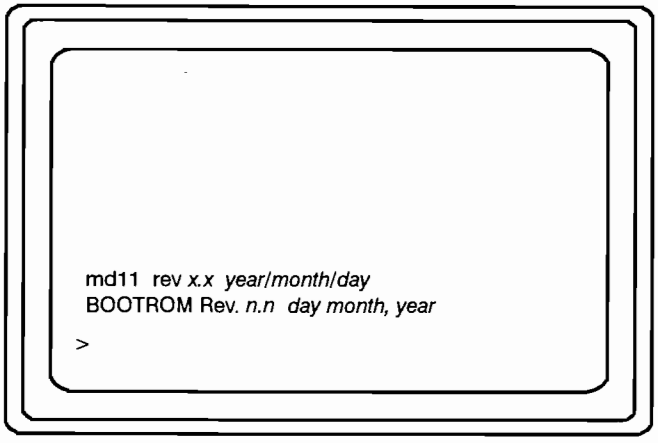


Figure 10–2. Sample Screen Prompt

2. If you are unable to boot the sytem in Normal mode, use the following command (shown in Figure 10–3) to boot the operating system from the Winchester disk while in Service mode:

di sd*n:n*

where:

sd specifies the SCSI disk drive.
n:n specifies the drive's *target ID:unit number.*

When you use the **di** command to specify another load device, you can specify any of the following valid options:

d any system disk (defaults to the highest device ID)

sd*n:n*
a specific SCSI disk (when there are more than one present, specify which one to use)

st *n:n*
a specific SCSI tape device (when there are more than one present, specify which one to use)

NOTICE: The *unit number* specified in the **di** command is always 0.

For example, if you wish to boot from a Winchester disk that is configured as SCSI target ID 5, you would enter the command:

di sd5:0

If you receive an error message, refer to Table 7–5.

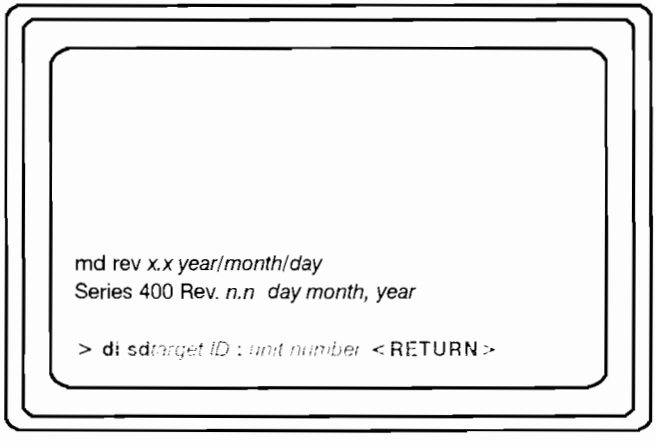


Figure 10–3. Booting from the Disk While in Service Mode

Starting Up a Diskless Workstation in Service Mode

Follow these steps to start up your diskless workstation in Service mode. These steps assume that the system is powered on in Normal mode,

1. Before the system finishes the self tests, first set the Service/Normal mode switch to Service mode, and then press the Reset switch as shown in Figure 10–4. Press the <**RETURN**> key until the screen displays the Mnemonic Debugger (MD) ">" prompt as shown in Figure 10–5.

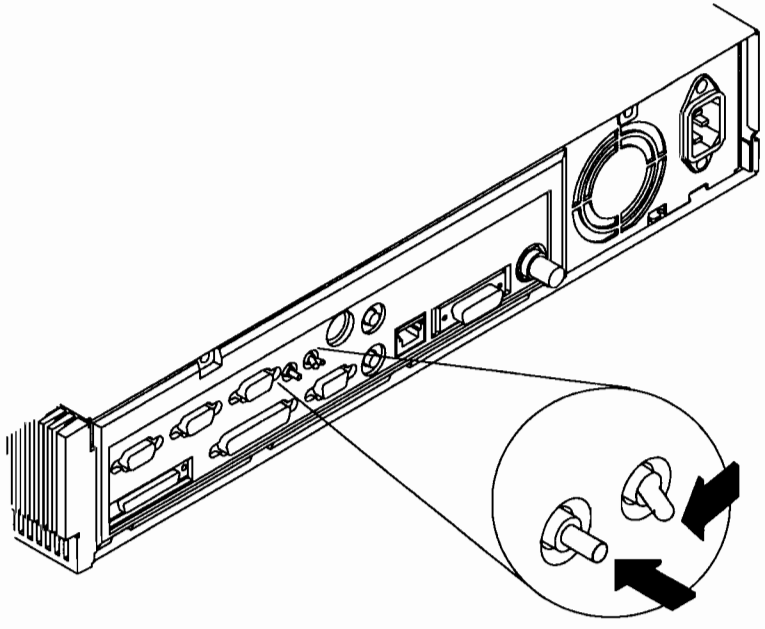


Figure 10–4. Starting Up a Diskless Workstation in Service Mode

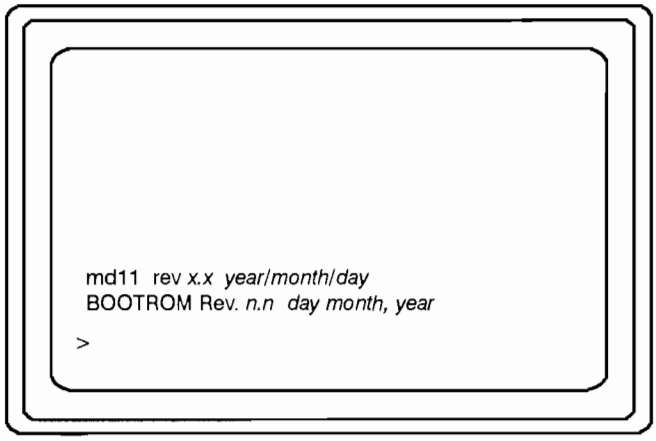


Figure 10–5. Sample Prompt

2. Enter the **di e** command to request access to the network on which the partner system resides (see Figure 10–6).

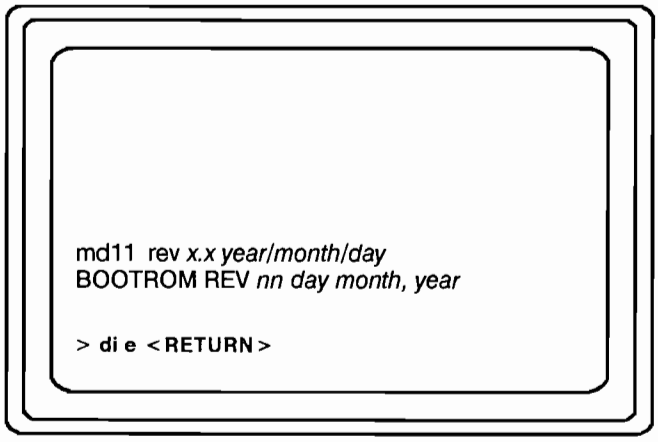


Figure 10–6. Requesting Access to the Partner System's Network

You can boot the diskless system in Service mode from another workstation's disk. Follow Steps 3 and 4 to do this.

3. To boot from a system other than the partner node, type the command shown in Figure 10–7, where *nnnnn* is the disked system's node ID. If the node ID begins with a letter (A through F), insert a 0 (zero) before the node ID.

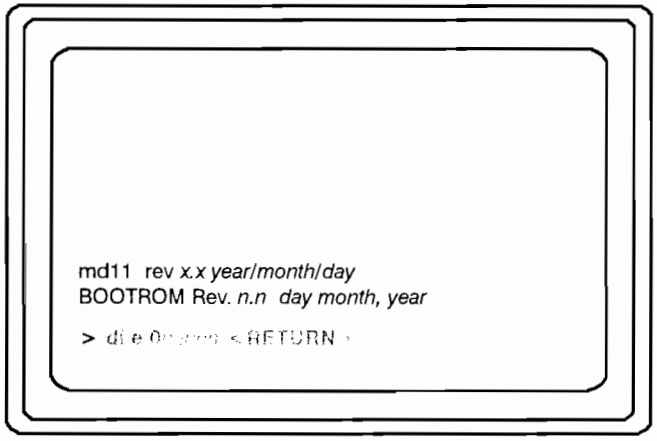


Figure 10–7. Booting from a System Other than the Partner Node

4. Now boot the operating system by entering the commands shown in Figure 10–8.

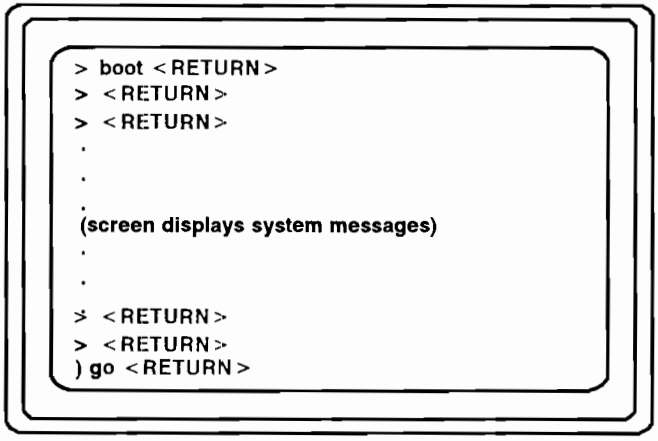


Figure 10–8. Booting the Operating System

You'll see several messages as the partner loads the operating system onto your workstation.

If you receive the "login:" prompt, go directly to Step 9.

If you receive a message concerning the system's calendar, go to Step 5.

If you receive an error message, refer to Table 7–6.

5. If you receive one of the messages shown in Figure 10–9, you need to set the system's calendar. Respond to the either of these screen prompts as shown the screens.

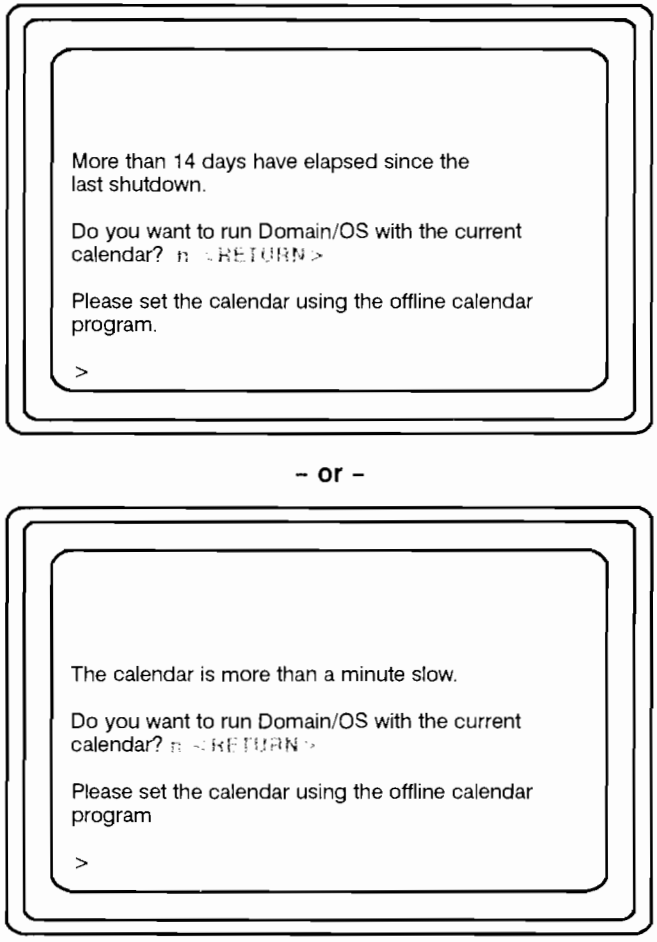


Figure 10–9. Sample ***calendar*** *Messages*

6. Use the commands shown in Figure 10–10 to start the **calendar** program.

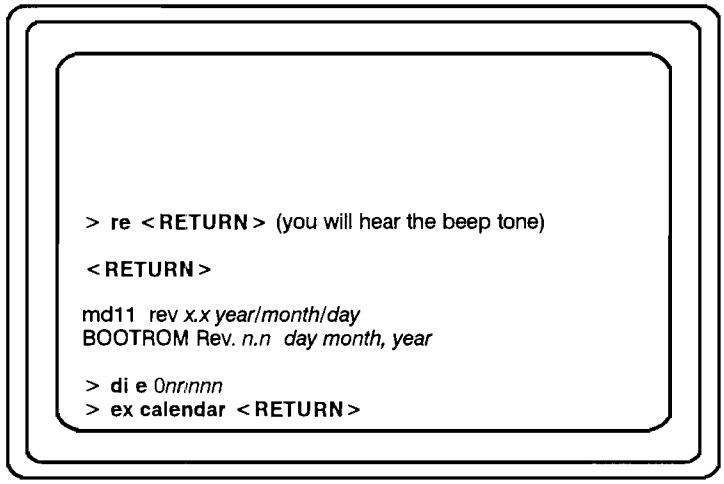


*Figure 10–10. Starting the **calendar** Program*

7. Your screen now displays the SCSI disk controller and unit numbers and a series of prompts. Answer the disk type question as shown in Figure 10–11. Press **<RETURN>** after answering each question.

Note that when running **calendar** and other utility programs, you are prompted for the disk type. You must enter the disk type (**w** = Winchester), controller number, and unit number. The controller and unit numbers are separated by a colon (**:**). In the Series 400 workstation, a single Winchester system disk is designated as controller number **6**, unit number **0**.

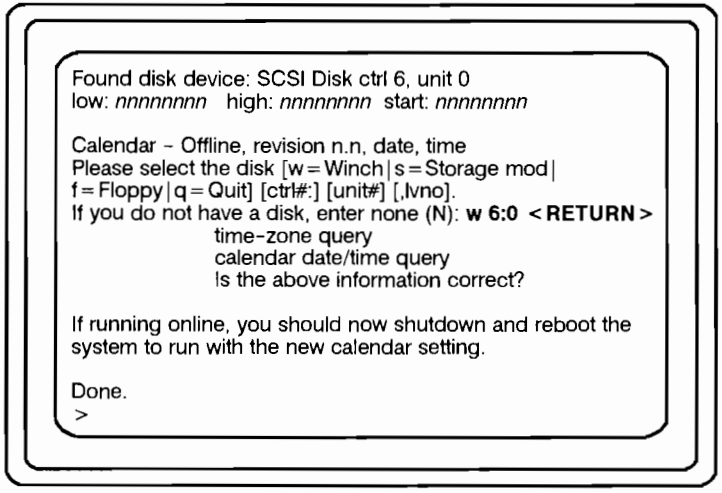


*Figure 10–11. Sample **calendar** Responses*

8. When "Done." appears on your screen, type the command shown in Figure 10–12 to start up the Domain/OS software. At initial system startup, this command starts up the Hardware Acceptance Program (HAP) software on disked workstations.

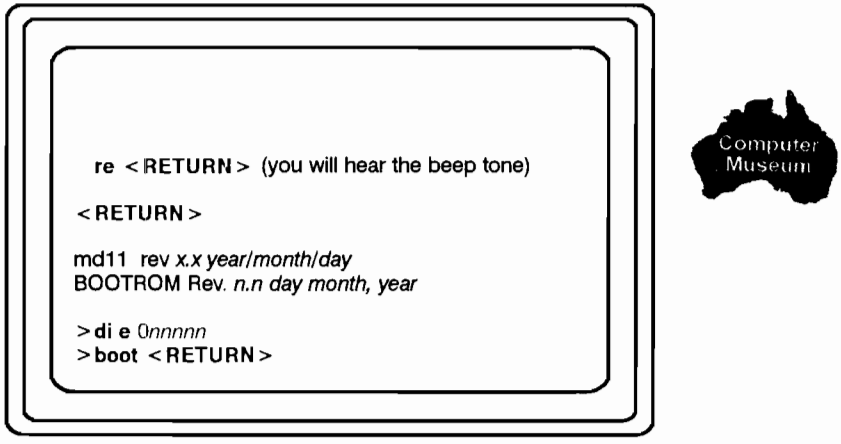


Figure 10–12. Starting Up the Domain/OS Software

As the diskless system boots up from its partner, you see screen messages similar to those in Figure 10–13.

NOTICE: If the following message appears in the DM output window (the lower–left corner of this screen), ignore it:

(CMDF) user_data/startup_dm.1280color name not found
from (stream manager / IOS

When the system starts up successfully, LED "D" on the system unit's front panel flashes continuously. If the software does not load, check Table 7–6.

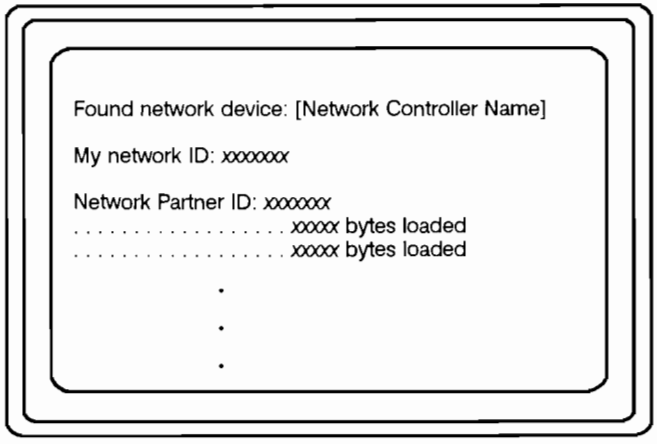


Figure 10–13. Sample Booting Messages

When the screen displays the ") " prompt type the command shown in Figure 10–14.

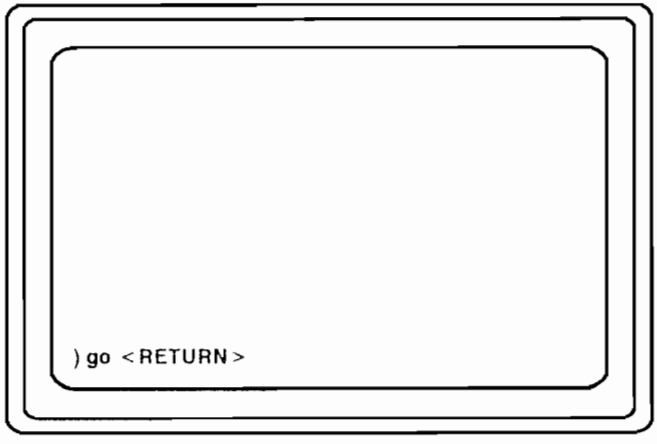


*Figure 10–14. Executing the **go** Command*

9. Log in as shown in Figure 10–15. If you don't have a username account yet, you may log in as **user**. If you log in as **user**, press **<RETURN>** at the "Password:" prompt.

Contact your system administrator to get your own username account.

When you log in as **user**, the operating system sets the working directory to the entry directory on the disked partner workstation. When you log in with your own log–in name, the operating system sets the working directory to your home directory.

See the *Getting Started with Domain/OS* manual if you need more information on using directories and files.

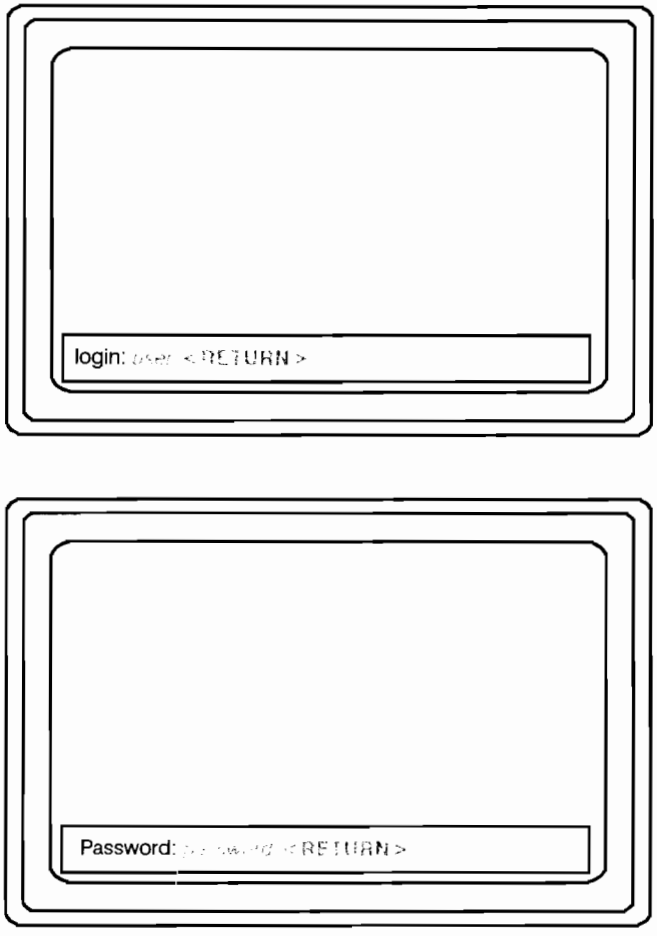


Figure 10–15. Logging In

Configuring the Workstation To Run Domain/OS

Your Series 400 workstation can run either the Domain/OS or HP-UX operating systems. Most systems are preconfigured to run the operating system you have chosen. If, however, your system was not preconfigured to run Domain/OS, you can reconfigure the workstation to run permanently in Domain compatibility mode. Setting your workstation permanently to Domain compatibility mode allows the system to run and operate with Domain/OS.

Follow these steps if you need to set your workstation to run in Domain compatibility mode. These steps assume that the system is powered on in Normal mode.

1. Before the system finishes running self-tests, first set the Service/Normal mode switch to Service mode, and then press the Reset switch as shown in Figure 10-16.

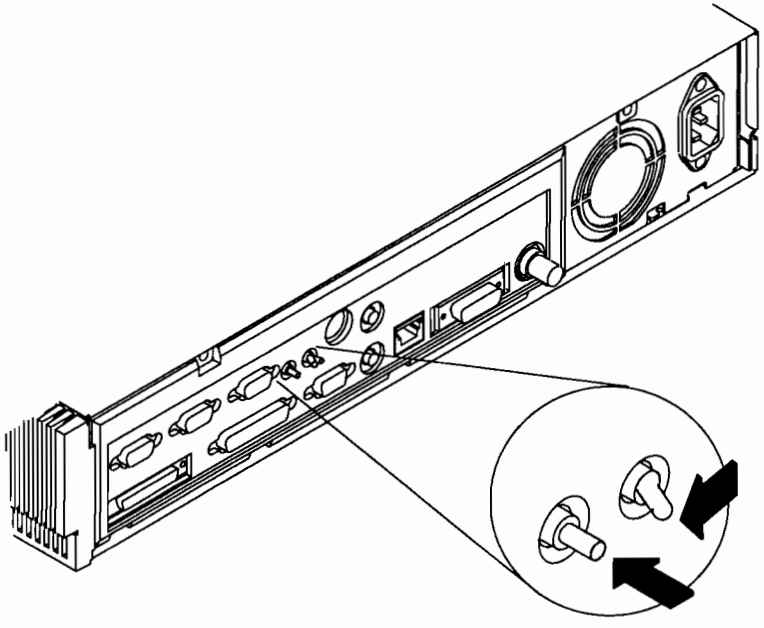


Figure 10-16. Setting the System to Service Mode

The screen displays system messages. Press the <RETURN> key until the screen displays the MD ">" prompt as shown in Figure 10–17.

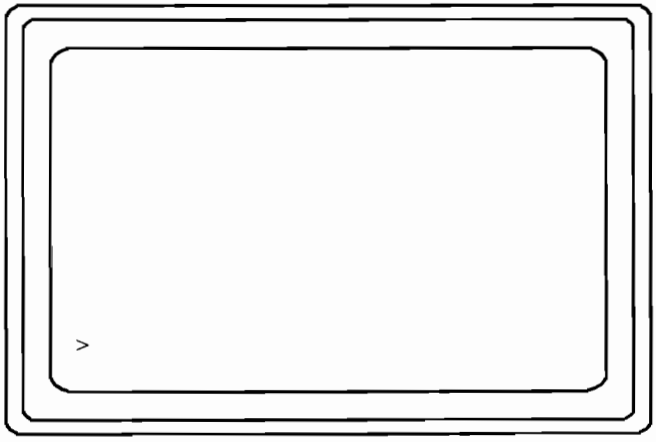


Figure 10–17. Sample Mnemonic Debugger (MD) Screen Prompt

2. Type the **cf** command as shown in Figure 10–18.

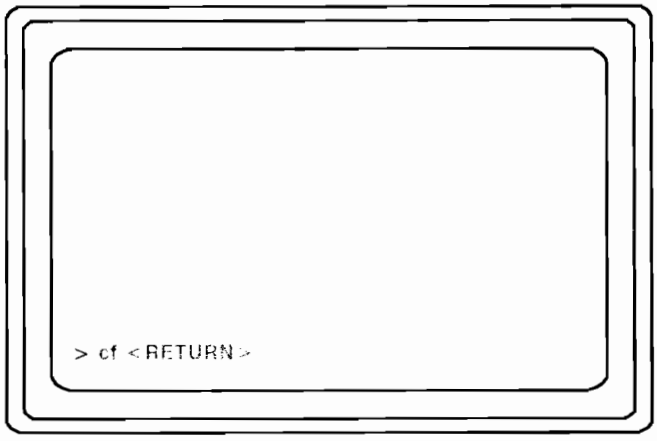
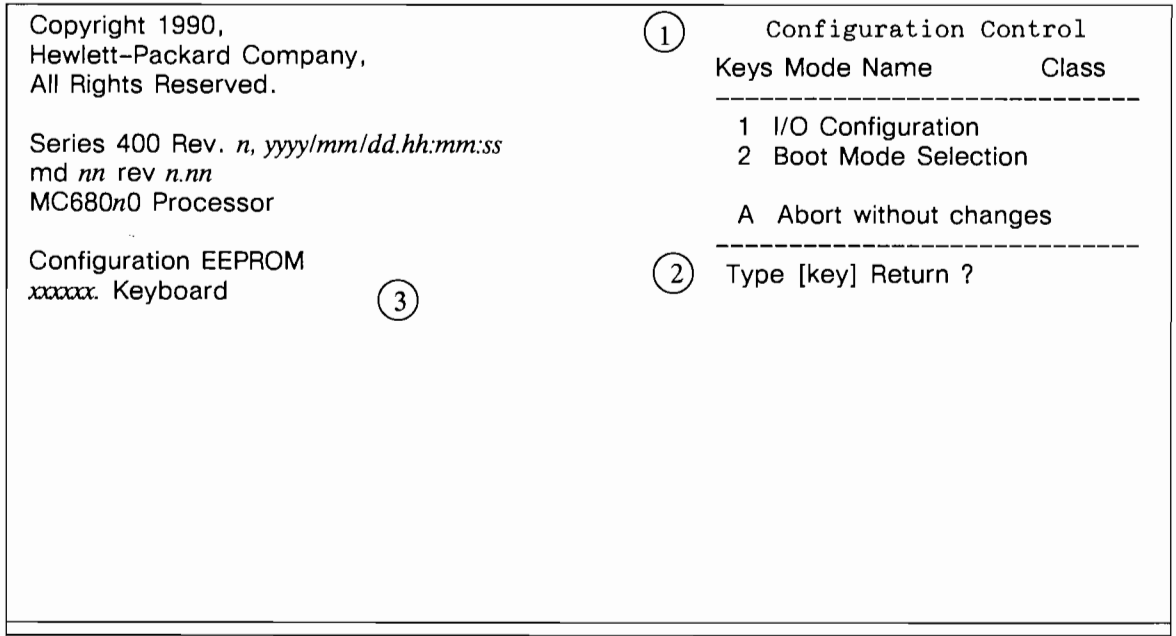


*Figure 10–18. Entering the **cf** Command*

The screen displays information about your system and the Configuration Control Menu, as shown in Figure 10–19.

If you receive an error message at item 3, refer to Table 7–10.



Legend

(1) Configuration Control Menu (see Step 3)

(2) Prompt for your menu selection (see Step 3)

(3) System EEPROM status (EEPROM error messages can appear here)

Figure 10–19. Sample Configuration Control Menu Screen Messages

3. Select the Boot Mode Selection menu by typing the following command:

2 <RETURN>

The screen displays the Boot Mode Selection menu shown in Figure 10–20.

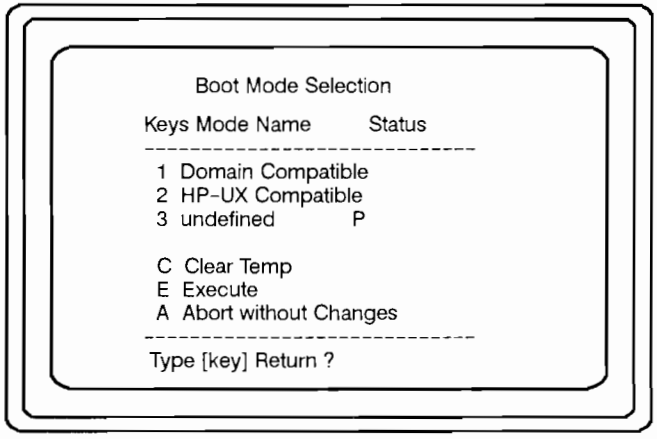


Figure 10–20. Boot Mode Selection Menu

4. Select Domain Compatible mode by typing the following command:

1 <RETURN>

The screen displays the menu shown in Figure 10–21.

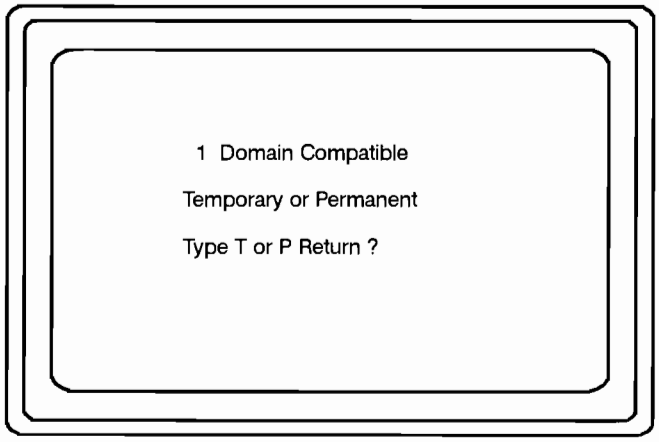


Figure 10–21. Selecting Domain/OS as the Permanent Operating System

5. Permanently select Domain Compatible mode in the system's EEPROM by typing the following command::

P <RETURN>

Note that you must type the capital letter P.

6. Store your selection in the system's EEPROM by typing the following command:

E <RETURN>

Note that you must type the capital letter E.

7. The system returns to the MD level as shown in Figure 10–22.

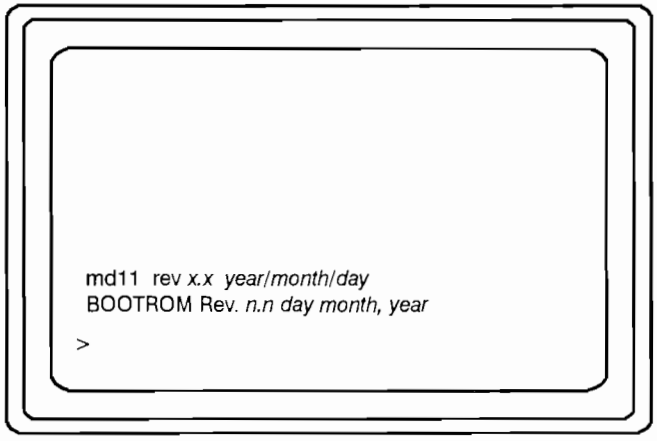


Figure 10–22. Returning to the MD Prompt

You can now continue with a normal system start up as described in Chapter 2 for a workstation with an internal disk, or as described in Chapter 3 for a diskless workstation.

Appendix A
SCSI Connections

This appendix provides the following information about connecting SCSI devices to a HP Apollo 9000 Series 400 Model 425e Domain/OS system:

- Domain/OS Series 400 SCSI Restrictions
- Connecting to the SCSI Port
- Assigning Domain/OS SCSI Device IDs

NOTICE: When using external SCSI cabling, you must use an active SCSI terminator at the last external device on the SCSI bus. We use terminators sold under the K2291 product number to insure reliable operation of the system. You can purchase this device from Apollo Direct Channel at 1-800-225-5290.

Domain/OS Series 400 SCSI Restrictions

There following conditions apply to HP Apollo 9000 Series 400 systems running Domain/OS:

- Only SCSI cables approved by HP Apollo should be used with the Series 400 and any connected SCSI devices. Always use the shortest possible cable(s) for your configuration. Cables are available from the HP/Apollo Direct Channel at 1-800-225-5290.

  CAUTION: SCSI cables approved by HP Apollo (listed in Table A-1 and Table A-2) are designed to function within the SCSI tolerances for HP Apollo devices. Use of other cables may result in significant problems with system operation.

- If the Series 400 system has internal disk drives, a floppy disk, or a CD-ROM drive, you must count them as SCSI devices.
- A maximum of one HP Apollo 1/4" Cartridge tape drive is allowed for each system.
- A maximum of one HP Apollo floppy diskette drive is allowed per system.
- Although a system can have up to seven disk drives (Winchester and magneto-optical), there is a limit of five mounted disk volumes per system at any one time.
- A maximum of two, 8-mm tape drives are allowed per system.
- We recommend that when adding third party SCSI devices, total cable length external to the Series 400 system unit (both external cables and cables internal to the devices) be limited to 4.6 meters (15 feet).

Connecting to the SCSI Port

The first SCSI port type is identified by its female threaded standoffs. This port connects to a SCSI cable with a high density thumb screw connector as shown in Figure A–1.

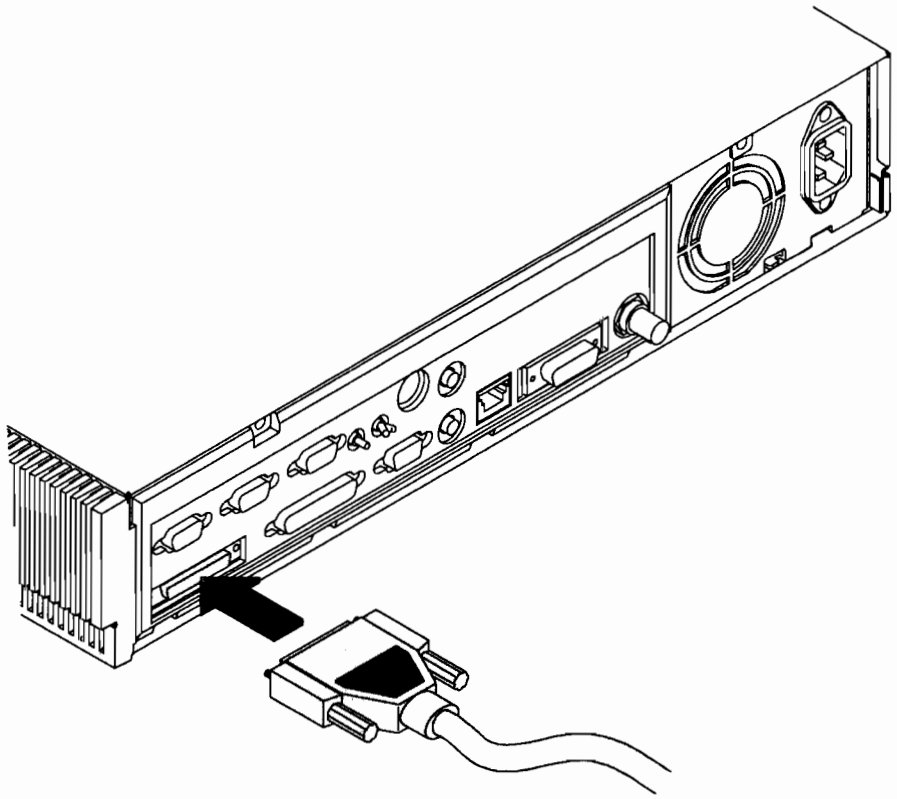


Figure A–1. SCSI Port with Threaded Standoffs

Table A–1 shows the external SCSI cables to order from HP Apollo Direct Channel (1–800–225–5290) to connect the Series 400 systems to their HP Apollo SCSI peripheral storage devices.

Table A–1. SCSI Cables for Connecting Model 425e Domain/OS Systems and Their SCSI Peripherals

Connecting From . . .	To These SCSI Devices . . .	Use These Cables:
Series 400 System SCSI Port with threaded standoffs	A-EX* AADDESTC* AADDSFLP* A-660E*	K2294 — 0.9 meter (3 feet) K2295 — 1.5 meter (5 feet)
	C2212D (with options) C2213D (with options) C1701A 7980S (xc) C1512A A16999A	K2296 — 0.9 meter (3 feet) K2297 — 1.5 meter (5 feet)

* Refer to the HP Apollo Products Price Guide for the specific Country Kit code number suffix. These devices ship with one free 1.5 meters (4.9 feet) low density thumb-screw to low density thumb-screw cable. Note that this free cable does not work with Series 400 applications. The correct cable (as listed in this table) must be ordered separately from HP Apollo Direct Channel (1–800–225–5290).

Table A–2 shows the cables to use if you are daisy–chaining SCSI devices to each other.

Table A–2. SCSI Cables for Daisy–Chaining SCSI Peripherals

Connecting These SCSI Devices . . .	To These SCSI Devices . . .	Use These Cables:
A–EX* AADDESTC* AADDSFLP* A–660E*	A–EX* AADDESTC* AADDSFLP* A–660E*	K2207 — 0.4 meter (1.3 feet) K2208 — 2.6 meter (8.5 feet) K2209 — 1.5 meter (4.9 feet) K2210 — 0.9 meter (3.0 feet) K2211 — 3.0 meter (9.8 feet)
	C2212D (with options) C2213D (with options) C1701A 7980S (xc) C1512A A16999A	K2284 — 0.9 meter (3 feet) K2283 — 1.5 meter (4.9 feet)
C2212D (with options) C2213D (with options) C1701A 7980S (xc) C1512A A16999A	C2212D (with options) C2213D (with options) C1701A 7980S (xc) C1512A A16999A	92222A — 0.5 meter (1.6 feet) 92222B — 1.0 meter (3.2 feet) 92222C — 2.0 meter (6.6 feet)

* Refer to the HP Apollo Products Price Guide for the specific Country Kit code number suffix. These devices ship with one free 1.5 meters (4.9 feet) low density thumb–screw to low density thumb–screw cable. Note that this free cable does not work with Series 400 applications. The correct cable (as listed in this table) must be ordered separately from HP Apollo Direct Channel (1–800–225–5290).

With the information from Table A–1 and Table A–2 use Table A–3 to determine the total SCSI cabling used for your system and its SCSI peripheral storage devices.

Table A-3. Series 400 Domain/OS Systems SCSI Device Cabling Configurations

SCSI Device Drives	Cable Lengths Internal meters (feet)	External meters (feet)
Model 425e — all internal SCSI drives (if present)	1.1 (3.6)	N/A
A-660E *	0.6 (2)	_____
AADDSFLP *	0.6 (2)	_____
AADDESTC *	0.6 (2)	_____
A-EX *	0.6 (2)	_____
C1701A †	0.3 (1)	_____
C1512A †	0.9 (3)	_____
7980S (XC) †	0.0 (0)	_____
C2212D †	1.5 (4.9)	_____
C2213D †	1.5 (4.9)	_____
A1999A †	.3 (1)	
Internal + External (not to exceed total of 6 meters [19.6 feet]) Subtotals:	_____ + _____	
	Total =	

* Refer to the HP Apollo Products Price Guide for the specific Country Kit code number suffix. Ships with one free external cable K2209 (1.5 meters — 4.9 feet) for DN2500 use only. Correct cables (as listed in Table A-1 and Table A-2) must be ordered separately from HP Apollo Direct Channel (1-800-225-5290) for Model 400s and 433s applications.

† Ships without external cable. Cable must be ordered as separate item.

Assigning Domain/OS SCSI Device IDs

Use Table A–4 to assign a device ID to each SCSI device associated with your Model 425e system.

Table A–4. Domain/OS Series 400 SCSI Device IDs

SCSI Device Drives	Device ID (Address) Number (Only 0 through 6 Available) Internal	External
Internal System Drives:		
System SCSI Drive(s)		
• 1st Winchester Drive (if present, uses ID No.6)	_____	N/A
• 2nd Winchester Drive (if present, uses ID No. 5)	_____	N/A
• Floppy Disk Drive (if present, uses ID No. 3)	_____	N/A
• CD-ROM Drive (if present, uses ID No. 2)	_____	N/A
External Device Drives:		
DEM SCSI Drives		
• 1/4-Inch Ctape Drive, Product No. AADDESTC	N/A	_____
• 8-mm Tape Drive, Product No. A-EX (if present, uses ID No.1 or No.2)	N/A	_____
• 660MB SCSI Disk Drive, Product No. A-660E	N/A	_____
• 5 1/4-Inch Floppy Diskette Drive, Product No. AADDSFLP	N/A	_____
External SCSI HP 6000 Series: 330D Disk Sub-system, Product No. C12212D; 660D Disk Sub-system, Product No. C12213D		
• 1st Winchester Drive	N/A	_____
• 2nd Winchester Drive	N/A	_____
• 3rd Winchester Drive	N/A	_____
• 1/4-Inch Ctape Drive	N/A	_____
• Magnet-Optical Drive	N/A	_____
External SCSI HP Standalone		
• Magneto-Optical Drive, Product No. C1701A	N/A	_____
• CD-ROM Drive, Product No. A1999A	N/A	_____

Appendix B
Changing Your Workstation's Hardware Configuration

This chapter tells you how to change your workstation's hardware configuration by performing the following procedures:

- Opening up the system unit
- Installing additional memory
- Changing the LAN configuration jumpers

Opening Up the System Unit

To open the system unit, you need a Pozidrive #2 screwdriver, 4-inch (100 mm) blade. Before opening the system unit make sure that you have performed the following:

- Shut down the operating system.
- Turn off the power to the workstation.
- Disconnect all power cords and external cables.

Perform the following steps to open the system unit:

1. Remove the two #2 Pozidrive screws holding the top cover to the back panel (as shown in Figure B–1).

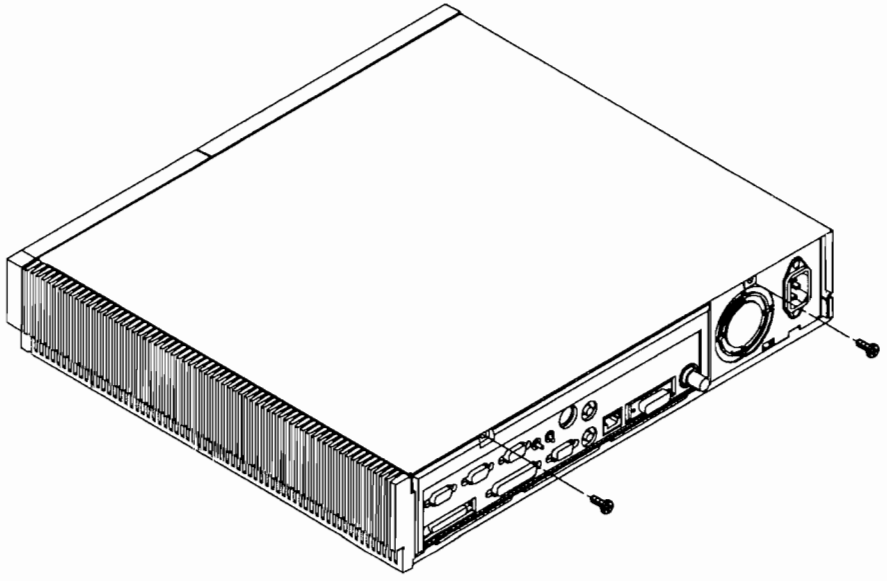


Figure B–1. Removing the Top Cover Screws

2. Slide the back of the top cover up and, then pull the two front tabs out of their slots as shown in Figure B–2 . Remove the top cover.

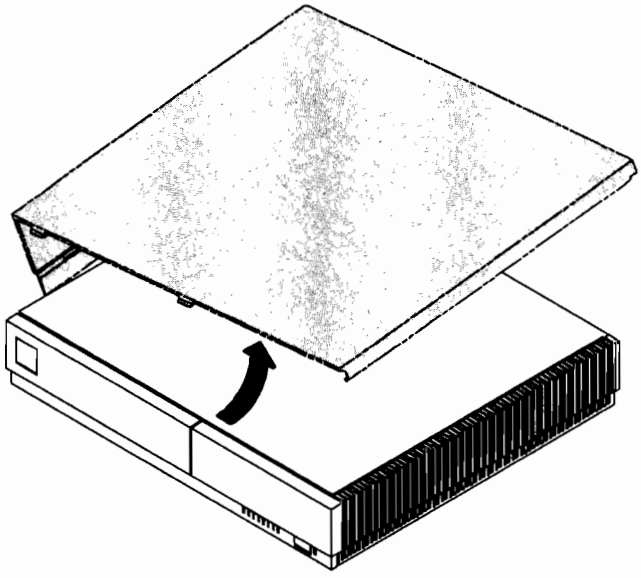


Figure B–2. Removing the Top Cover

3. Lift the support brace up and out of the system as shown in Figure B–3.

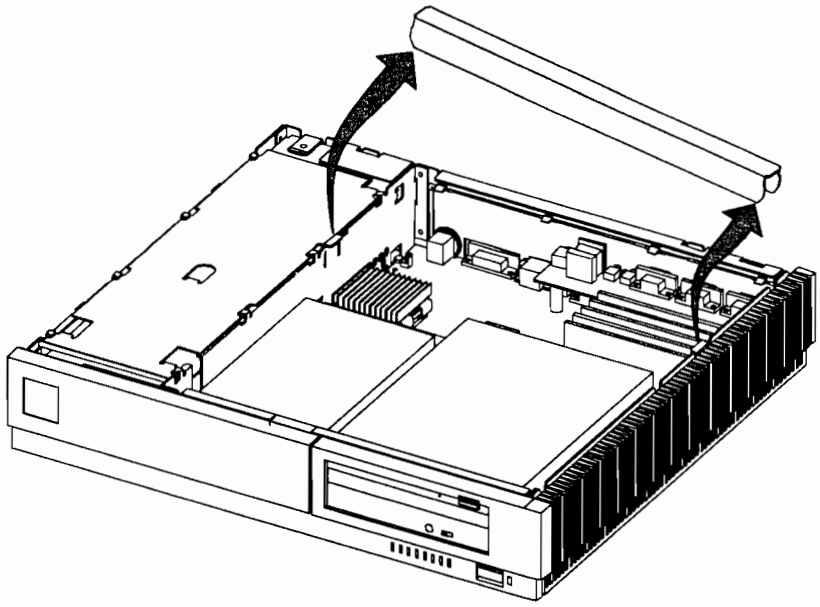


Figure B–3. Removing the Support Brace

4. To close the system unit, reverse the order of the opening steps.

NOTICE: To maintain FCC/EMI compliance, verify that the covers are properly sesated when closing the system unit.

Installing Additonal Memory

This section describes how to add additional memory boards to your workstation. In this section, we cover the following topics:

- Required tools for memory installation.
- Memory installation requirements
- Adding additional memory boards

Required Tools

You only need a Pozidrive #2 screwdriver, 4–inch (100 mm) blade to open the system.

Memory Installation Requirements

The following requirements must be met before you install additional memory to your workstation:

- Boards must be installed in matched pairs; each board must be the same size.
- *Do not* leave empty slots between memory boards.
- Slots 0A and 0B must house the largest–sized memory board pair.
- Slots 1A and 1B memory boards must be equal to or smaller than the memory boards in slots 0A and 0B.
- Slots 2A and 2B memory boards must be equal to, or smaller than the memory boards in slots 1A and 1B.
- Each higher–numbered slot pair must be equal to or smaller than the memory boards in the next lower–numbered slot pair.

NOTICE: The memory board slots are labelled MEM 0A through MEM 2B.

Installing Additional Memory Boards

Perform the following steps to add memory boards to your workstation:

1. Open the system unit according to the directions in the *Opening Up the System Unit* section, earlier in this appendix.

2. If you do not need to remove any memory boards, skip this Step 2 and go directly to Step 3. If you need to rearrange (remove and replace) any memory boards in your workstation, perform this step.

   To remove a memory board, push the two slot clips out and then tilt its top away from the board next to it. Lift the memory board up and out of the workstation. Place the memory board on a static-free surface. Figure B–4 shows how to remove the memory board.

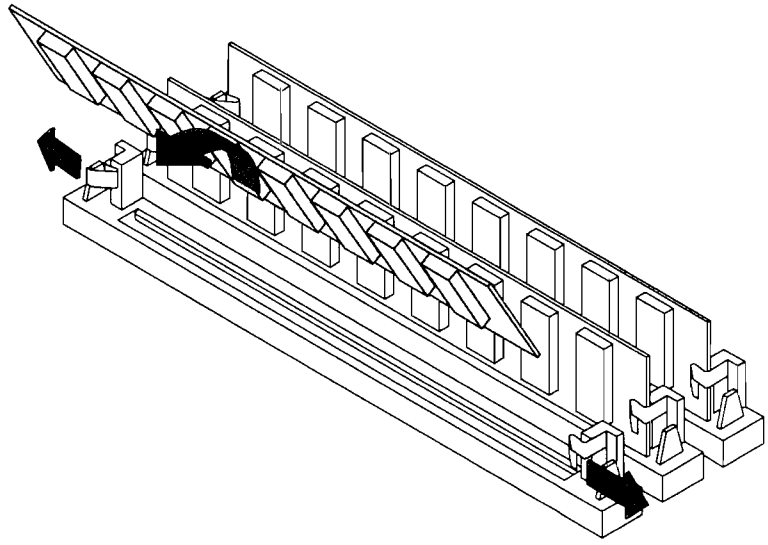


Figure B–4. Removing Memory Boards

3. Install the new memory board with its top edge tilted toward the the rear of the system unit. Note that the memory board is notched on one end to fit the keyed connector. Snap the board into place by moving it to a veritcal position. Its ends snaps into the slot's spring clips. Figure B–5 shows how to install the memory board.

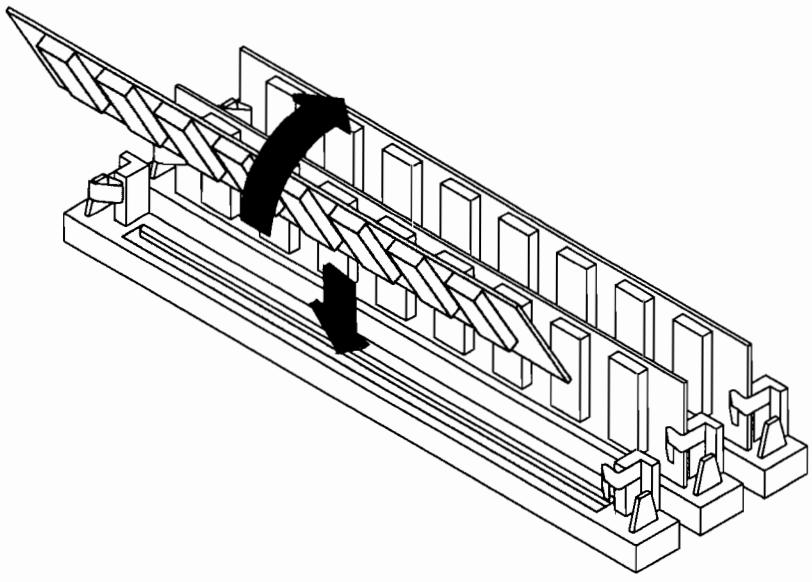


Figure B–5. Installing Memory Boards

4. Close the system unit and reconnect all cables.

Changing the 802.3 LAN Configuration

This section describes how to change your workstation's 802.3 LAN configuration. The LAN configuration was factory set for either the Internal Transceiver (Thin LAN) or the External Transceiver (AUI LAN) setting. Perform the following steps to change the jumper settings.

1. Open the system unit according to the directions in the *Opening Up the System Unit* section of this appendix.

2. Use an extractor tool to change the jumpers as shown in Figure B–6.

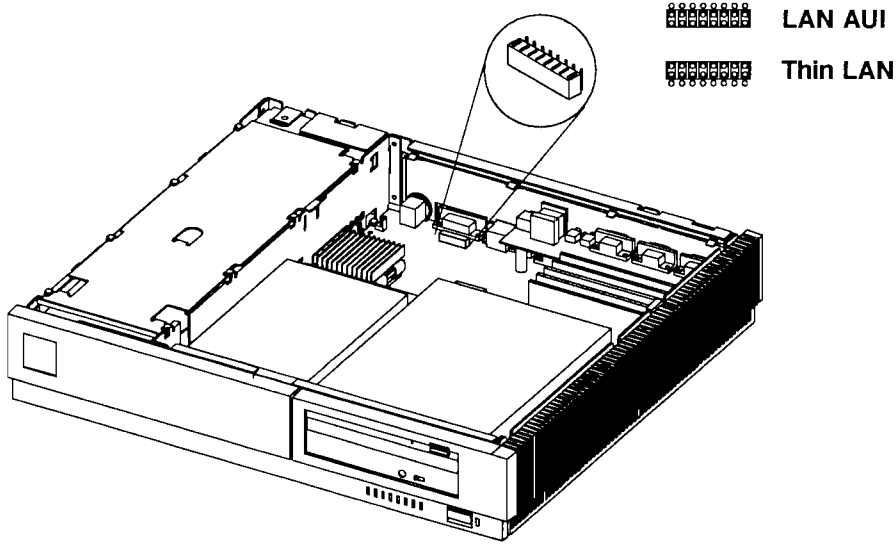


Figure B–6. Changing the LAN Configuration Jumper

3. Close the system unit and reconnect all cables.

Glossary

Access rights

These rights list the people who can use each object in the network, and specify how each person can use the object (e.g., permission to read, write, and execute the object). The phrase is used in connection with the Aegis environment; UNIX users refer to permissions, which are comparable (but not equivalent).

Active node

A node that is electrically and logically connected to the network. Nodes are connected to the network through a set of relays. Nodes are considered active when these relays are connected to the network and the node is receiving, reclocking, and transmitting data. Typically, these relays are connected when a node is running the operating system; however, the relays are also connected while the node is executing certain diagnostics from the Mnemonic Debugger (MD) program.

Aegis

The environment developed at Apollo Computer. Also refers to the shell program used to interact with the Aegis environment in the Domain/OS operating system.

ANSI

The American National Standards Institute, a non-profit organization, made up of various expert committees, that publishes standards for use by national industries. ANSI has adopted the IEEE standards for local area networks.

Attachment Unit Interface (AUI)

A transceiver cable that conforms to IEEE 802.3 specifications.

Boot

Short for bootstrap service. *See* **Bootstrap service**.

Bootstrap service

A service provided by a short program, stored in the workstation's read-only memory, that loads the operating system (or any complex program) into a workstation's main memory. Partner workstations provide bootstrap service to diskless workstations.

BSD

The environment based on 4.3 BSD UNIX from the University of California at Berkeley.

Command

An instruction that you give to run a program.

Command argument

Information you provide on a command line to describe the object (usually a file or directory) to be operated on by the command.

Command option

Information you provide on a command line to indicate any special action you want the command to take. *See also* **Default**.

Configuration

The arrangement of a computer system or network as defined by the nature, number, and the chief characteristics of its functional units. More specifically, the term configuration may refer to a hardware configuration or a software configuration.

Control key sequence

A keystroke combination used as a shorthand way of specifying commands. To enter a control key sequence, hold down <CTRL> while pressing another key.

Cursor

The small blinking box initially displayed in the screen's lower left corner. The cursor marks your current typing position on the screen and indicates which program (shell or DM) receives your commands.

Default

Most programs give you a choice of one or more options. If you don't specify an option, the program automatically assigns one. This automatic option is called the default. *See also* **Command option**.

Directory

A special type of object that contains information about the objects beneath it in the naming tree. Basically, it is a file that stores names and links to files. *See also* **File**.

Disk

A thin, record-shaped plate that stores data on its magnetic surfaces. The system uses heads (similar to heads in tape recorders) to read and write data on concentric disk tracks.

Diskless booting

Loading the operating system into local memory from another workstation's disk.

Diskless workstation

A workstation that has no disk. A diskless workstation may use the disk of the partner node or other nodes, and (if needed) use the computational services of the partner node or other nodes. A diskless workstation boots from a partner node. *See also* **Node** and **Disk**.

Disked workstation

A workstation that has its own disk.

Display Manager (DM)

The program that executes commands that start and stop processes, and commands that open, close, move, or modify windows and pads.

DM input window

The window where you type DM commands (contains the "Command:" prompt).

DM output window

The window that displays output messages from DM commands.

Domain/OS

The operating system developed by HP's Apollo Systems Division. Domain/OS supports a high-speed communications network connecting two or more nodes and providing Domain services on that network. Each node can use the data, programs, and devices of other network nodes. Each node contains main memory, and may have its own disk, or share one with another node. Domain/OS provides three interfaces or operating environments:
Aegis, BSD (UNIX Berkeley), and SysV (UNIX System V). The Domain services distributed file system underlies each operating environment. Domain/OS supports UNIX directory structures and such protocols as TCP/IP ftp (file transfer protocol), while also providing Domain services.

Downstream node

The node in an Apollo Token Ring network that is next in line to receive the token. See Upstream Node for contrast.

ETHERNET

A 10 Mbps LAN, developed by Digital Equipment Corporation, Intel, and Xerox Corporation, upon which the IEEE 802.3 network is based.

File

The basic named unit of data stored on disk. *See also* **Directory**.

Home directory (~)

A shorthand way of referring to a frequently used directory, almost always the log-in directory. This is a UNIX term; in Aegis, one refers to the naming directory.

Input window

The window that displays a program's prompt and any commands typed but not yet executed.

LAN

See **Local Area Network.**

Local Area Network (LAN)

A data communications system that allows a number of independent devices to communicate with each other.

Logging in

Initially signing on to the system so that you may begin to use it. This creates your first user process.

Log–in directory

The directory in which you are placed when you log in.

Mnemonic Debugger (MD)

A low–level debugging facility that provides a set of commands and utility programs.

Name

A character string associated with a file, directory, or link. A name can include various alphanumeric characters, but never a slash (/) or null character.

Naming directory (~)

The Aegis shell allows you to refer to a frequently used directory with the tilde (~) symbol. Aegis uses your log–in directory as the initial naming directory. UNIX users generally call this the home directory.

Network

Two or more nodes sharing information.

Network controller

A printed circuit board that passes bit streams between the network and the node's main memory. Coupled with the network transceiver, the controller also handles signal processing, encoding, and network media access.

Network root directory (//)

The top directory in the network. Each node has a copy of the network root directory.

Node

A network computer. Each node in the network can use the data, programs, and devices of other network nodes. Each node contains main memory, and has its own disk, or shares one with another node. *See also* **Diskless workstation**.

Object

Any file, directory, or link in the network.

Operating system

The program that supervises the execution of other programs on your node.

Option

See **Command option**.

Output window

The window that displays a process response to your command.

Pad

A temporary, unnamed file that holds the information displayed in a window. A window can display an entire pad or only part of the pad. *See also* **Window**.

Partner node

A node that shares its disk with a diskless node. *See also* **Diskless workstation**.

Password

The word you enter next to the "Password:" prompt at log–in time. As you type your password, the system displays periods (.) instead of the letters in your password. You should keep your password secret and change it occasionally in order to protect your account from unauthorized use. *See also* **User account**.

Pathname

A series of names separated by slashes that describe the path of the operating system from some starting point in the network to a destination object. Pathnames begin with the starting point's name, and include every directory name between the starting point and the destination object. A pathname ends with the destination object's name.

Permissions

A set of rights (read, write, execute) associated with an object in the file system. Determines who may use the object. *See also* **Access rights**.

Principal network

The network on which a node boots.

Process

A computing environment in which you may execute programs.

Prompt

A message or symbol displayed by the system to let you know that it is ready for your input.

Root directory

See **Network root directory**.

Shell

A command–line interpreter program used to invoke utility programs.

Shell command

An instruction you give the system to execute a utility program.

Software

Programs, such as the shells and the DM, that allow you to perform various tasks.

System administrator

The person responsible for system and network maintenance and security at your site.

SysV

The Domain/OS environment derived from UNIX System V, Release 3, from AT&T Bell Laboratories.

Transceiver

A device that transmits and receives signals.

Upstream node

The node in an Apollo Token Ring network that has most recently received the token and/or transmitted a data packet. (*See* Downstream node for contrast.)

User account

The system administrator defines a user account for every person authorized to use the system. Each user account contains the name the computer uses to identify the person (user ID), and the person's password. User accounts also contain project and organization names, helping the system determine who can use the system, and what resources they can use. *See also* **User ID** and **Password**.

User ID

The name the computer uses to identify you. Your system administrator assigns you your user ID. Enter your user ID during the log-in procedure when the system displays the log-in prompt. *See also* **User account**.

Utilities

Programs provided with the operating system to perform frequently required tasks, such as printing a file or displaying the contents of a directory. *See also* **Command**.

Wildcards

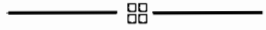
Special characters that you may use to represent one or more pathnames or other strings of characters.

Window

An opening on the screen for viewing information. Display management software lets you create several windows on the screen. Each window is a separate computing environment in which you may execute programs, edit text, or read text.

Workstation

Usually includes a keyboard, a monitor, and a system unit.



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