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Models V743/64 and V743/100 Owner's Guide

HP 9000 Series 700

VXIbus Controllers



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Printing Conventions

This book uses the following typographical conventions:

If you see ...	It means ...
`computer text`	Represents text you will see on the screen or text you must type/enter yourself. For example, `login:` indicates a login prompt displayed by the system.
italic text	Variable text supplied by you. For example, *file_name* means that you type a file name of your choice. Italic text is also used for text emphasis and for document titles.
Key	Type the corresponding key on the keyboard. For example, CTRL-D means you hold down the CTRL key, and press the D key.
`Displayed Item`	Select an on-screen item or a corresponding softkey. For example, `Help`

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Product Description

Chapter Contents

- Features.
- Memory Configurations.
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The HP 9000 Model V743 Embedded VXI Controller

The HP 9000 Model V743 VXI controller is an exceptionally flexible and responsive high-performance Precision Architecture VXI controller based on the Hewlett-Packard PA-RISC 7100LC technology. Some of the features are outlined in this chapter. See your *Installation Guide* for detailed hardware information.

Features

The Model V743 VXI controller has the following general features:

- Single-slot VXI C-size configuration.
- 64-MHz PA-RISC processor (Model V743/64).
- 100-MHz PA-RISC processor (Model V743/100).
- HP-UX 9.05 (minimum) Operating System.
- Configurable with 16 MB to 128 MB main memory (see "Memory Configurations").
  - For the Model V743/64: factory-installable RAM is 16 MB to 64 MB.
  - For the Model V743/100: factory-installable RAM is 32 MB to 128 MB.
- Error-Checking and Correcting (ECC) SIMM RAM.
- External Cache: 256 KB merged (64-MHz or 100-MHz CPU):
  - Configurable for 1 MB of shared memory.
- Total external disk capacity: 14 GB.
- Input/Output:
  - On-Board Graphics.
  - RS-232C (2 ports).
  - HP-IB.
  - Trigger Input-Output.
  - Clock Input-Output.
  - AUI (LAN).
  - Audio interface: 16-bit voice quality; composite mono; audio connector (one output jack for speaker or headphone).
  - SCSI-II single ended.
  - PS/2 Keyboard and Mouse; Mini-DIN Connector.

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Memory Configurations

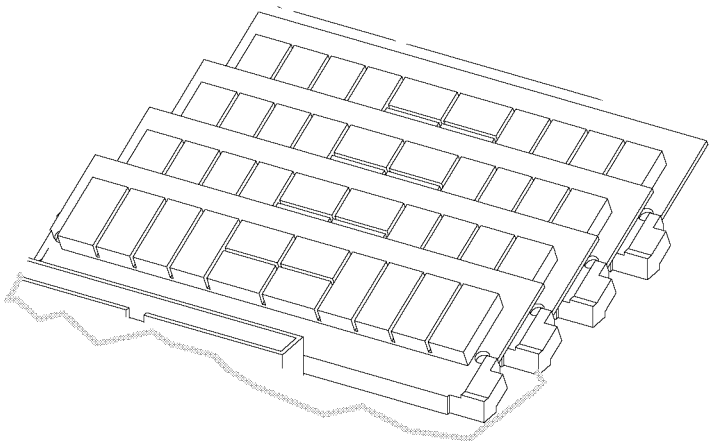


Figure 1-1. Four RAM Cards Installed

The standard Model V743 VXI controller comes with either 16 MB or 32 MB factory-installed RAM, with other options possible. It can be upgraded by the user with internal RAM cards as follows (two cards per upgrade):

- HP A2578A; 16 MB total.
- HP A2829A; 32 MB total.
- HP A2827A; 64 MB total.

Upgrades or factory-integrated RAM provide the Model V743 VXI controller with up to 128 MB maximum memory. See Appendix A for installation instructions.

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Interfaces

For graphics, printing, and LAN communications, the Model V743 VXI controller provides the following I/O interfaces:

- Graphics (on-board GSC; integrated color).
  - 640 x 480 (15-in. monitor).
  - 800 x 600 (15-in. monitor).
  - 1024 x 768 (15- or 17-in. monitor).
  - 1280 x 1024 (17- or 20-in. monitor).
  - 1024 x 768 (11.8-in. flat panel). *(Not currently supported)*
- LAN AUI (high-density, 15-pin D-subminiature; requires a custom cable and MAU for connection to LAN).
- Two asynchronous RS-232C Interfaces: high-density, 9-pin male DTE (PC standard). Requires a custom cable.
- SCSI-II Interface: high-density, 50-pin; single-ended 8-bit, up to 5 MB/sec. synchronous.

Custom Cables

The high-density I/O connectors for this board computer require adaptation to standard cabling, using one or more of the following items (these are provided with your controller):

HP A4301A	RS-232C: High-density 9-pin to standard 9-pin “M”. (2)
HP A4303A	LAN: High-density 15-pin to 15-pin AUI.
HP A4304A	Video: High-density 15-pin to standard 15-pin “F”.
HP K2996	SCSI: High-density 50-pin to standard bail lock.
HP 11130A	HPIB: High-density 15-pin to standard 24-pin, IEEE-488.

In addition, standard cables are also available and may be required.

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Physical Dimensions and Power Requirements

- The Model V743 VXI controller occupies one standard VXI slot.
- Height: 30.48 mm (1.2 in.)
- Width: 259.84 mm (10.23 in.)
- Depth: 368.30 mm (14.5 in.)
- Power Requirements:

DC Voltage	DC Current	Dynamic Current
+ 5 V	10 A	100 mA
+ 12 V	250 mA	3 mA
- 12 V	80 mA	2 mA
+ 24 V	40 mA	1 mA
- 24 V	0 mA	0 mA
- 5.2 V	560 mA	4 mA
- 2 V	480 mA	2 mA
+ 5 V STDBY	0 mA	0 mA

Note that +24V is required only for a flat-panel display (not currently supported).

System power requirements depend to some degree on the RAM configuration as well as on the software being run. Each additional RAM card adds .2 amps to the +5 Vdc. requirement at 64 or 100 MHz. See the hardware specifications in your service manual for further information.

Graphics

The Model V743 VXI controller comes with on-board graphics.

For information on currently supported monitors, see Chapter 5 in this manual, or the current Release Notes file in `/etc/newconfig/905RelNotes` on HP-UX 9. For Release Notes on HP-UX 10, see the `/usr/share/doc` directory.

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Operating System

Table 1-1 lists the HP-UX operating system features and languages for the Model V743 VXI controller.

Table 1-1.
Operating System and Languages
for the Model V743 VXI Controller

Operating system:	■ HP-UX 9.05 or later
Languages:	■ HP-PA Assembler 1.1 ■ C and ANSI C ■ C++ ■ Pascal ■ ANSI FORTRAN ■ SICL for C Programming, Revision 3.9
User Interface:	■ HP-UX 9.05 includes the X Window System and can be configured with HP VUE 3.0.
Network Features:	■ IEEE 802.3/Ethernet Local Area Network ■ ARPA/Berkeley networking services ■ VXI Backplane Networking (Optional) ■ TCP/IP ■ HP Diskless

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Finding Information About Your System

Chapter Contents

- Manuals for System Information:
  - HP-UX
  - HP VUE
- Online Sources of Information.

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Overview

- The Model V743 VXI controller uses the standard HP-UX operating system, a highly versatile system for multitasking, running your application programs, and performing a variety of development tasks. For information on installing HP-UX 9, see the manual *Installing and Updating HP-UX 9.03* (and the 9.05 Release Notes for updates). For HP-UX 10, see *Installing HP-UX 10* (and the Release Notes in the `/usr/share/doc` directory for updates).
  - To get started with using HP-UX, first read your *Installation Guide*, then go to Chapter 3 in this manual for information on booting and running the system.

Manuals for System Information

If you have not installed your hardware or started your controller, refer to the *Installation Guide* for the Model V743 VXI controller before going on.

HP-UX

After you have done the procedures in the *Installation Guide* for the Model V743 VXI controller, you may want to see the following sources for further information:

- For HP-UX administration information, see *System Administration Tasks*.
- For a quick reference to commonly used HP-UX commands, see the Appendix in *Using HP-UX*.
- HP VUE is the default interface for HP-UX. At some point, you may want to interact with the Model V743 VXI controller using HP VUE via the LAN, with an X Window System display. As a simpler window alternative, you can also use the X Window System by itself. Both are included in HP-UX. For further information, see the manual *Using the X Window System*, *Using HP-UX*, or *HP VUE User's Guide*.
- The following manuals will also be useful:
  - If you have not yet installed your HP-UX system, see *Installing and Updating HP-UX 9.03* (and the 9.05 Release Notes in `etc/newconfig` for

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updates) for HP-UX 9, or see *Installing HP-UX 10* (and the Release Notes in the `usr/share/doc` directory) for HP-UX 10.

- For troubleshooting HP-UX, see Chapter 9 in this manual, and the manual *Solving HP-UX Problems*.

VXI

For VXI configuration information, see the *C-Size VXIbus Systems Configuration Guide*. For VXI programming information, see the *HP SICL User's Guide for HP-UX*.

HP VUE

For information on using and configuring the HP VUE interface with HP-UX, see the *HP VUE User's Guide*. For information on installing HP VUE, see the *HP VUE Installation Guide*.

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Online Sources of Information

HP-UX is designed so that you can access many sources of information without leaving your system. Most of these information sources are accessible via the shell command line on a character terminal.

- Man Pages: The information on HP-UX which is found in *HP-UX Reference* is also available online. You can access this information by clicking on the up arrow (▲) over the `?` help icon on the HP VUE Front Panel, or by entering the command line `man` *command*, where *command* is the name of the HP-UX command or routine you want to get information on. If you're not sure of the command name, you can enter `man -k` *keyword*, where *keyword* is a likely topic word to search on. This will result in a display listing commands having the keyword in their description.

There are also a variety of files on your HP-UX system which contain version-specific information. These will be useful in administering and configuring cards and devices for your version of HP-UX. Among these files are the following:

- Release Notes: This is the online version of the Release Notes which came with your system. It contains all the latest information, undocumented changes and bug fixes for your release of HP-UX. It also contains information on the current version of HP VUE. The Release Notes document is found in the `/etc/newconfig` directory for HP-UX 9, or the `/usr/share/doc` directory for HP-UX 10. Look for the file named by its release number, for example, `905RelNotes`, for HP-UX 9.05.
- HP-UX and HP VUE Help: For graphics displays, extensive help information on the operating system and the visual interface is included with HP VUE. Access it via the `?` button on the control panel.

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- Newconfig: The directory `/etc/newconfig` for HP-UX 9, or `usr/share/doc` for HP-UX 10, contains information and new versions of HP-UX product configuration files, as well as shell scripts which may have been customized on your system. The contents of this directory will vary depending on which products you have loaded on your system. In most cases, old versions of these files, in their regular locations in the file system, are not overwritten by the update process. See the README file in `/etc/newconfig` on HP-UX 9, or `/usr/share/doc` on HP-UX 10, for information on the contents of this directory.

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3

Getting Started with HP-UX

Chapter Contents

- Before Logging In the First Time.
- Turning On the System.
- Configuring the Controller.
- Configuring the RS-232 Ports.
- Logging In and Out.
- Creating a New User Account.
- Setting or Changing a Password.
- Selecting a New Password.
- Powering Down the System.
- Using the Command Line.

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Before Logging In the First Time

If your Model V743 VXI controller does not have a hard disk connected, or if it has a file system disk, and you want it to be a cluster client node (cnode), refer to the manual *Managing Clusters of HP 9000 Computers* for instructions on setting up HP-UX clusters and cnodes.

This chapter reviews some initial procedures and provides information on using both HP VUE sessions and HP-UX. For more detailed information about using HP VUE after login, see the *HP VUE User's Guide*.

You should first read the *Installation Guide* for the Model V743 VXI controller, and follow the initial hardware setup and booting procedures applicable to your configuration. When you first turn on the VXIbus mainframe to complete the installation process, your display will ask for information on the time zone, system host name, and network IP address. If you do not have this information readily available, simply press Enter after the questions and you can supply the information later.

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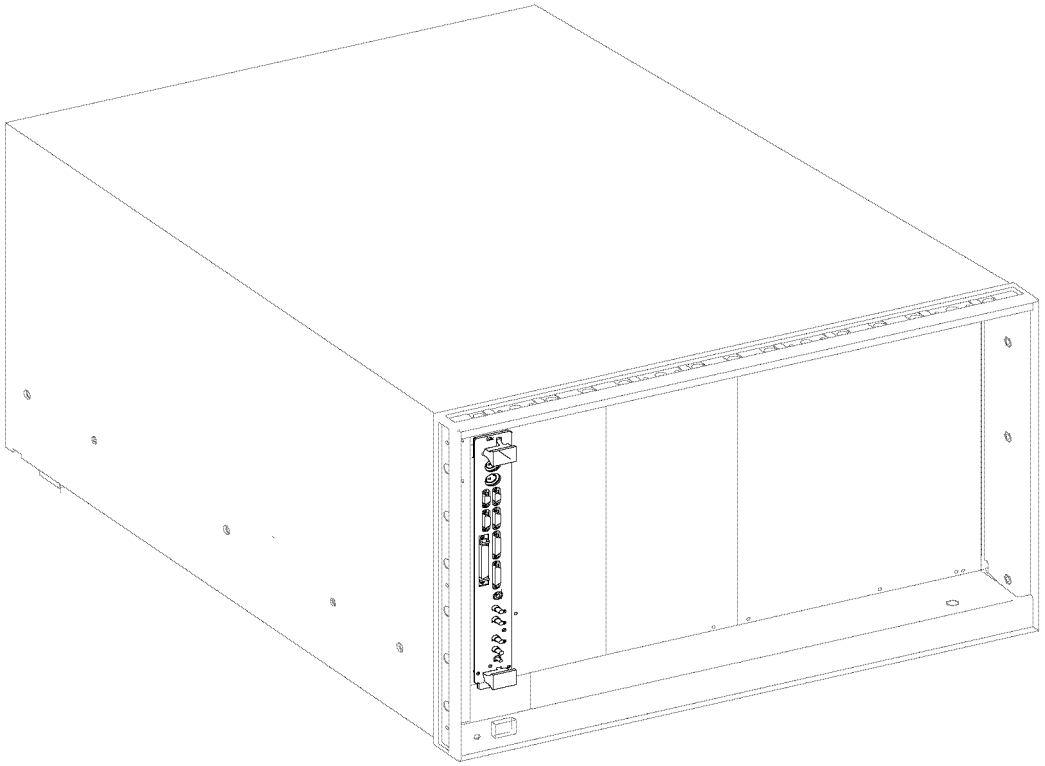


Figure 3-1. Model V743 VXI Controller in Mainframe

System Requirements

You should check to see that you have connected the following components before proceeding further with booting your system:

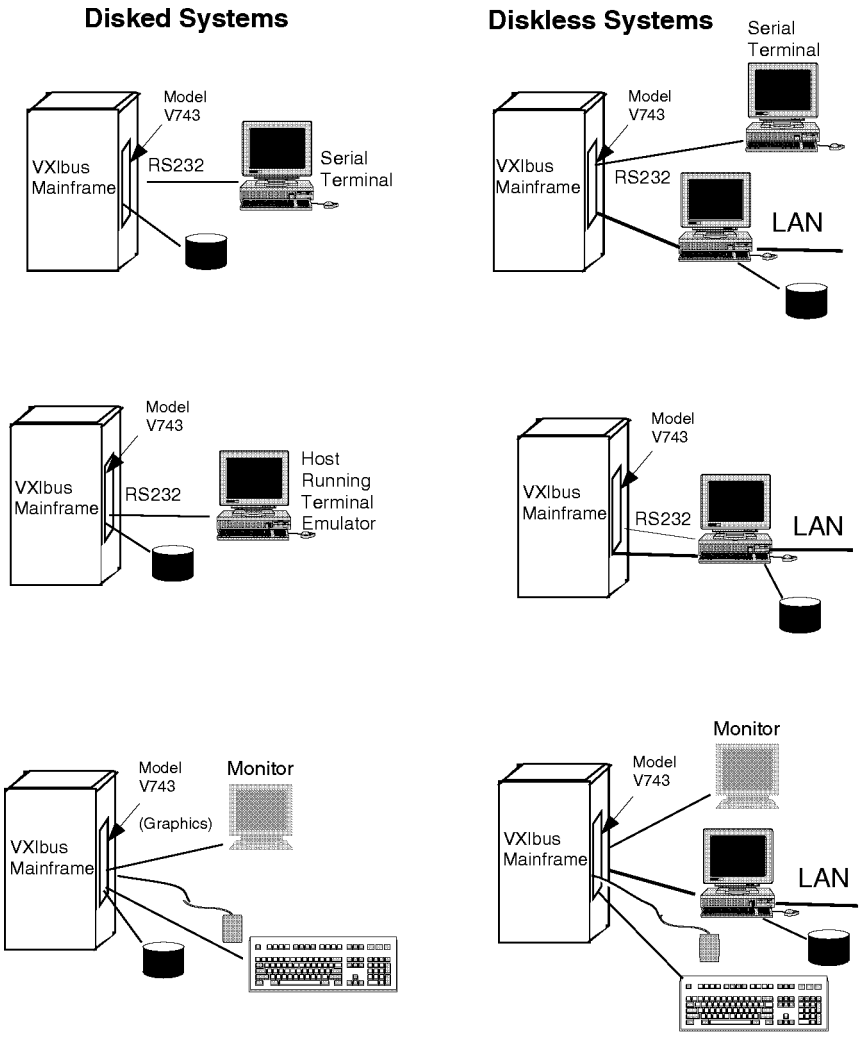
- Host System: HP Model E1401A or equivalent VXIbus mainframe.
- HP-UX, installed on a disk accessible to the Model V743 VXI controller.
- A direct connection to AC power for the mainframe. Avoid using extension power cables or power strips.
- LAN connection to the Model V743 VXI controller via an appropriate MAU interface and custom cable for the AUI.

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- Custom cables (provided with the Model V743 VXI controller) with high-density connectors for LAN, monitor, and RS-232C. (See "Custom Cables" in Chapter 1 for a listing of custom cables.)
- Monitor connected to video output, or a terminal or terminal-emulator system connected to an RS-232C output.
- Keyboard connected to the Model V743 VXI controller.
- DDS-Format tape drive configured to the SCSI bus of the Model V743 VXI controller (for backup of local disk, if installed).
- Disk configured to the SCSI bus on the Model V743 VXI controller (optional).

Some of the more common VXIbus configurations with the Model V743 VXI controller are shown in Figure 3-2.

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Note: Other configurations are possible.

Figure 3-2. Configurations for the Model V743 VXI Controller

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Turning On the System

Before Booting the System

With all peripheral devices turned off, do the following:

1. Install the Model V743 VXI controller according to the instructions in the *Installation Guide* for the Model V743 VXI controller.
2. Connect a monitor to your system. See Figure 3-2 for some configuration alternatives.
3. Turn on the power to the monitor. The power indicator LED on the monitor will show that it is turned on, even if the screen remains dark. Make sure of the following:
   - The appropriate LAN and/or RS-232C connection has been made to the Model V743 VXI controller.
   - If you use a remote graphical display host connected via LAN, make sure the remote system is configured to host the controller. See Figure 3-2 and "Displaying Graphics on a Remote X Host" in Chapter 5 for the specifics of setting this up.
4. Check SCSI connections.
5. Turn on the power to any peripheral devices, but do not turn on the power to the VXIbus mainframe until you have read the following note.

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Note

If you want to change the configuration of the controller from graphics display to displaying on a console (via the serial port), you can do so by first connecting the console to the RS-232C (Port A). (Note: The monitor and keyboard should *not* be connected during this procedure.) Then hold the Rst/Abt switch in the "`Abt`" (down) position while you cycle power (turn the power off and back on) on the VXIbus mainframe. This action starts the boot console routine which interactively selects the display and configures the computer to recognize a monitor's format correctly. Prompts for this are given during the screen display process. See "Configuring the Console Path and Display Format" in Appendix B for the details of this procedure.

Using the Rst/Abt Switch

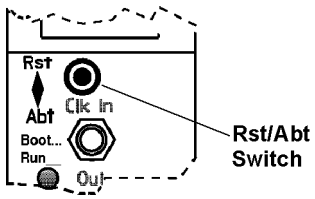


Figure 3-3. Rst/Abt Switch

The Rst/Abt switch on the front panel is a momentary-contact, two-position switch which enables either a hard reset (in the "`Rst`" position) or process termination (in the "`Abt`" position). The switch is used at boot, as indicated earlier, to set the computer to display in the correct format for the console monitor.

- To reboot the computer, push the Rst/Abt switch to the "`Rst`" (up) position.
- To exit all currently running processes, push the Rst/Abt switch to the "`Abt`" (down) position. This position is also used when cycling power to reset the monitor configuration and console path.

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Configuring the Controller

A number of configurations are possible, as diagrammed in Figure 3-2. One common configuration for the controller is as an HP-UX cluster node, or cnode. See the manual *System Administration Tasks* for procedures for other configurations.

Cluster Configuration

After your hardware is in place, you can use SAM on the cluster server to do most of the configuration tasks. The manual *Managing Clusters of HP 9000 Computers* gives you detailed guidance for configurations relating to clusters. The following procedure gives you general guidance for setting up the controller as a cnode:

1. Ensure that HP-UX has been installed on the server and that it is appropriately configured as a root server (a cluster that has any Series 700 clients must have a Series 700 root server). Check that a client name (ARPA host name) has been assigned for the new Model V743 VXI controller. See Chapter 4 in *Managing Clusters of HP 9000 Computers* for more information on this.
2. Log onto the root server as `root`.
3. Print out a copy of `/tmp/cluster.log` which contains a list of the context-dependent files (CSFs) which SAM creates on your system.
4. Get the LAN station address for the new Model V743 VXI controller from the label on its packing box, or cycle power on its host system and get the LAN station address from the boot console interface display `I/O ASIC` menu. You can also use `/etc/lanscan` to get this address from a running system if it already has access to an OS. Write down the LAN station address.
5. On the cluster server, type the following:

   On HP-UX 9:

   `/usr/bin/sam` ENTER

   On HP-UX 10:

   `/usr/sbin/sam` ENTER

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6. On HP-UX 10, select `Clusters`
7. Select `NFS Cluster Configuration -->`
8. Choose `Add Cluster Clients ...` on HP-UX 9, or `Define Clients` on HP-UX 10.
9. Fill in the information in the selected fields on the SAM form.
10. Click on `Add` or `Apply` when the fields are filled in.
11. Enter information for the next cnode to be added, if any.
    OR
12. Click on `OK` to end the process if you have no more cnodes to add, and wait for confirmation that the action has been completed successfully.
13. Check `/tmp/cluster.log` for errors.
14. Boot each new client.
15. Use SAM to add local DDS drives, for backup, if needed.

Install your SICL software onto the server disk for each cnode including rebuilding the kernel after each SICL installation. Use the configuration steps for SICL in Chapter 4 in this manual. You will find further information in the *HP SICL User's Guide for HP-UX*.

Booting the System

1. If your Model V743 VXI controller is to be a diskless cluster node (cnode), go to "Configuring the Controller" earlier in this chapter for instructions on configuring the server.
2. If you have not already done so, turn on the power to the Model V743 VXI controller by powering up the VXIbus mainframe. The controller turns on with the host system that it is plugged into.

   The topmost green LED ("`Boot ... Run`") on the panel will blink slowly until HP-UX is booted, then it is continuously on. The other green LED ("`Act`") will blink when there is VXI backplane access activity. The two red LEDs (second and fourth) will only light if there is a system problem in this VXI system. Details of the indications are given in Table 9-1.

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3. You should see a sequence of boot messages. As shipped, the Model V743 VXI controller will first attempt to boot from an external SCSI device at SCSI address 6 if present, then at SCSI address 5 if present, then from any LAN-configured system for which this system is a valid cluster client. If there are multiple cluster servers that could recognize this client, or if you are installing HP-UX from CD-ROM, you should interrupt the automatic boot selection by pressing the ESC key, then select key 1 `Boot From a Device` to select the correct boot device. See Appendix B for more information about configuring the automatic boot selection.

4. During the boot process, a new system will give you messages prompting you for the host name, IP number, and time zone. If you have this information, enter it as requested. Otherwise, press Enter. You can also enter or update this information later by typing `set_parms` Enter after login. The information is as follows:

   a. The time zone where your system is located.
   b. The host name for your system - any alphanumeric, single-word name with eight or fewer characters.
   c. The network address number, also called an IP number, for your system. This consists of four address fields separated by periods: for example, *255.32.3.10*. You may need to consult with your system administrator for this information. Or, if your host name and IP number have already been assigned, you can find out the host name after boot by entering `uname -a`. If you know your host name, you can find out your IP number by entering `nslookup` *host_name* at the system prompt.

5. You will also be asked if you want to set a root password at this time. If so, see "Selecting a New Password" in this chapter for password requirements. Finally, you will see the "`Console login:`" prompt.

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Configuring the RS-232 Ports

The Model V743 VXI controller comes equipped with two RS-232C ports. The first port, labeled "A", may be configured using SAM (System Administration Manager). The second port, labeled "B", however, cannot be configured using SAM; SAM will incorrectly configure this port. To configure this port you need super-user privilege. The command for configuring this port is:

```
mknod /dev/rs232_b c 1 0x702004
```

You may choose a different name than "rs232_b" for the device file.

If you plan to use this port with the HP-UX "`cu`" command or similar utilities, you will also need to modify the `/usr/lib/uucp/Devices` file to add an entry for this device file name. A typical entry is:

```
Direct rs232_b - 9600 direct
```

Logging In and Out

Once HP-UX is running on your system, you must log in. The process of logging in is one of the ways that HP-UX prevents unauthorized persons from using your system. This is especially important if your system is attached to a network.

Logging In

If you are not using HP VUE, then a command line login prompt appears after boot:

```
login:
```

1. Type your login name (or `root`). (See "Setting or Changing a Password" for setting a password).
2. Press Enter.

   If you *haven't* yet set a password, you will get a a system prompt ("`#`" for root, or `$` for user), and you can begin using the system.

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3. Otherwise, type your password when the system gives the following prompt:

```
Password:
```

4. Press Enter. The system prompt ("#" or "$") appears and you can use the system.

Logging Out

If you are not using HP VUE, you can use the `lock` command to temporarily leave your system (while leaving processes running). If you want to log out of your current work session entirely, use the following command:

```
exit
```


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Creating a New User Account

If you have access to a system administrator, that person may have already set up a user account for you. Otherwise, you will need to do the following to set up a user account so that you can interact with the system as non-`root` and not incur the risk of accidentally damaging data.

You usually work in your home directory or "account", and most of your default files are kept there. As "owner" of this directory and its subdirectories, you also have control over access to the files in the account.

Using SAM

To create a user account, you will need to use SAM, the System Administration Manager.

Caution In order to use SAM, you must be logged in as `root` (indicated by the command prompt "`#`"). The `root` account is a separate login account providing unlimited permissions on your system. This means that you need to take actions more carefully when you are `root`. The `root` account is only used to do system administration tasks, and, for security reasons, it should use a password which is different from your everyday user password. *Using HP-UX* and *System Administration Tasks* give you more details on using SAM.

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You can navigate around a SAM screen on a character terminal using the arrow keys and Tab to illuminate the selection you want to activate. When the selection is illuminated, press Enter to activate (or "choose") it.

1. Type the following:

   On HP-UX 9:

   `/usr/bin/sam` ENTER

   On HP-UX 10:

   `/usr/sbin/sam` ENTER

2. At the opening menu, choose `Users and Groups->` by pressing Enter with `Users and Groups->` illuminated.

3. At the next screen, choose `Users`. You will see a screen displaying a list of logins and real names.

4. Go to the `Actions` menu (use the appropriate function key to get to the menu bar). Select `Add` from the `Actions` pull-down menu. You will see a form `Add a User Account`.

5. Fill in your login name, choice of start-up program and environment (if different from the defaults given), and the optional information.

Note At this point you can select X Windows as your login default environment, if you so desire.

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6. Choose `OK` when you are finished.
7. You will be asked to select a password. (See "Selecting a New Password" for password requirements. If you wish, you can select a temporary password and reset it later.) Type the password and choose `OK` (or press Enter). Re-enter the password as requested and choose `OK`. The re-entered password must match the first.
8. Choose `OK`.
9. When the "Task Completed" message appears, choose `OK`.
10. Select `Exit` then `Exit SAM`.

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Setting or Changing a Password

From a command line shell prompt, you can use the `passwd` command directly to set or change a password. (You do not have to be `root`.) Enter the following:

3

```
passwd  Enter
```

You will be prompted for your old password. Then you will be prompted to enter and re-enter your new password. The re-entered password must match the first entry.

See the "Selecting a New Password" section below if you need help with selecting passwords. Use the same procedure to change an old password as to add a new password. If you already have one, you will be prompted appropriately for the old password.

Selecting a New Password

If you have already booted and used your system, you should already have set different passwords for your user account and for `root`.

However, you will also want to change your password from time to time as a matter of good security practice. The following gives the general requirements of setting passwords.

A password must meet four criteria to be valid:

- Contain at least six characters.
- At least two characters must be alphabetic.
- At least one character must be a number (0-9) or a special character (/, ?, !, or other punctuation mark).
- Differ from your previous password by at least three characters.

Your password is case sensitive, so the password `?Secret` is different from the password `?secret`. Your password can also be as long as you want, but only the first eight characters are checked.

If you are adding many users to your system, see *System Administration Tasks* for the details of controlling access to your system.

If you have not yet set your password, you can do so using SAM or a shell command line.

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Powering Down the System

Caution If you have a local disk connected to the Model V743 VXI controller, do not turn off power to the system without first shutting down the controller's operating system software according to the following procedure. Turning off the power for your system without first doing the shutdown procedure may result in damage to data on your disk. Always execute the shutdown process to completion first.

1. Exit all processes currently running.
2. Execute the `shutdown` command as described in the next section to bring the system to a halted state.

   You can do this either from the command line, with SAM, or by using the HP VUE Toolbox. The following procedure uses the conventional HP-UX command.

Using the Shutdown Command to Stop Your System

1. As `root`, exit your applications and, at a shell prompt, type the following command:

   ```
   cd / Enter
   shutdown -h 0 Enter
   ```

   This gives a zero-length "grace period" before the system goes down to the halted state.

2. You will see a message:

   ```
   Halted, you may now cycle power.
   ```

3. At this time the system no longer responds to keyboard input and you may turn off the power. Turning the system back on again will initiate the boot sequence (see Appendix B).

If you want to shut down and reboot automatically instead of using the above procedure, simply enter the `shutdown` command with *no* options.

See *shutdown*(1M) for various other options.

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Using the Command Line

For guidance on entering HP-UX commands and using the HP-UX file system, tools, and networking commands, see the manual *Using HP-UX*. For more advanced work with shell programming, see the manual *Shells: User's Guide*.

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4

Configuring for a VXI/MXI System

Chapter Contents

- Overview.
- Examining Your VXI/MXI Configuration.
- Changing Your VXI/MXI Configuration.
- Configuring the VXI/MXI Trigger Lines.
- Examining the VXI/MXI Boot Process.
- Using HP SICL for VXIbus Backplane Communication.

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Overview

If your Model V743 VXI controller is to be a node in an HP-UX cluster, and it has not yet been installed and configured according to the procedures in the *Installation Guide* for the Model V743 VXI controller, see "Configuring the Controller" in Chapter 3 before proceeding.

This chapter describes the VXIbus default values and how to change these values using the utilities provided with the HP Standard Instrument Control Library (SICL). SICL is an I/O library that comes with your Model V743 VXI controller. You can use SICL for communication with your VXI SCPI-compatible instruments. Install SICL according to the instructions in the *HP SICL User's Guide for HP-UX*. If you have an application other than HP SICL, see your application's documentation for information on changing the VXIbus configuration.

4

Description of HP SICL

SICL is a modular instrument communications library that works with a variety of computer architectures, I/O interfaces, and operating systems. Applications written in C or C++ using this library can be ported at the source code level from one system to another without, or with very few, changes.

SICL uses standard, commonly used functions to communicate over a wide variety of interfaces. For example, a program written to communicate with a particular instrument on a given interface can also communicate with an equivalent instrument on a different type of interface. This is possible because the commands are independent of the specific communications interface. SICL also provides commands to take advantage of the unique features of each type of interface, thus giving the programmer complete control over I/O communications.

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Examining Your VXI/MXI Configuration

Default Values

Your Model V743 VXI controller comes preconfigured from the factory as follows:

- VXI Logical Address : 0.
- VXI Servant Area Size : 255.
- VXI Bus Error Timeout : 1ms.
- VXI Shared Memory : 0 (disabled).

The above values are programmed into the Model V743 VXI controller EEPROMs at the factory. There are times, however, when you want to change these values. See the next section "Changing Your VXI/MXI Configuration," for details on changing these values.

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Changing Your VXI/MXI Configuration

SICL includes some Model V743 VXI controller configuration utilities that are used to change the VXI Shared Memory in the VXIbus configuration.

Changing the VXI Shared Memory

You can reserve 1 MByte of the Model V743 VXI controller system memory to be used as VXI shared memory in A24 address space. The Model V743 VXI controller is shipped with this feature disabled. When enabled, 1 MByte of the system memory becomes unavailable for use by HP-UX and your applications. Instead, this memory is mapped onto the VXI backplane for use as VXI shared memory. You can use the SICL "`e1497cnf`" utility to enable or disable this feature by executing the following:

On HP-UX 9:

```
/usr/pil/bin/e1497cnf -i vxi
```

On HP-UX 10:

```
/opt/sicl/bin/e1497cnf -i vxi
```

See the "Customizing your VXI/MXI System" chapter in the *HP SICL User's Guide for HP-UX* for more information on using the `e1497cnf` utility.

Note You must be super user in order to run this utility. This utility also requires you to reboot the system.

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Configuring the VXI/MXI Trigger Lines

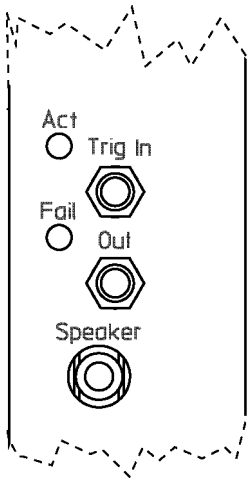


Figure 4-1. Front Panel Trigger I/O

The table listed on the next page shows the relationship between SICL and the Model V743 VXI controller trigger lines and SMB connectors.

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Trigger Lines

SICL	V743
I_TRIG_TTL0	TTL0
I_TRIG_TTL1	TTL1
I_TRIG_TTL2	TTL2
I_TRIG_TTL3	TTL3
I_TRIG_TTL4	TTL4
I_TRIG_TTL5	TTL5
I_TRIG_TTL6	TTL6
I_TRIG_TTL7	TTL7
I_TRIG_ECL0	ECL0
I_TRIG_ECL1	ECL1
I_TRIG_ECL2	INVALID
I_TRIG_ECL3	INVALID
I_TRIG_EXT0	Trig in
I_TRIG_EXT1	Trig out
I_TRIG_EXT2	INVALID
I_TRIG_EXT3	INVALID
I_TRIG_CLK0	16 MHz Clock
I_TRIG_CLK1	INVALID
I_TRIG_CLK2	INVALID
I_TRIG_CLK10	INVALID
I_TRIG_CLK100	INVALID

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Routing VXI TTL Trigger Lines in a VXI/MXI System

Use the SICL `ivxitrigroute` function to route VXI trigger lines. For example, if you want to route TTL7 to Trig out, you can use the following SICL function call in your program:

```
ivxitrigroute (id, I_TRIG_TTL7, I_TRIG_EXT1);
```

See the *HP SICL Reference Manual* for more information on this and other SICL functions.

Routing VXI TTL Trigger Lines in a Multiple Mainframe System

When you have multiple mainframes connected via the MXIbus, the TTL trigger lines are not routed from one mainframe to another. The INTXbus does not allow multiple INTXbus devices to drive the same TTL trigger line. If you need TTL trigger lines in the extended VXI mainframes, you need to edit the `/usr/pil/etc/vxi16/ttltrig.cf` configuration file on HP-UX 9, or the `/etc/opt/sicl/vxi16/ttltrig.cf` configuration file on HP-UX 10, to map the TTL trigger line to the source logical address.

The following example illustrates an entry in the `ttltrig.cf` file, where the first column is the TTL trigger line and the second column is the logical address of the TTL trigger source:

```
0 0
1 0
2 0
3 0
4 0
5 0
6 0
7 0
```

(Multiple trigger sources are still allowed on the same line within the same mainframe.)

In the example above, all TTL trigger lines are sourced by the device at logical address 0.

The following is an example of what you would see when the resource manager runs:

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```
VXI-MXI TTL Trigger Routing:

Name          0 1 2 3 4 5 6 7
----          - - - - - - - -
hpvximxi      I I I I I I I I
 I - MXI->VXI
 O - VXI->MXI
 * - Not Routed
```

Now the following illustrates TTL trigger line 1 being sourced by the device at logical address 24:

`ttltrig.cf` file:

```
0 0
1 24
2 0
3 0
4 0
5 0
6 0
7 0
```

resource manager output:

```
VXI-MXI TTL Trigger Routing:

Name          0 1 2 3 4 5 6 7
----          - - - - - - - -
hpvximxi      I 0 I I I I I I
 I - MXI->VXI
 O - VXI->MXI
 * - Not Routed
```


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Note You can use the `/usr/pil/bin/e1489trg` diagnostic test on HP-UX 9, or `/opt/sicl/bin/e1489trg` test on HP-UX 10, for the MXI/INTX trigger and interrupt circuitry. See Appendix F, "Configuring your VXI/MXI System," in the *HP SICL User's Guide for HP-UX* for information on this and other diagnostic tests for the E1489 MXIbus Controller Interface.

Inverting the Polarity of the Model V743 VXI Controller External Trigger Lines

At times you may wish to change the polarity of the `Trig In` and `Trig Out` lines on the Model V743 VXI controller. This would allow you to connect to an external device independent of the device's polarity. There is a SICL utility, `itrginvrt`, that can be used to do just this. The following is an example that inverts the polarity of the `Trig In` line:

```
itrginvrt -a vxi -i ON -o OFF
```

Where:

- `-a vxi` specifies the interface name, `vxi`
- `-i ON` specifies that the Trig In line is to be inverted
- `-o OFF` specifies that the Trig Out line is not to be inverted

See the "Customizing your VXI/MXI System" chapter in the *HP SICL User's Guide for HP-UX* for a complete description of the `itrginvrt` utility.

Note The external trigger lines remain inverted until power is cycled or the resource manager runs (with `iclear` or `ivxirm`, for example). The external trigger lines then return to the same state as the trigger line routed to them.

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Examining the VXI/MXI Boot Process

When HP SICL is installed and configured according to the procedures in the *HP SICL User's Guide for HP-UX*, certain SICL utilities are copied onto your system. These utilities automatically run when the system boots. The following is a summary of the VXIbus boot process utilities:

`iproc` This utility runs at system boot and performs various system initialization functions. It uses the `iproc.cf` configuration file to determine when the other configuration utility runs.

`ivxirm` This utility runs the resource manager which initializes and configures the VXI/MXI mainframe resources. The resource manager reads the VXI/MXI configuration files and polls the VXI devices to determine their resources and capabilities. This utility runs at mainframe initialization if specified in the `iproc.cf` configuration file (the default is to not run at mainframe initialization).

Note These utilities and configuration files are only provided with the SICL `VXI` fileset. In order to use VXI/MXI, you must have loaded this fileset during the SICL installation. See the *HP SICL User's Guide for HP-UX* for SICL installation and configuration information.

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Viewing the VXIbus System Configuration

You can use the SICL `ivxisc` utility to read the current system configuration and print a human readable display:

On HP-UX 9:

```
ivxisc /usr/pil/etc/vxi16
```

On HP-UX 10:

```
ivxisc /etc/opt/sicl/vxi16
```

See "The HP SICL Utilities" chapter of the *HP SICL User's Guide for HP-UX* for information on using this utility.

Note The boot-up initialization line is commented out by default. You *must* un-comment the following line in the `/usr/pil/etc/iproc.cf` file on HP-UX 9, or the `/etc/opt/sicl/iproc.cf` file on HP-UX 10, in order for the resource manager to run on boot-up.

```
boot ivxirm -p I vxi
```

VXI/MXI Configuration Files

The VXI/MXI configuration files are used to specify some site-dependent configuration rules and any changes from the default. These files are not usually edited except under special circumstances. See the *HP SICL User's Guide for HP-UX* for more details on these files and when you want to make changes to them.

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VXI/MXI Configuration Files

Configuration File	Description
`vximanuf.cf`	Contains a database that cross references the VXI manufacturer id numbers and the name of the manufacturer. Edit this file if you add a new VXI vendor that is not currently in the file.
`vximodel.cf`	Contains a database that lists a cross reference of manufacturer id, model id, and VXI device names. Edit this file if you add a new VXI device to your system that is not currently in this database.
`dynamic.cf`	Contains a list of VXI devices to be dynamically configured. You only need to add entries to this file if you want to override the default dynamic configuration assignment by the resource manager.
`vmedev.cf`	Contains a list of VME devices that use resources in the VXI mainframe. Edit this file if you add a VME device to your VXI system.
`irq.cf`	Contains a database that maps specific interrupt lines to VXI interrupt handlers. If you have non-programmable interrupters and you want the interrupters to be recognized by a VXI interrupt handler, you must make an entry in this file. Keep in mind that not all VXI devices need to use interrupt lines and not all interrupt lines need to be assigned.
`cmdrsrvt.cf`	Contains a commander/servant hierarchy other than the default for the VXI system. Edit this file only if you want to override the default according to the commander's switch settings.
`names.cf`	Contains a database of a list of symbolic names to assign VXI devices that have been configured. Edit this file if you add a new VXI device to your system that is not currently in the database.
`oride.cf`	Contains values to be written to logical address space for register-based instruments. This can be used for custom configuration of register-based instruments every time the resource manager runs.
`ttltrig.cf`	Contains the mapping of VXI devices to TTL trigger lines for extended VXI/MXI systems. Edit this file only if you have an extended VXI/MXI system and you want your TTL trigger lines to be recognized.

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The `iproc` Utility (Initialization and SYSRESET)

The `iproc` program is run from `/etc/rc`. This program becomes a daemon and monitors the VXI backplane for SYSRESET. The `iproc.cf` file tells `iproc` what to do if a SYSRESET occurs. Usually you want the resource manager to run and configure your system (since the SYSRESET has destroyed the configuration).

Note

The SYSRESET line is commented out by default. You *must* un-comment the following line in the `/usr/pil/etc/iproc.cf` file on HP-UX 9, or the `/etc/opt/sicl/iproc.cf` file on HP-UX 10, in order for the resource manager to run on SYSRESET.

```
sysreset vxi ivxirm -t 5&
```


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The following is an example of the `/usr/pil/etc/iproc.cf` file:

```
#
# iproc configuration file
#

#
# Boot up functions
#
# Lines are of the form:
#       boot <command_to_execute>
#
boot echo "PIL:  Instrument I/O Initialization"

# The next line must always exist.
boot pilsetup

#
# V/382 or VXI/MXI Support
#

boot ivxirm -p -I vxi

# When a SYSRESET occurs, rerun the resource manager (delay 5 sec).
# The resource manager MUST be run in the background (i.e. last
# character should be a '&').

sysreset vxi ivxirm -t &

# Sample lines for a second VXI/MXI interface:
#boot ivxirm -p -I vxi2
#sysreset vxi2 ivxirm -t &

# The following line must be present for ALL VXI/MXI systems
monitor
```


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Using HP SICL for VXIbus Backplane Communication

Once your VXIbus system is configured, you can start programming with SICL. SICL allows you to communicate directly over the VXIbus backplane to SCPI compatible message-based and register-based instruments.

With the SICL C library, you simply open a communications session with the desired instrument or interface (`vxi`, or `iscpi` for register-based instruments) and send your instrument SCPI (Standard Commands for Programmable Instruments) commands directly over the VXIbus backplane. The following is a C language example that queries a VXI instrument for its identification string and prints the results:

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```
/* idn.c
   The following program uses SICL to query a VXI
   instrument for an identification string and prints the results. */
#include <stdio.h>
#include <sicl.h>              /* SICL header file */

/* Modify this line to reflect the address of your device */
#define DEVICE_ADDRESS "vxi,24"
void main()
{
  /* declare a device session id */
  INST id;
  char buf[256];

  /* error handler to exit if an error is detected */
  ionerror(I_ERROR_EXIT);

  /* open a device session with device at DEVICE_ADDRESS */
  id = iopen (DEVICE_ADDRESS);

  /* set timeout value to 1 sec */
  itimeout (id, 1000);

  /* send a SCPI *RST command and prompt for identification string */
  iprintf (id, "*RST\n");
  ipromptf (id, "*IDN?\n", "%t", buf);

  /* print contents of buf */
  printf ("%s\n", buf);

  /* close device session */
  iclose (id);
}
```

For More Information

See the *HP SICL User's Guide for HP-UX* and the *HP SICL Reference Manual* for information on using HP SICL.

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5

Configuring Graphics

Chapter Contents

- Monitor Selection.
- Displaying Graphics on a Remote X Host.

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Overview

Graphics operation will require a graphics display monitor connected to the Model V743 VXI controller selected from the following:

Table 5-1. Supported Color Monitors

Product Number	Resolution	Size	Refresh Frequency (Hz)
HP D2806A	1024 x 768	15 in.	70
HP A4032A	1280 x 1024	17 in.	(Multi-Sync)
HP A4033A	1280 x 1024	20 in.	72
HP A4032B (Southern Hemisphere)	1280 x 1024	17 in.	60
HP A4033B (Southern Hemisphere)	1280 x 1024	19 in.	72

From time to time, this information may change. For the most recent information on supported monitors, please see the Release Notes for your HP-UX system (online in `/etc/newconfig` *on HP-UX 9, or* `usr/share/doc` *on HP-UX 10) or the Support Matrix available from your HP support engineer.*

Configuring for a New Monitor

Note that configuration of the Model V743 VXI controller to recognize new monitors is accomplished interactively by the boot console handler by following the procedure in "Configuring the Console Path and Display Format" in Appendix B in this manual.

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Identifying Graphics Cards

Since only on-board graphics is supported on this computer, only `GRAPHICS 1` will be indicated in the boot ROM console search display (see Appendix B).

Displaying Graphics on a Remote X Host

You can display graphics using a remote computer with X server capability connected to the Model V743 VXI controller via LAN. This is done by setting the `DISPLAY` environment variable on the controller. `DISPLAY` sets the host, display number, and screen number to which a system sends bitmapped output for clients.

For example, if the Model V743 VXI controller is called *server_system*, your remote system is *xhost_system*, and the program running on the Model V743 VXI controller is called `xwijit`, enter the following on the command line of your remote X host system to get it to display for the *server_system*:

`xhost +`*server_system*	*This enables the Model V743 VXI controller to recognize the remote X host.*
`rlogin` *server_system*	*Log in on the Model V743 VXI controller.*
`DISPLAY=`*xhost_system*`:0.0`	*On the controller, set the* `DISPLAY` *variable so that it will display on your remote X system.*
`export DISPLAY`	*Export the variable.*
`xwijit`	*Run the program on the Model V743 VXI controller.*

For More Information

For detailed information on running HP VUE in a networked environment, see the *HP VUE User's Guide*.

For additional information on configuration for graphics formats, see "Configuring the Console Path and Display Format" in Appendix B in this manual.

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6

Configuring HP-UX for Printers

Chapter Contents

- Preparing for Installation.
- Testing the Printer Installation.
- Dealing With Printer Problems.

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Preparing for Installation

You may have to do some configuration for appropriate data interchange with a new printer. This chapter gives you general guidance for these tasks.

You can use SAM (System Administration Manager) procedures to make your printer installation easier. SAM can determine the status of any of your connected devices and will perform the necessary software installation of the printer for you.

If you don't want to use SAM to install the printer, or if SAM is not on your system, you can also use HP-UX commands directly to accomplish the same tasks. For information on using manual system administration procedures for this, see the manual *System Administration Tasks*.

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Configuring HP-UX for a Printer

You will need to supply certain items of information needed to identify the printer you are installing. It will help you to write down this information now, so that you have it available to refer to during the software installation process:

- Printer Interface:
  - □ Serial (RS-232C) (Port A):_____
  - □ Serial (RS-232C) (Port B):_____
- Printer Name (a name the system uses to identify the printer. It can be any name.):

  _____
- Printer Model Number (located on a label on the back of the printer):

  _____

Printer Cables

For serial data exchange, you will need the following:

- HP A4301A (Serial): 9-pin high density to standard 9-pin "M". (Two of these cables are provided with the Model V743 VXI controller.)

Other standard cables may be required.

Procedure:

To install your printer:

1. Log in as `root`.
2. Run SAM by typing:

   On HP-UX 9:

   `/usr/bin/sam` Enter

   On HP-UX 10:

   `/usr/sbin/sam` ENTER

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To get help in SAM, press the f1 key. This key gives you context-sensitive information for the object at the location of the cursor in either graphical or character mode.

Use the arrow keys and Tab to move the highlighted areas around the screen. Press Enter to "choose" an item when illuminated (such as `OK`).

3. At the SAM opening screen, choose `Printers and Plotters`.
4. Select `Printers/Plotters` on the next screen.

   If your system doesn't have any printers connected, you will see a message. Make sure you have a printer connected. Choose `OK` or press Enter.
5. From the `Actions` menu (on the menu bar at the top of the screen), choose `Add Local Printer/Plotter`.
6. Choose an appropriate selection on the sub-menu giving options for Serial, HP-IB, etc.
7. A screen will give you information on available serial or parallel interfaces.
8. On HP-UX 9, if you choose `Add Serial (RS-232C) Printer/Plotter`, more than one serial interface could be listed. The serial interfaces are listed in ascending order. The lowest-numbered serial interface corresponds to the lowest-numbered serial connector on your system. Choose the one to which you have connected your printer.
9. Choose `OK`.

   A display opens for `Add Local Printer/Plotter`.
10. Choose the box labeled `Printer Name` and enter your *printername* for the new printer (entered in the blank earlier).
11. Select `Printer Interface` and choose `Printer/Model Interface`.
12. Scroll down the next screen, using the arrow keys, to find the Model Name of your printer.
13. Choose the Model Name (press Enter when illuminated).
14. Choose `OK`.

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15. In the `Add Local Printer/Plotter` display which reappears, select and choose the box labeled `Make this the system default printer`.
16. Choose `OK`.
17. If the print spooler was not previously running, a screen will appear with the question: `Do you want to start the print spooler now?`. Choose `Yes` or press Enter.
18. You will see a confirmation screen asking if your printer is turned on, connected to your system, and online. Check your printer to ensure that it is ready, and press Enter.
19. You will see the message `Task completed`. Press Enter.
20. Exit the task and press the `Exit SAM` function key.
21. Type `exit` Enter to exit `root` and return to `user` status.

Refer to *System Administration Tasks* for additional SAM information.

Testing the Printer Installation

If you made your printer the default system printer, type the following commands to test it:

```
cd Enter

lp .profile Enter
```

(If your printer (called *printername*) isn't the default system printer, enter the following command to test it:)

```
lp -dprintername .profile Enter
```

The file named `.profile` should print out on the new printer.

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Dealing with Printer Problems

If you experience problems in printing, check the following:

- The power cord for the printer is plugged in.
- The printer is turned on.
- The printer selection switches are set for online.
- Paper is loaded into the printer (and it isn't jammed).
- The correct interface has been set up.
- The printer cable is connected to the correct interface port on your printer.
- The cable is connected to the correct port on your system.

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7

Configuring HP-UX for a DDS Tape Drive

Chapter Contents

- Finding the Status of Existing SCSI Bus Addresses.
- Configuring for a Backup DDS Tape Drive.
- Configuring the Drive on HP-UX.
- Testing Your Installation.
- DDS Tape Drive LED Indicators.
- Maximum Usage of DDS Cassettes.
- In Case of Difficulty.

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Finding the Status of Existing SCSI Bus Addresses

Before you attach a new SCSI drive, you can use the `ioscan` tool to help determine which device addresses are currently in use. To determine the connected SCSI bus IDs, enter `ioscan -fb`.

The result will be a display of information, such as the following:

```
Class      H/W Path  Driver   H/W Status    S/W Status   Description
============================================================================

   ...

disk       2.0.1.2.0 scsi     ok(0x5800101) ok           TOSHIBA CD-ROM
tape_drive 2.0.1.3.0 scsitape ok(0x1800202) ok           HP      HP35450A
disk       2.0.1.6.0 scsi     ok(0x101)     ok           MICROP  1528

   ...
```

For example, the SCSI bus address for the HP 35450A tape device is in the fourth column of its hardware address as "3" (`2.0.1.`*`3`*`.0`). The following procedure outlines how to use SAM for installing a tape drive.

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Configuring for a Backup DDS Tape Drive

You will need to use a backup device if you have local disks connected to the Model V743 VXI controller. This section contains instructions for configuring an external DDS drive on HP-UX to use for backup.

Tape Selection

The DDS ("Digital Data Storage") tape drive is a sequential-access, read-write device using removable DDS cassettes. Although DDS drives are similar to DAT players in the audio industry, DDS and DAT cassettes are *not* interchangeable. There are two major differences:

1. Audio cassette tapes transfer data in streaming mode, that is, they are left in motion for periods of minutes. Tapes used for data are continually starting, stopping and repositioning, which is stressful to the tape. DDS tapes are made rugged enough to withstand this kind of treatment. Audio tapes are not expected to perform this well, and as a result they fail very quickly in a data environment.
2. DDS cassettes have a much tighter case-dimension specification than DAT cassettes. As a result, DAT cassettes can get stuck in a DDS drive, requiring the drive to be disassembled. For this reason, only Hewlett-Packard supported or properly certified DDS tape cartridges should be used. Use of DAT tapes intended for audio use could void your warranty.

Caution Do not attempt to extricate a DAT cassette which is stuck in a DDS drive. You may damage the drive. Have the drive disassembled by someone qualified to do so.

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The general steps for adding a DDS tape drive to your system are as follows:

1. Make sure that the necessary device drivers are configured into the kernel. On HP-UX, SAM will make this test.
2. Shut your system down and turn off the power.
3. Choose a SCSI bus address for the new tape drive that does not match the bus address for any other SCSI device.
4. Make all necessary hardware connections for the device.
5. Turn the new tape drive *on*.
6. Turn your system *on* and boot HP-UX.
7. Run SAM to create the device file for the new tape drive.

Factory-Set SCSI Address

The factory-set SCSI address for the DDS drive is as follows:

- SCSI bus address: `3`

As it is possible that the SCSI bus address jumpers for a drive may be shipped with different settings, please check the settings before installing the device. See the *Installation Guide* for the device for information on resetting the bus address, should this be necessary.

Configuring the Drive on HP-UX

The SAM `Kernel Configuration` procedure will confirm which drivers are active for your tape devices and will configure them as needed for connected devices. Reconfiguring the kernel will involve rebooting your system.

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Before You Begin:

Make a note of the tape drive product number and its hardware address (SCSI bus address) so that you will be able to identify it later.

- DDS Drive Product Number: _____
- Bus Address: _____

1. Log in as `root`.
2. Run SAM by typing the following:

   On HP-UX 9:

   `$ /usr/bin/sam` Enter

   On HP-UX 10:

   `$ /usr/sbin/sam` ENTER

   To get help in SAM, press the f1 key. This gives you context-sensitive information for the object at the location of the cursor.
3. Highlight and select `Peripheral Devices ->`.
4. At the next screen highlight and select `Tape Drives ->`.
5. The `Tape Drive Manager` screen lists what tape devices are connected, including your new device. Highlight that device.
6. From the `Actions` menu, choose `Add...`. A message screen gives you the hardware steps for adding the tape drive. Choose `OK` or press Enter.
7. A confirmation screen indicates whether any related device drivers needed to be added to the kernel. Choose `Yes` or press Enter.
8. If you needed to add a device driver, you will also need to create a new kernel and (eventually) reboot the system. Select from the menu on the `Create a New Kernel` screen whether you want to create the new kernel now, later, or cancel the proposed modifications. (Make sure your

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choice has an asterisk placed by it, by pressing Enter while that line is highlighted.) Choose `OK` to confirm your choice of action.

9. You will next be given a choice of whether to install the new kernel now or later. If you move the kernel into place now, the system will also reboot. If you choose to do it later, you can then move the new kernel and reboot. You should also move:

   On HP-UX 9:
   `/etc/conf/dfile.sam` to `/hp-ux`
   `/etc/conf/dfile.sam` to `/etc/conf/dfile`

   On HP-UX 10:
   `/stand/system.sam` to `/stand/vmunix`
   `/stand/system.sam` to `/stand/system`

   If you reboot, the old kernel will be backed up as `/SYSBCKUP` on HP-UX 9, or `/stand/system.prev` on HP-UX 10.

10. Exit SAM, if you have not already done so.

Note If you are modifying a cluster client's kernel, its kernel is not backed up, since `/SYSBCKUP` is used exclusively for the cluster server's kernel.

Your system is now running the added driver for SCSI DDS tape drive. You are ready to use the drive to load a tape into your system.

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Testing Your Installation

Note that a write-protect tab on the cassette allows you to protect data from being overwritten. You will need to make sure that the tab is moved to the "writable" position in order for it to serve as a backup medium.

A simple test to make certain that everything has been installed satisfactorily is to load a tape in the drive, wait for the "busy" light to stop blinking, and execute the `ioscan` command.

The LED on the drive should flicker briefly. If the command completes successfully, a listing of your devices, including the tape hardware address, name and status will be displayed, indicating that it is installed correctly. Note that the command may fail with a busy error if the command is executed before the tape has completed loading.

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DDS Tape Drive LED Indicators

Two LED indicators on the front panel of the drive indicate several operational and test states. The following table shows the LED combinations and explains what they indicate.

Table 7-1. DDS Tape Drive LED State Codes

States	Cassette	Drive	Meaning
Read/Write			Cassette (un)loading
			Cassette loaded/online
			Cassette loaded/Activity
			Cassette loaded/offline
Write-Protect			Cassette (un)loading
			Cassette loaded/online
			Cassette loaded/Activity
			Cassette loaded/offline
Error			Media wear (Caution Indicator)
			High humidity/No termination on SCSI bus
			Self-test (normal)
			Self-test (failure)

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LED Symbol	Meaning
	Off
	Green
	Amber
	Pulse Green
	Pulse Amber
	Pulse Green/Amber

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Caution Indicator

The DDS drive continually monitors the number of errors it has to correct when reading or writing a tape. This information is presented to the user through the Caution Indicator (see chart above).

A caution indication has two common meanings:

- The tape heads need cleaning.
- The tape itself is approaching the end of its useful life.

Maximum Usage of DDS Cassettes

Under optimal environmental conditions (50% relative humidity, 72°F), Hewlett-Packard DDS cassettes are currently specified to 2000 passes over any part of the tape. In operational terms, this can be translated into approximately 200 to 300 backup operations. This takes into account that during a backup, an area of tape may have several passes because streaming cannot be maintained, or because the backup software requires that certain areas of the tape are accessed frequently.

Under certain conditions the recommended number of backup operations needs to be reduced. These conditions are as follows:

- Sustained use at low humidity.
- Backup software requiring certain areas of the tape being accessed frequently.

As a guideline, HP recommends that the number of backup operations should be limited to 100 per cassette in extreme cases of the above conditions.

In Case of Difficulty

If you experience any problems with the operation of the new drive, contact your Hewlett-Packard Service Representative for assistance.

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8

Backing Up and Restoring Software

Chapter Contents

- Backing Up Your HP-UX System and Software.
- Restoring Individual Files.
- Restoring HP-UX Using the Recovery Tape.

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Backing Up Your HP-UX System and Software

The most important part of your system is the data you have accumulated. It is also especially important to protect your system from corruption. You can protect your data and system from loss, using the general procedures given in this chapter. (For detailed procedures, see the manual *System Administration Tasks*.)

- Make sure you create and maintain a backup HP-UX kernel (`/SYSBCKUP` on HP-UX 9, or `/stand/system.prev` on HP-UX 10) on your disk from which you can boot in an emergency. The backup kernel is automatically created by SAM whenever you reconfigure and reboot a new kernel from your system console.
- To build your recovery system, you can use the following devices:
  - Cartridge tape drives
  - DDS ("DAT") drives
  - Magneto-optical disk drives
  - Other hard disk drives
- Back up your file system.
- Restore your file system, if needed.

Creating a Recovery System

A "recovery system" is a special tape containing a subset of the HP-UX operating system. In the event of an operating system failure that prevents you from booting or logging into HP-UX, you can boot from the recovery system tape and use the tools on the tape to repair the file system on your disk. A recovery system is created by using commands rather than by using SAM.

You can also restore your system from a system CD-ROM that you can purchase from your HP Sales Representative.

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You should make a recovery tape by using the utility `mkrs` at the following times:

- Immediately after you set up the Model V743 VXI controller.
- Each time you update your operating system or make a change in your disk swap configuration.

To do this, you will need a tape drive (cartridge or DDS) and one or more tapes.

Using `mkrs` to Create a Recovery System on HP-UX 9

The `mkrs` utility on HP-UX 9 constructs a recovery system on removable media (or on a formatted hard disk drive). If a system later becomes unbootable due to a corrupt root disk, then you can boot your system from the recovery tape. Once booted on the recovery system, you can then use the tools it provides to repair the corrupt root disk.

Some Options for `mkrs`

Note The `-s` option is necessary for building Series 700 DDS tape recovery systems.

If enough free disk space is available in `/usr/tmp` (typically 10-20 MB), the `-q` option can be used to make `mkrs` create an image of the recovery system in this directory before copying it to the recovery media. This option generally saves a great deal of time due to reduced seeking on non-random-access recovery media (cartridge tape and DDS). Note: for DDS tape recovery systems, the `-q` option is assumed.

When creating a DDS recovery system for a small memory system (8 MB), the `-s` option should be used to specify that a smaller set of files be placed on the recovery system.

See *mkrs*(1M) for more options with `mkrs`.

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Source Device Files

By default, `mkrs` uses the following device files:

```
/dev/update.src
/dev/rct/c0
/dev/rct
```

If none of the above defaults exist on the system, *one of these device files must be created* or the `-f` option must be used to specify the device file. The recovery device file can be either a block or a character device file.

Root Device Files

`mkrs`, by default, uses the following device files for the root device:

```
/dev/dsk/0s0
/dev/root
/dev/hd
```

If none of the above defaults exist on the system, one of these device files must be created or the `-r` option must be used to specify the device file to be used. The root device file must be a block device file.

If You Have a Problem

An error message results if:

- None of the default device files for the recovery device exist and the `-f` option is not used to specify a recovery device file.
- None of the default device files for the root device exist and the `-r` option is not used to specify a root device file.
- The machine type cannot be determined and the `-m` option is not used to specify the machine type.

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Backing Up Your File Systems

Preparation:

The following procedure sets up a scheduled backup:

1. If your system is more than six months old, you have non-HP supported software, or you have never done a backup before, see *System Administration Tasks* before proceeding. Otherwise, SAM will provide interactive guidance. To use SAM, do the following:
2. Log in as `root`.
3. Type the following:

   On HP-UX 9:

   `/usr/bin/sam` ENTER

   On HP-UX 10:

   `/usr/sbin/sam` ENTER
4. Choose `Backup and Recovery`.
5. Choose `Backup Devices` (to determine what backup devices are connected), `Automated Backups`, or `Interactive Backup and Recovery`.
   a. If you open `Backup Devices` and no devices are shown or you see a warning, make sure the device is connected and the tape is inserted.

Note If you have to connect a device during this process, choose `Refresh` from the `Options` menu.

---

   b. Choose the entry for the desired device.
   c. Choose `Add an Automated Backup` from the `Actions` menu.

1. If you go directly to `Automated Backups`, you can select your local or remote backup device from `Actions` → `Add an Automated Backup (Local or Remote)` → `Specify Backup Device`. A form will display any existing backup devices.

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2. Before initiating the backup, verify that your tape is *not* write-protected by checking that the write-protect device is in "writable" position.
3. Load a tape into the tape drive. Depending on what tape drive you are using, you may see activity lights flashing while the tape is loading. You can proceed when one light remains on, indicating that the drive is ready to accept data.
4. From the `Add an Automated Backup` screen, you can select the options which will bring up additional forms for specifying the following required items:
   a. `Select Backup Device`: (if you have not already specified it).
   b. `Select Backup Scope`: what filesets to include or exclude. The default is to backup the entire system.
   c. `Select Backup Time`: time, day, date. You can also set whether you want a full or incremental backup, for each time specification.
5. `Additional Parameters` (optional) allows you to specify the following:
   a. If you want your backups to cross NFS mount points.
   b. If you want the tape (cartridge or autochanger) rewound.
   c. If you want an index log to be created for each backup. (Results can be mailed to a specified user.)
6. After the minimum required forms are filled out, SAM will then use your specified tape device to complete the backup according to your specifications.

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Restoring Individual Files

To restore specified files from a local device using SAM, first you will need to have the following information and materials:

- A list of files you need.
- The media on which the data resides.
- The location on your system to restore the files (original location or relative to some other location).
- The device and device file for restoring the data.

Note

- To restore data to disks physically connected to another system, enter the `Remote Administration` functional area of SAM, or the `Run SAM on Remote System` area.
- When restoring files that are NFS mounted to your system, `frecover` can only restore those files having "other user" write permission. The `frecover` command normally operates in `user`-mode when crossing NFS mount points; not `root`-mode. To ensure that `frecover` can restore the files exported from the NFS server, login as `root` on the NFS file server and use the `root=` option to the `/usr/etc/exportfs` command to export the correct permissions. Refer to *exportfs*(1M) in the *HP-UX Reference* and the *Installing and Administering NFS Services* manual.

To restore individual files:

1. Ensure that you have `root` capabilities.
2. Type the following:

   On HP-UX 9:

   `/usr/bin/sam` ENTER

   On HP-UX 10:

   `/usr/sbin/sam` ENTER

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3. Choose `Backup and Recovery`.

4. Choose `Backup Devices`, `Automated Backup`, or `Interactive Backup and Recovery`.

5. Highlight the device in the list from which the data is to be restored.

6. Choose `Recover Files or Directories` from the `Actions` menu and highlight `Select Recovery Scope`. Click on `OK` or press Enter.

7. Choose the `Selected Files` checkbox (it should have an asterisk (*) in it. Do either of the following:

   - Fill in the filename containing a list of files to restore. The filenames should be full pathnames. This file is *not* a graph file. This file is used to create a graph file. You can use the on-line index file created by a previous backup, but it must be edited to containing only the full pathnames of the files to be restored.
     OR
   - Enter each file name in the "Included" and "Excluded" boxes and click on `Add`. If you make a mistake, highlight the entry with the error and use `Modify` or `Remove` to correct the mistake. Only the "Included" box is required, if you choose this method.

     You can use both the file and the included/excluded method simultaneously to specify files to be restored.

   When you have completed determining the selected files to be recovered, click on `OK`.

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8. To do any of the following during the restore process, activate `Set Additional Parameters`:

   - Overwrite new files.
   - Maintain original ownership.
   - Recover files using full path name.
     OR
   - Place files in a non-root directory.

   Turn on the appropriate checkbox(es).

   To restore files relative to a particular directory, fill in the directory.

   Choose `OK` to set the additional parameters.

9. Choose `OK` to start the restore process.

   If confirmation messages appear, read the message(s) and choose `OK` to proceed in each case. SAM displays a screen containing the output of the executed `frecover` command.

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Restoring HP-UX Using the Recovery Tape

If your operating system or the entire root disk becomes corrupted and not usable, you can restore your system using your recovery system tape and your archive backup tape(s). Also see "Booting and Resetting the VXIbus Mainframe" in Appendix B for information on using the boot ROM to find and boot from a recovery tape.

If your operating system is still usable but not functioning correctly, you can load the fileset `TOOL` from an update tape to obtain diagnostic utilities.

You can boot a memory-based version of `/hp-ux` on HP-UX 9 or `/stand/vmunix` on HP-UX 10 (known as a *recovery system*) from the tape cartridge or DDS recovery tape which you have made. From the recovery system, you can mount and unmount file systems, run `fsck` to check and repair file systems, copy files back onto your system disk, and various other tasks.

Caution Do not run `fsck` on a file system that is mounted and active. This could introduce data corruption. Run `fsck` in single-user mode when checking the root file system. For file systems other than the root file system, unmount the file system, run `fsck`, and then remount the file system.

If your system disk (including `/SYSBCKUP` on HP-UX 9, or `/stand/system.prev` on HP-UX 10) is unbootable, do the following:

1. Verify that the recovery tape is *not* write-protected. HP-UX needs to have write access to your recovery tape when you boot it.
2. Load the recovery tape in your tape drive and be sure that the drive is turned on.
3. Wait for the drive to become ready (the "busy" light remains off).
4. Reset your computer and start the boot process by pressing the Rst/Abt switch to the "`Rst`" (up) position.
5. Stop the automatic boot process by pressing ESC after the boot message:

   ```
   System Search started
   Press [Esc] to discontinue the Auto Boot process.
   ```


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You will see the message:
`Auto Boot discontinued`

6. At the Main Menu, select `Boot from a Device` by typing 1 Enter. You will see a display like the following:

```
==== BOOT FROM DEVICE ========================

Key  Boot Device
---  ----------------------------------------
  1  SCSI.6.0 HP C2233
  2  LAN.080009-72333            15.99.255.25
  3  LAN.080009-72345 INSTALL    15.88.123.456
  4  SCSI.4.0 CD-ROM HP nnnn
---  ----------------------------------------
  0  Previous Menu
 33  Effective ISL Mode  [ AUTOMATIC ]
 66  Rescan for Boot devices
 77  Reset the System
-----------------------------------------------
To boot from a device, Press Key, then press [Enter/Return]
```

7. Select the DDS drive (product number HP 35450A, in the example) by typing the number of the line for the device ("1", in the example) followed by Enter.
8. Your recovery system should begin loading from the tape. Once your recovery system is running, you will have a minimum set of commands to use. These will help you repair and restore your primary (disk-based) operating system.
9. From this point, the specific things you need to do to recover your primary system depend on the nature of the boot problem. Some possibilities are outlined in the following list:

Note If your inability to boot your system is caused by faulty hardware, it will be necessary to have that hardware repaired before you can proceed with the items in this list.

---

a. Run the `fsck` program to repair your root file system. If you do this make sure you first shutdown to the single-user mode.

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b. The `/hp-ux` kernel file on HP-UX 9, or `/stand/vmunix` file on HP-UX 10, can be restored if it has been corrupted or removed, by doing the following:
   i. Mounting your system disk to an empty directory (make one if necessary) in your memory-based recovery system.
   ii. Using the `cp` command to copy the `/hp-ux` file on HP-UX 9 or the `/stand/vmunix` file on HP-UX 10 from your memory-based system (it is a copy of your *real* `/hp-ux` file) to the directory you used as a mount point for your system disk. The destination file should be called `/hp-ux` on HP-UX 9 or `/stand/vmunix` on HP-UX 10.

c. You might need to restore important system files such as `/etc/inittab`, `/etc/rc`, etc. from your memory-based system to your system disk. The procedure for doing this is almost identical to the procedure for restoring `/hp-ux` on HP-UX 9 or `/stand/vmunix` on HP-UX 10. Only the file names and directories will be different.

d. You might also need to move, remove, copy, or search for other files.

Note that the memory-based system has limited capabilities. Your primary objective is to restore your disk-based system to a bootable condition and then reboot your computer from your system disk. From that point, you can recover lost files from backup tapes, or whatever else is necessary to restore your system to its normal operational condition.

For More Information

For more information on backup and recovery, see *System Administration Tasks* and the reference for *mkrs*(1m), in the online `man` pages. Also see *Solving HP-UX Problems*.

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9

Dealing With Problems

Chapter Contents

- Interpreting LED Indicators.
- Managing a Boot Failure.
- Selecting an Alternate Operating System.
- Recovering from a System Panic.
- Dealing with Network Failures.

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Interpreting the LED Indicators

There are four LEDs, which you can view on the panel of the Model V743 VXI controller, next to the clock and trigger I/O.

LED Behavior

Blinks occur in blinks/second groups. Each blink pattern is repeated at one-second intervals:

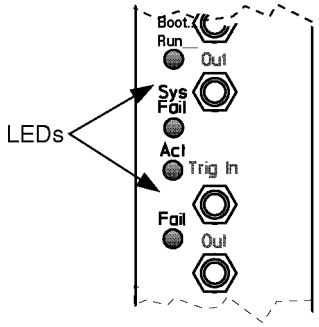


Figure 9-1. Front Panel LEDs

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Table 9-1. Front Panel LED Indications

LED	Behavior	Meaning	Remedy
Boot/Run (Green)	*Off* continuously	Power failure	Check DC power supply on VXI mainframe. Check AC power.
	On continuously	Normal status	No action needed.
	One blink/second	CPU failure	Replace system board.
	Four blinks/second	No console identified	Check console path and keyboard connections. If these are OK, replace system board.
Sys Fail (Red)	*On* when powered up and goes *off* after 5 seconds.	Normal operation	No action needed.
	Stays *on*	VXI failure. EEPROM failed to set up boot ROM	Try to reboot. Call your Hewlett-Packard Service Representative.
	Goes *on* again after boot	Hardware failure	Check `Boot/Run` (green) blink code. Identify chassis code in self-test diagnostic display (RS-232C-PortA). Check service manual codes.
Act (Green)	"Activity", flashes intermittently while running	System accessing the VXIbus	Normal operation.
Fail (Red)	*On* when powered-up and goes *off* after 5 seconds	Normal operation	No action needed.
	Stays *on*	VXI failure. EEPROM failed to set up boot ROM	Try to reboot. Call your Hewlett-Packard Service Representative.
	Goes *on* again after boot	Hardware failure	Identify chassis code in self-test diagnostic display (RS-232C-PortA). Check code with service manual.

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Managing a Boot Failure

The boot program is located in the firmware of the Model V743 VXI controller. You can configure the behavior of the boot process by interacting with the boot console handler. See Appendix B for procedures dealing with the boot console handler. If you have indications that the boot process has failed, check the following items.

Boot Program Initializes Hardware

Problems during the first stage of the boot process are rare. At this stage problems can be caused by:

- No power to the host system (check the local circuit breakers and the power connections to your VXIbus mainframe).
- Processor hardware failure.
- Interface card hardware failure.
  - The Model V743 VXI controller isn't fully plugged into its VXI slot.
  - The LAN MAU connector is loose.
- Incorrectly connected SCSI cable.

Turn off the power to the VXIbus host system. Wait five or ten seconds and turn the power to the system back on.

If the problem recurs, record the symptoms, the status of any indicators (especially any LED displays) on your processor, and any messages that appear on your system console.

At this stage in the boot process, most of the problems that occur require your hardware to be serviced by a person trained and qualified to do so.

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Selecting an Alternate Operating System

If your hardware is functioning correctly, but your usual boot device (such as the root disk) is not responding as it should, you can select an alternate available boot device manually by following these steps:

1. Turn off the power to the VXIbus mainframe, and then turn it back on.
2. Press (ESC) at the prompt for stopping the boot selection process:

```
System Search started
Press [Esc] to discontinue the Auto Boot process
```

3. You will see the following menu:

```
==== MAIN MENU ================================

Key  Operation
---  ----------------------------------------
  1  Boot From a Device
  2  Path Configuration
  3  Mode Configuration
  4  Interactive Testing
  5  Firmware Information
  6  Hardware Information
  7  System Configuration
...  ........................................
 77  Reset the system
 88  Change Mode
 99  Restart Auto Boot
-----------------------------------------------
Press Key(s), then press [Enter/Return]
```

Select the first action, "`Boot From a Device`" by pressing `1`, followed by (Enter).

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You will see a list of bootable devices and LAN addresses, such as the following:

```
==== BOOT FROM DEVICE ========================

Key  Boot Device
---  ----------------------------------------
  1  SCSI.6.0 HP C2233
  2  LAN.080009-72333            15.99.255.25
  3  LAN.080009-72345 INSTALL    15.88.123.456
  4  SCSI.4.0 CD-ROM HP C2943A
---  ----------------------------------------
  0  Previous Menu
 33  Effective ISL Mode [ AUTOMATIC ]
 66  Rescan for Boot devices
 77  Reset the system
-----------------------------------------------
To boot from a device, Press Key, then press [Enter/Return]
```

4. If you are running a disked system and no disk devices are found, then you may have a hardware installation problem. In this case, you should recheck the connection to the SCSI devices and try the boot again. If this still results in no devices being listed, contact your HP Service Representative for assistance.

   If the search locates a disk, enter the device selection number ("1", in the example above) to boot from that device. (Make sure that it is not indicated as an "Install" operating system.)

   Boot messages should begin to appear on the screen after several seconds.

For detailed help in troubleshooting the boot process, see the manual *Solving HP-UX Problems*. For additional detail about boot ROM configuration, see "Booting and Resetting the VXIbus Mainframe" in Appendix B in this manual.

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Recovering from a System Panic

A system panic simply means that the operating system encountered a condition that it did not know how to respond to, so it halted your system.

System panics are rare and not always the result of a catastrophe. They sometimes occur at boot if your system previously was not shut down properly. Sometimes they occur as the result of a hardware failure. In a clustered HP-UX environment, a diskless client node will panic if too much time has elapsed since its last communication with its server. This could be the result of nothing more than a LAN cable that has been disconnected for too long.

Recovering from a system panic can be as simple as rebooting your system. If you have an up-to-date set of file system backup or system recovery tapes, the *worst case* scenario would involve reinstalling the operating system and restoring any files that were lost or corrupted. If this situation was caused by a rare hardware failure such as a disk head crash, you will of course have to have the hardware fixed before you can perform the reinstallation.

Note It is important to maintain an up-to-date backup of the files on your system so that, in the event of a disk head crash or similar situation, you can recover your data. How frequently you update these backups depends on how much data you can afford to lose. For information on how to back up data, refer to *System Administration Tasks*.

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Should your system panic, it is important to record and categorize the circumstances associated with the panic. The following table will help you do so:

Table 9-2. Summary of Possible Causes of Panics

Problem Area	Action
Hardware	■ If the failure appears to be associated with a peripheral device: □ Check the integrity of the cable connections. □ Ensure that the peripheral is online. ■ If the above did not correct the problem, the failure may be associated with the System Processing Unit. In this case, call your designated service representative.
File System	■ Run the file system checker, `fsck`, to correct the problem. Follow the instructions that `fsck` may give, and use `reboot -n`, for HP-UX, for any subsequent reboots required by `fsck`. See Chapter 6 "File System Problems," in *Solving HP-UX Problems* for detailed information.
LAN	■ Ensure the integrity of all LAN connections, including taps in any AUI cable. Check for proper 50 ohm terminations at both ends of the LAN.
Other	■ Reboot the system.

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Procedures for Recovering from a System Panic

Step 1: The Panic Message

In a log book, record and categorize the panic message displayed on the system console. The panic message will tell you why the operating system panicked. Sometimes panic messages refer to internal structures of HP-UX (or its file systems) and the cause might not be obvious. Generally, the problem is in one of the following categories, and wording of the message should allow you to classify it into one of them:

Category	Action Step Number
Hardware Failure	Step 2a
File System Corrupted	Step 2b
LAN Communication Problem	Step 2c
Other Situations	Step 2d

Step 2a: Recovering from Hardware Failure

If the panic message indicated a hardware failure, the text or context of the message should indicate what piece of hardware failed.

If the hardware failure appears to be associated with a peripheral, ensure that its cables are tightly connected to their proper locations and that the device is powered on, and in an "online" state. If there is an error indicated on the device's display:

1. Record the error message(s) in your log book.
2. Turn the device off.
3. If the device is a disk drive, wait for it to stop spinning.
4. Turn the device back on.

If the problem reappears on the device or if the hardware failure appears to be associated with an interface card or an internal component of the system module, you should refer the problem to your Hewlett-Packard Service Representative.

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Proceed to Step 3, (**Rebooting Your System**).

Step 2b: Recovering from a File System Problem

If the panic message indicates a problem with one of your file systems, you will need to run the file system checker `fsck` to check and correct the problem(s). This is normally done automatically at boot time (from the `/etc/rc` file) so you should proceed to Step 3, "Rebooting Your System". Follow all directions that `fsck` gives you *especially if the root file system ("/" directory) has the problem*. It is important to use the "`-n`" option to the `reboot` command if requested to do so by `fsck` during any subsequent reboot.

Step 2c: Recovering from a LAN Communication Problem

If the panic messages indicates a problem with LAN communication (such as when a diskless cluster client node is prevented from communication for too long), check all LAN cable connections to ensure the following:

- All connectors are tightly fastened to the LAN cable and the media access units (MAUs).
- LAN is assembled correctly and does not exceed recommended lengths. If you use an AUI, the LAN must be connected *directly* to the MAU with no intervening length of cable between the MAU on your Model V743 VXI controller to the LAN tee.
- Your LAN is properly terminated.

Proceed to Step 3, (**Rebooting Your System**).

Step 2d: Recovering from Other Situations

When you suspect the problem was something other than the above (or when you do not know where to classify it), proceed to Step 3, **Rebooting Your System**. In this case, it is especially important that you write down the *exact text* of the panic message, just in case you need it for future troubleshooting or help from HP service personnel.

Step 3: Rebooting Your System

Once you have checked for and corrected any problems from Step 2, you are ready to reboot your system. You can reboot your system using the Rst/Abt

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switch on the panel. Otherwise, you can turn the system off and then back on to initiate the boot sequence.

You will probably notice a few differences in boot behavior as compared with your normal boot sequence. Your system might save a "core" file to disk. This core file is a "snapshot" of the previously running kernel at the time that it panicked. If necessary, this core file can be analyzed using special tools to determine more about what caused the panic.

Note For HP-UX, core files are quite large and, if your system is so configured, they are saved to the directory `/tmp/syscore` on HP-UX 9, or `/var/adm/crash` on HP-UX 10. If you feel you need to save these files for future analysis (something that isn't usually required), it is best to save them to tape and remove them from your file system in order to free up space. If you *know* why your system panicked, you can delete the core files. Core files are used in rare circumstances to diagnose hard-to-find causes of system panics.

If the reason your system panicked was because of a corrupted file system, `fsck` will report the errors and any corrections it makes. If the problems were associated with your root file system, `fsck` will ask you to reboot your system when it's finished. When you do this on an HP-UX system, use the following command:

```
reboot -n
```

The `-n` option tells `reboot` not to sync the file system before rebooting. Since `fsck` has made all the corrections on disk, you do not want to undo the changes by writing over them with the corrupt memory buffers.

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Step 4: Monitoring the System

If your system successfully boots, there is a good chance that you can resume normal operations. Many system panics are isolated events and are unlikely to reoccur.

Check your applications to ensure that they are running properly and monitor the system closely. For a day or so, you might want to do backups more frequently until you are confident that the system is functioning properly.

For Further Information

- Refer to *Solving HP-UX Problems* and *System Administration Tasks* for further information.
- To restore a corrupted HP-UX operating system, see the procedures for restoring in Chapter 8 of this manual.

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Dealing with Network Failures

If the program you have been running uses resources from a local area network (LAN) and it stops unexpectedly, the following may help locate the source of the problem:

Table 9-3. Problems with the Network

Problem	Action
No systems respond to the `/etc/ping` *hostname* command.	■ Check the network connection on the panel of your Model V743 VXI controller. Make sure that the cable is securely fastened to the connector.
Your system does not respond to `/etc/ping` from another system on the network.	■ Check to see if the networking software is still running on your system by using `ps -ef`.
Some systems respond to `/etc/ping`, but others do not.	■ Contact your network administrator, if you have one. This condition either indicates that some systems are down, or that there is a fault with the network.

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A

Installing Additional Memory

Appendix Contents

- RAM Upgrade Products.
- Planning for Installation of RAM.
- Installing the RAM Boards.

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RAM Upgrade Products

The RAM upgrades for the Model V743 VXI controller are as follows (two cards per upgrade product):

- HP A2578A: 16 MB total.
- HP A2829A: 32 MB total.
- HP A2827A: 64 MB total.

This Appendix is a general guide to RAM installation. For detailed information, also read the *Installation Guide* that comes with your upgrade before proceeding with any installation procedure.

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Planning for Installation of RAM

Determining Existing Memory

Follow these steps to determine how much memory your Model V743 VXI controller already has:

1. Turn the VXIbus mainframe *on*. If the mainframe is already *on*, cycle power (turn it *off* and back *on*.)
2. Stop the boot selection process by pressing (ESC) at the prompt. You will see the the boot console Main Menu.
3. Select `HARDWARE INFORMATION`.
4. Note the amount of memory listed in the `RAM` line of the display, as in the following example:

```
==== HARDWARE INFORMATION ====================

   Machine Model           9000/743
   System Board Serial No. 1234567890
   Cache size              128 Kbytes 128 Kbytes

Key  Component
---  ---------------------------------------
     CPU           Rev. 2.1, Freq. 100 MHz
     RAM           16 Mbytes
  1  I/O ASIC
  2  VME ASIC      Rev. 2
  3  VME
     GRAPHICS 1

Key  Operation
...  .....................................
  0  Previous Menu
 77  Reset the System
---------------------------------------------
press Key, then press [Enter/Return]
```

5. Write down the current amount of memory on your system:
   RAM _____ Bytes.

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Installing the RAM Boards

Caution A static charge of almost *40,000 volts* can be generated on a carpeted floor. This exceeds the limits of these RAM cards and can cause unsuccessful operation or damage.

Integrated circuits on printed circuit boards can be damaged by electrostatic discharge. Use the following precautions before working with the Model V743 VXI controller board or the RAM modules:

- Use the grounding wrist strap supplied with this upgrade. Follow the instructions printed on the strap's package.
- Do not wear clothing subject to static charge buildup, such as wool or synthetic materials.
- Do not handle integrated circuits in carpeted areas.
- Do not remove the device from its anti-static bag until you are ready to install it.
- Avoid touching circuit leads as much as possible.

Before You Start

- You will need the following tools:
  - Grounding wrist strap.
  - Flat-tipped screwdriver.
  - #1 Pozidriv screwdriver.
- You can install up to four RAM cards in a Model V743 VXI controller.

Procedure

1. Exit any processes you may have running on the Model V743 VXI controller.
2. Shut down the applications and operating system on the board computer (see "Powering Down the System" in Chapter 3).

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3. Turn off the power for the VXIbus mainframe.
4. While facing the front panel of the board computer, use a flat-tipped screwdriver to remove the two screws at the corners of the panel.

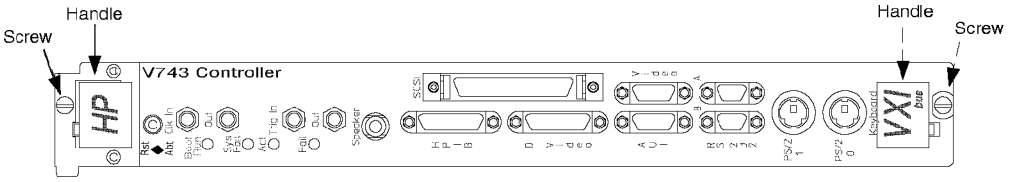


Figure A-1. Extracting the Controller

5. Spread the two handles on the front panel. This will have the action of extracting the board computer out of its rear connector.
6. Pull the board out of the mainframe and place it labeled-side up on a firm, static-free surface.
7. Follow the grounding wrist strap instructions and attach the strap to your board computer front panel and to your wrist.

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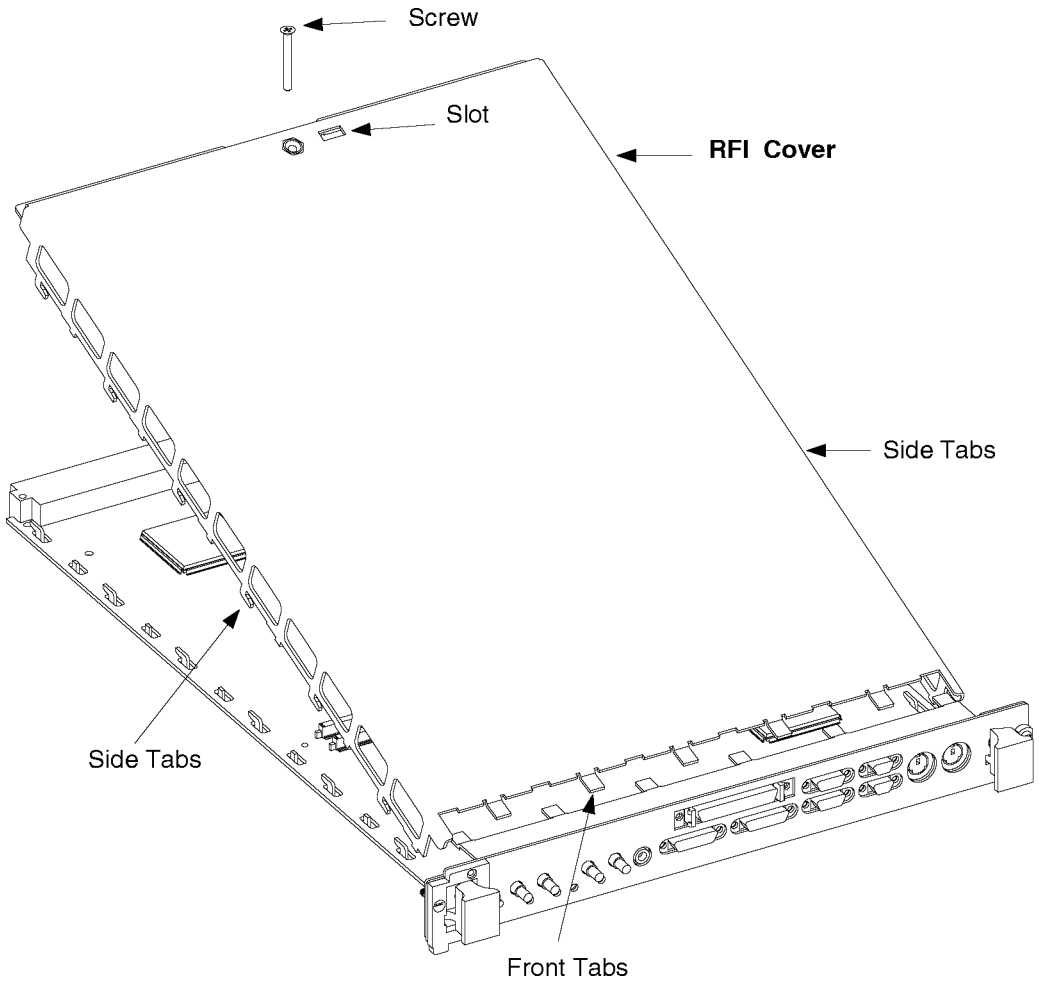


Figure A-2. Removing RFI Cover

8. Using the Pozidriv screwdriver, remove the screw holding the RFI cover (with specifications printed on it) from the top side of the board.
9. Place the tip of a flat-tipped screwdriver through the slot in the RFI cover next to to the screw hole. Then pry the top cover *back* about 8mm (0.32 in.) to disengage the RFI cover front tabs from the system board and bottom cover.

A-6 Installing Additional Memory

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Note the L-shaped side tabs on the top cover that fit through the system board and into the bottom cover on each side. Moving the RFI cover back also disengages these tabs.

10. Raise the back end of the RFI cover and remove the cover.
11. Remove a RAM card from the static-free packing material. *Cards are installed in pairs, using either the front pair or the rear pair of RAM connectors on the board computer.* Note that the RAM card is notched on one end to fit the keyed connector.

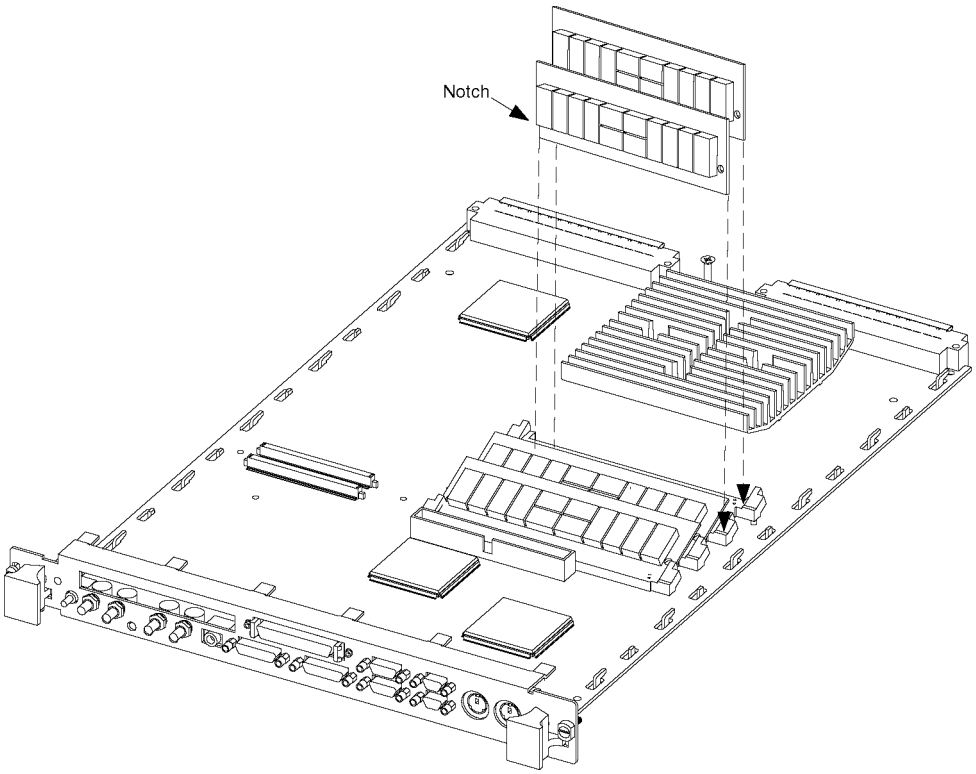


Figure A-3. Installation of Two RAM Cards

12. Place the first card vertically in the available position farthest from the front panel, and align the edge notches with the connector.

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13. Snap the RAM card in place by moving it from vertical position to the angle of the old cards (or approximately 25°). The ends of the card will snap into the spring clips at 25°.
14. Install the other member of the RAM pair the same way, in the adjacent slot toward the front panel.
15. Repeat the steps if you are installing another pair of RAM cards.
16. To test your installation, reinstall the Model V743 VXI controller in the VXI mainframe. Turn on the power to the VXIbus mainframe and observe the Boot ROM power-up display on the console. Stop the boot process by pressing ESC.
17. Select `Hardware Information` from the Main Menu by typing `6` followed by Enter. You should see the current total memory listed under `RAM` in this display. The following example shows that 32 MB of RAM (two 16-MB cards) has been installed:

```
==== HARDWARE INFORMATION ====================

   Machine Model           9000/743
   System Board Serial No. 1234567890
   Cache size              128 Kbytes 128 Kbytes

Key  Component
---  ---------------------------------------
     CPU          Rev. 2.1, Freq. 100 MHz
     RAM          32 Mbytes
  1  I/O ASIC
  2  VME ASIC     Rev. 2
  3  VME
     GRAPHICS 1

Key  Operation
...  .....................................
  0  Previous Menu
 77  Reset the System
---------------------------------------------
press Key, then press [Enter/Return]
```

18. If the correct total RAM (32 Mbytes, for this example) is listed, reset the board computer system by typing 77 at the Boot ROM Hardware Menu or Main Menu.

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19. If the correct total memory is *not* listed, turn off the VXIbus mainframe and remove the board computer.
    a. Verify that the RAM cards are installed in adjacent pairs (front pair or rear pair).
    b. Verify that no RAM card connectors are dirty.
20. Turn off power and remove the board computer.
21. Reinstall the RFI cover.
22. Replace and tighten the RFI cover screw.
23. Reinstall the Model V743 VXI controller in the mainframe.
24. Replace the screws in the board computer front panel.

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B

Using the Boot Console Handler

Appendix Contents

- The Boot Console Handler.
- Special Tasks.
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- Configuring the Console Path and Display Format.
- Booting and Resetting the VXIbus Mainframe.
- Searching for Bootable Media.
- Displaying and Setting Paths.
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- Displaying the LAN Station Address.
- Interactive Testing.
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B

The Boot Console Handler

There are times when you want to interact directly with the hardware of your VXIbus mainframe before it boots the operating system. The system provides an EEPROM configuration interface, called the boot console handler, which you can use before booting the operating system to display information, set paths, and set other system parameters even though the operating system isn't running. This appendix gives you guidance on the functions of the boot console handler which especially relate to using HP-UX.

Most of these tasks can be performed by selecting from menus, or by using the default values set in the EEPROM at the factory.

Special Tasks

Here are some of the special tasks that you can perform:

- Configure your system for different monitor types.
- Boot your system from any specified hardware device.
- Search for hardware devices that contain media from which your system can be booted.
- Configure the tests your system undergoes at the time of booting.
- Get firmware and hardware information.
- Reset the system.
- Change or reconfigure the boot mode.

Boot Console Information Display

Here is some of the information the boot console handler can display:

- Settings of the Boot Device paths.
- Boot Device search order for unattended operation.
- Operating Mode.
- ISL Mode (Automatic or Interactive).
- Hardware Information:
  - Processor revision and frequency.
  - Memory RAM size.
  - Instruction and Data Cache size.
  - I/O ASIC revision.
  - LAN interface address.

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  - Board serial number.
- SCSI device addresses and identifications.
- Console path configuration.

Note As some of the firmware in the boot console handler is also used with the Model 743*i*, the I/O ASIC selections may list some device options such as HP Parallel not in the Model V743 VXI controller.

Using the Boot Console Handler Interface

To use the boot console handler menus, follow these steps:

1. Exit any applications you may have running.
2. Shut down your system.
3. Turn *off* the power to the VXIbus mainframe for a few seconds. Then, turn the power back *on*.
4. Press ESC at the following prompt:

```
System Search started ...
Press [ESC] to discontinue the Auto Boot process.
```

In a few seconds, this message appears:

```
Auto Boot aborted.
```

A short time later, the following menu appears:

```
==== MAIN MENU ==============================

Key  Operation
---  ----------------------------------------
  1  Boot From a Device
  2  Path Configuration
  3  Mode Configuration
  4  Interactive Testing
  5  Firmware Information
  6  Hardware Information
  7  System Configuration
...  ........................................
 77  Reset the system
 88  Change Mode
 99  Restart Auto Boot
----------------------------------------------
Press Key, then press [Enter/Return]
```


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Specifying a Boot Device

To display devices that can boot HP-UX, type 1 (Enter). A list of potential boot devices will be displayed. For example:

```
==== BOOT FROM DEVICE ========================

Key  Boot Device
---  ----------------------------------------
  1  SCSI.6.0 HP C2233
  2  LAN.080009-72333            15.99.255.25
  3  LAN.080009-72345 INSTALL    15.88.123.456
  4  SCSI.4.0 CD-ROM HP C2943A
---  ----------------------------------------
  0  Previous Menu
 33  Effective ISL Mode  [ AUTOMATIC ]
 66  Rescan for Boot devices
 77  Reset the System
-----------------------------------------------
To boot from a device, Press Key, then press [Enter/Return]
```

If your VXIbus mainframe is a member of a cluster (a group of computers that share the file system of a host by means of a network connection), there may be no disks listed because your system has no disks directly attached to it.

Type a numerical choice from the menu, followed by (Enter). Your system will proceed to boot from the device you have just selected.

To exit this menu without doing anything, type 0 (Enter).

Configuring the Console Path and Display Format

If you are using a terminal display connected to your controller via an RS-232C port, the Console Path is set correctly by default. You will not need to set it. You can connect to either one of the serial ports, but Port A is the only one which delivers system diagnostics.

Note You may *not* use an RS-232C port for a console if you enable either RS-232C port for use under SICL.

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Setting the Console Path

If you are using a graphics display or if you are changing from graphics to a RS-232C display mode, you will need to set the Console Path.

1. Press (ESC) at the prompt "`System Search started ...` "
2. From the `MAIN MENU`, access the Path Configuration screen by typing `2` (Enter). Type `3` (Enter) at the Path Configuration menu to select the Console Path menu. A menu similar to the following appears:

```
==== CONSOLE PATH ============================

CONSOLE PATH  is  now [ GRAPHICS 1 ]

Key  Device Path
---  ----------------------------------------
  1  GRAPHICS 1
  2  RS-232 (A)
  3  RS-232 (B)
...  ......................................
  0  Previous Menu
 66  Rescan for Console devices
 77  Reset the System
---------------------------------------------
To set the CONSOLE PATH, Press Key, then press [Enter/Return]
```

3. Type `2` (Enter) to select the RS-232C Port A as the console path. This will give you a menu for selecting the display format for the display mode you have chosen.

Setting the Console Display Format

If you disconnect or change your graphics display output hardware, it is possible that the display format may not be configured properly. In this case you will need to be familiar with the following procedure to restore the configuration information relative to the current monitor or console. *Note that the RS-232C setting should always be 9600 baud. Changing this setting may cause the terminal to display incorrectly.*

1. Make sure the VXIbus mainframe power is off and the console is connected and turned on.
2. Hold the Rst/Abt switch on the panel in its "`Abt`" (down) position.

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3. Turn on the VXIbus mainframe power.
4. Release the Rst/Abt switch.
5. You will begin seeing a set of messages on your screen, some of which will display clearly and some of which will not. The messages repeat the same content and each will remain on your display for about seven seconds.

   Depending on whether you are running graphics or a console terminal (RS-232C), one of the following message-types will appear:

   - If you are using a terminal (RS-232C) display, each message will prompt you to press (ESC) on the console keyboard, as follows:

     ```
     Press [ESC] to select this device as the CONSOLE
     ```

     OR

   - If you are using a monitor (graphics) display, each message will prompt you to enter a number, *N*, as follows:

     ```
     Press N, to select this CONSOLE, then press [Enter/Return]
     ```

   In either case, the action must be taken within about seven seconds in order to select the set of console display protocols which that particular screen represents.

   In both cases, after you have indicated your selection, you will be asked to confirm the selection by the following prompt:

   ```
   TO CONFIRM THIS DEVICE AS THE CONSOLE, press [ESC]
   ```

   - If you don't take any action, after seven seconds, the message cycles to the next set of display parameters, displaying the same message again.
   - If you take one of the actions (press (ESC) or type *N* (Enter)), and confirm it, you will see the following message before the `MAIN MENU`. This indicates that a selection has been made and that the display is configured for this session only. This message also tells you how to store the choice for future logins.

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```
You have selected this device as the CONSOLE
CAUTION   Before selecting 77 or 99:
          Set the CONSOLE PATH to this device, then
   Deselect INTERACTIVE CONSOLE SEARCH

This graphic device MONITOR TYPE is KEY 3
```

6. After the monitor or console type is confirmed, your console display shows the `MAIN MENU`. Type 2 (Enter). The `PATH CONFIGURATION` menu appears.

```
==== PATH CONFIGURATION ======================

PRIMARY PATH  is  now [ SCSI.6.0 ]
ALTERNATE PATH is now [ LAN.080009-723333 ]
CONSOLE PATH  is  now [ GRAPHICS 1 ]
KEYBOARD PATH is  now [ PS/2 (0) ]

Key  Operation
---  ----------------------------------------
  1  Primary Boot Path
  2  Alternate Boot Path
  3  Console Path
  4  Keyboard Path
...  ......................................
  0  Previous Menu
 77  Reset the System
---------------------------------------------
Press Key, then press [Enter/Return]
```

7. Type 3 (Enter). A display similar to the following appears:

```
==== CONSOLE PATH ============================

CONSOLE PATH  is  now [ GRAPHICS 1 ]

Key  Device Path
---  ----------------------------------------
  1  GRAPHICS 1
  2  RS-232 (A)
  3  RS-232 (B)
...  ......................................
  0  Previous Menu
 66 Rescan for Console devices
 77  Reset the System
---------------------------------------------
To select the CONSOLE PATH, press Key, then press [Enter/Return]
```


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8. For example, this menu indicates that your current console path is `GRAPHICS 1`. To display a listing of supported monitors, type the number of this path. For this example, type `1`.
9. For `GRAPHICS 1`, a screen similar to the following example appears, indicating the supported monitor types, with an asterisk (*) beside your current selection. In this example, the current monitor format is indicated as Key 3 and is shown by the message at the top.

```
==== CONSOLE PATH MONITOR TYPE ==================


CONSOLE PATH is [ GRAPHICS1 ]  Type is Key 3

Key   Resolution     Hz   Style          Key   Resolution     Hz   Style
---  ------------------------------- --- --------------------------
  1   1280 x 1024  72                   2    1024 x  768   75
  3 * 1024 x  768  70                   4    1024 x  768   75  Flat Panel
  5   1280 x 1024  60                   6    1024 x  768   60
  7    640 x  480  60                   8    1280 x 1024   75  VESA
  9   1024 x  768  75  VESA            10     800 x  600   75  VESA
 11    640 x  480  75  VESA            12     640 x  480   60  Flat Panel
 13   1280 x 1024  50

Key  Operation
...  ......................................
 55  SAVE ANY CHANGES  and go to  Previous Menu
-----------------------------------------------
To Select a Type, press Key, then press [Enter/Return]
```

The selected set of parameters should describe your monitor. You can check this information in your HP-UX 9.05 Release Notes (see "Online Sources of Information" in Chapter 2).

To change console configuration, you can press the appropriate key here, or you can invoke the Mode Configuration screen, and type `8` Enter (`Interactive Console Search`) which gives you the same configuration opportunity as at power up.

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Booting and Resetting the VXIbus Mainframe

In case you do not want the usual automatic boot sequence to occur, you can start your system from an operating system that is stored on a device that is different from your usual boot device. If your normal operating system kernel or the disk on which it resides becomes damaged or unusable, you may wish to boot from a different disk or perhaps another type of device, such as a DDS-format tape drive.

To boot from an alternate device:

1. At power-up, stop the automatic boot process (if auto boot is configured) by typing (ESC) at the following prompt:

```
System Search started ...
Press [ESC] to discontinue the Auto Boot process.
```

2. Select `Boot From a Device` from the menu list by typing `1` (Enter). A list of devices with bootable media appears.
3. Select a device or LAN path from the device list by entering its number, or abandon the process by typing `0` (Enter) to return to the previous menu.

In most boot console menus, you can enter `77` to reset the system and return to the automatic boot process.

Resetting the System

The act of resetting your system causes it to restart completely. It is similar to turning the system *off* and then back *on* again.

- Reset the system by pressing the Rst/Abt switch on the front panel of the controller to the "`Rst`" (up) position.

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Searching for Bootable Media

Unless configured otherwise in the boot console handler, the boot console process will automatically search exhaustively for bootable media.

In automatic mode, the boot process searches all types of I/O devices in the default order for that operating mode (Test, OEM, or User), or in another order, if you have so specified in the `BOOT FROM DEVICE` menu. When it finds an ISL file, the ISL process initiates boot processes on its device.

To temporarily change to interactive use of ISL, go to the `MAIN MENU` and type `1` Enter (`Boot from a Device`). In that menu, type `33` Enter. Note that this toggles the `Effective ISL Mode` setting, the value used only for this session.

To back out of this action, type `0` Enter to return to the previous menu.

To return to the automatic boot process (with any new configurations in the list), type `77` Enter. Automatic mode ISL uses an autoboot file to select which system or utility to load, non-interactively. Interactive mode ISL will always provide you with a prompt.

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Displaying and Setting Paths

A path is the hardware address of a device that is attached to the I/O system of your system. To display the current settings for the system paths, select `Path Configuration` from the boot console `MAIN MENU` by typing 2 Enter. A screen similar to the following appears:

```
==== PATH CONFIGURATION ======================

PRIMARY PATH  is  now [ SCSI.6.0 ]
ALTERNATE PATH is now [ LAN.080009-723333 ]
CONSOLE PATH  is  now [ GRAPHICS 1 ]
KEYBOARD PATH is  now [ PS/2 (0) ]

Key  Operation
---  ---------------------------------------
  1  Primary Boot Path
  2  Alternate Boot Path
  3  Console Path
  4  Keyboard Path
...  .......................................
  0  Previous Menu
 77  Reset the System
```


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Setting the Primary Path

To reconfigure the primary boot device path, at the `PATH CONFIGURATION` menu, type `1` Enter. You will see the `PRIMARY PATH` menu.

```
==== PRIMARY PATH ============================

PRIMARY PATH  is  now [ SCSI.6.0 ]

Key  Device Path
---  ----------------------------------------
  1  SCSI.6.0 HP C2233
  2  LAN.080009-72333 15.99.255.25
  3  SCSI.4.0 CD-ROM HP C2943A
...  ........................................
  0  Previous Menu
 66  Update Device Path list
 77  Reset the System
---------------------------------------------
To set the PRIMARY PATH, Press Key, then press [Enter/Return]
```

Update the path by typing in the key number for your selection of the path or device. For example, if you wanted to configure the boot process to use LAN.080009-72333 as its primary selection, you would type `2` Enter. The following statement would appear above the menu:

```
PRIMARY PATH  is  now [ LAN.080009-72333 ]

...
```

Type `0` Enter to go back to the `PATH CONFIGURATION` menu which confirms the new selection:

```
==== PATH CONFIGURATION ======================

PRIMARY PATH  is  now [ LAN.080009-723333 ]
ALTERNATE PATH is now [ SCSI.6.0 ]
CONSOLE PATH  is  now [ GRAPHICS 1 ]
KEYBOARD PATH is  now [ PS/2 (0) ]
```


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Selecting the Alternate Path

Select the Alternate Path in a similar way by going to the `PATH CONFIGURATION` menu and typing 2 (Enter) to see the `ALTERNATE PATH` menu.

Resetting the Boot Device List

Resetting the search list for primary or alternate boot devices is a similar process to setting paths in general. First, go to the `MAIN MENU` and type 2 (Enter) to get the `PATH CONFIGURATION` menu:

```
==== PATH CONFIGURATION ======================

PRIMARY PATH  is  now [ SCSI.6.0 ]
ALTERNATE PATH is now [ LAN.080009-723333 ]
CONSOLE PATH  is  now [ GRAPHICS 1 ]
KEYBOARD PATH is  now [ PS/2 (0) ]

Key  Operation
---  ------------------------------------------
  1  Primary Boot Path
  2  Alternate Boot Path
  3  Console Path
  4  Keyboard Path
...  ......................................
  0  Previous Menu
 77  Reset the System
----------------------------------------------
Press Key, then press [Enter/Return]
```


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To reset the primary boot device, for example, type 1 Enter to get the PRIMARY PATH menu:

```
==== PRIMARY PATH ============================

PRIMARY PATH  is  now [ SCSI.6.0 ]

Key  Device Path
---  ---------------------------------------
  1  SCSI.6.0 HP C2233
  2  LAN.080009-72333  15.99.255.25
  3  SCSI.4.0 CD-ROM HP C2943A
...  .....................................
  0  Previous Menu
 66  Update Device Path list
 77  Reset the System
-----------------------------------------------
To set the PRIMARY PATH, Press Key, then press [Enter/Return]
```

Type a numerical key and Enter to activate an item. For example, type 2 Enter to select LAN as the primary path, giving the following display:

```
==== PRIMARY PATH ============================

PRIMARY PATH  is  now [ LAN.080009-72333 ]

Key  Device Path
---  ---------------------------------------
  2  LAN.080009-72333 15.99.255.25
  1  SCSI.6.0 HP C2233
  3  SCSI.4.0 CD-ROM HP C2943A

  ...
```

Note In the interest of having your system behave consistently with other Series 700 systems, you should *not* change the boot device lists without a specific reason.

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Displaying and Setting the Secure Boot Mode

There may be circumstances in which you would not wish to allow anyone to attempt to boot your system from a device other than the device you have specified, or to control the system from any console other than the one you have designated. This can be an important consideration in secure installations.

If you set up your system in such a way that it is physically impossible for unauthorized persons to disconnect it from its designated boot device, you can guarantee that the boot console handler cannot be used to boot the system from an unauthorized device or to change the console path.

With Secure Mode turned on (set to `YES` *), the boot console handler cannot be activated (see the Caution below).* Thus, you are assured that your system's security cannot be compromised through interaction with that interface.

To display the status of Secure Boot Mode, go to the `MAIN MENU` and type `3` Enter. You will see the `MODE CONFIGURATION` menu

```
==== MODE CONFIGURATION ======================

Mode is now [ USER ]

Key  Edited  Mode Attribute Class
---  ----------------------------------------
  1          Boot Search Control
  2          Console Search Control
  3          Keyboard Search Control
  4          Test Configuration
  5          Control Flags
...  ........................................
  0  Previous Menu
 44  Set USER Mode Default Values
 77  Reset the System
 88  Change Mode
-----------------------------------------------
To edit Mode Attributes, press Key, then press [Enter/Return]
```


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Type 5 Enter to get the `CONTROL FLAGS` menu, which will look something like the following:

```
==== CONTROL FLAGS ========================

Mode is now [ USER ]

Key  Enable  Control Feature
---  ----------------------------------------
  1  NO      Fast Boot
  2  NO      Secure Mode
  3  YES     Auto Boot Select
  4  NO      Diagnostics to RS-232 (A)
  5  NO      Error Logging
  6  NO      Interactive ISL
  7  NO      Repeat Scan for Boot Devices
  8  NO      Interactive Console Search
...  ......................................
  0  Previous Menu
-------------------------------------------
To change a Feature, press Key, then press [Enter/Return]
```

Type 2 Enter to change the `Secure Mode` from "`NO`" to "`YES`". This activates the secure mode.

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Caution

Once the secure boot mode is activated, the only way to *deactivate* it is to use the Rst/Abt switch, as in the previous section "Setting the Console Display Format" in this Appendix. This procedure is outlined below:

1. Make sure the VXIbus mainframe power is *off* and the console is connected and turned *on*.
2. Hold the Rst/Abt switch on the panel in its "`Abt`" (down) position.
3. Turn *on* the VXIbus mainframe power.
4. Release the Rst/Abt switch.
5. You will begin seeing a set of messages on your screen, some of which will display clearly and some of which will not. The messages repeat the same content and each will remain on your display for about seven seconds. Select the console format, using (ESC) or a number, according the the screen instructions, as in "Setting the Console Display Format".
6. You will then see the boot console handler `MAIN MENU`.
7. Type `3` (Enter). You will see the `MODE CONFIGURATION` menu.
8. Type `5` (Enter). You will see the `CONTROL FLAGS` menu.
9. At the `CONTROL FLAGS` menu, type `2` (Enter) to change the secure boot mode from `YES` to `NO`.
10. Type `0` (Enter) to return to the `MODE CONFIGURATION` menu.
11. Type `77` to reset the system.

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Displaying the LAN Station Address

The LAN station address ("LANIC ID") of your system is the label that uniquely identifies the LAN connection for it at the link level (the hardware level). It is sometimes necessary for you to supply this address to other users. For example, if your system is to become a member of a cluster, the cluster administrator needs to know your LAN station address in order to add your system to the cluster.

To display your system's LAN address before your system is booted, do the following:

At the `MAIN MENU`, type 6 Enter to get to the `HARDWARE INFORMATION` menu. You will see a menu similar to the following:

```
==== HARDWARE INFORMATION ====================

   Computer Model          9000/743
   System Board Serial No. 1234567890
   Cache size              128 Kbytes 128 Kbytes

Key  Component
---  ---------------------------------------
     CPU          Rev. 2.2, Freq. 100 MHz
     RAM          16 Mbytes
  1  I/O ASIC
  2  VME ASIC     Rev. 2
  3  VME
     GRAPHICS 1

Key  Operation
...  .....................................
  0  Previous Menu
 77  Reset the System
---------------------------------------------
press Key, then press [Enter/Return]
```

Type 1 Enter to get information like the following for input/output devices:

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```
==== Hardware Component Info =================

     I/O ASIC Rev     2.0

     SCSI
     LAN 080009-010203
     RS-232 (A)
     HP PARALLEL
     AUDIO
     PS/2 (0)
     PS/2 (1)

Key  Operation
...  ....................................
  0  Previous Menu
 77  Reset the System
---------------------------------------------
Press Key, then press [Enter/Return]
```

Note the third item in the list, which is the LAN address. (The item "HP PARALLEL" does not apply to the Model V743 VXI controller.)

Interactive Testing

This menu allows you to run selected tests, and it allows access to the debugger environment. To get to this menu, at the `MAIN MENU`, type `4` Enter (`INTERACTIVE TESTING`). You will see a menu similar to the following:

```
==== INTERACTIVE TESTING =====================

Key  Operation
---  ---------------------------------------
  1  CPU S.S.
  2  GRAPHICS 1 INIT
  3  GRAPHICS 2 INIT
  4  GRAPHICS 3 INIT
  5  GRAPHICS 4 INIT
...  ....................................
  0  Previous Menu
 44  Enter Debug Environment
 77  Reset the System
---------------------------------------------
To run a test, Press Key, then press [Enter/Return]
```


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The tests are as follows:

- `CPU S.S.` : tests the CPU super scalar operations.
- `GRAPHICS 1` : initializes and tests the specified graphics interface. (Only GRAPHICS 1 is supported on the Model V743 VXI controller.)

  If the specified graphics interface is the console, the test will not be run but it will report "passed". HIL INIT does not apply to the Model V743 VXI controller.

Note that this menu lists devices other than those which are present and working. Running a test on nonexistent devices in the list will give a positive result.

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Displaying Firmware Information.

This menu will give you information on the firmware module revision number. To get to this menu, at the `MAIN MENU`, type 5 Enter (`FIRMWARE INFORMATION`). You will see a menu similar to the following:

```
==== FIRMWARE INFORMATION ====================

 PDC Version 310.0 Release 0  Extension ROMs
Name         Revision   Name         Revision
-----------  --------   -----------  --------
CPU              1.00   MIOC             1.00
CACHE            1.00   RAM              1.00
Misc I/O         1.00   MSGS (Eng)       1.00
VME              1.02   EISA             1.00
BPN              1.02   RS-232           1.01
LAN              1.00   SCSI             1.00
PS/2             1.00   HIL              1.00
GRAPHICS         1.00   FW SCSI          1.00

Key  Operation
...  ......................................
  0  Previous Menu
 77  Reset the System
-----------------------------------------------
Press Key, then press [Enter/Return]
```

Note that the revision number of the boot ROM itself (PDC) is also shown above the listing.

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Glossary

absolute path name
The name of a file which lists all the directories leading to it, starting with root ("/") and ending with the file base name itself. If the path name indicates a *directory*, leave the trailing slash. For example, `/users/jth/`. See *Using HP-UX* for more information on path names and directory structures in HP-UX.

access permissions
File name characteristics (including *read, write*, and *execute*) which determine whether a process can perform a requested operation on the file (such as opening a file for writing). Access permissions can be changed by a *chmod*(1) command.

alternate boot path
The address at which the firmware searches for a boot device, if it has not found the device specified by the primary boot path.

application
A program used to perform a particular task, usually interactively, such as computer-aided design, text editing, or accounting.

argument
The part of a command line which identifies what (file, directory, etc.) is to be acted upon.

backup
A copy of all or part of the file system.

boot
To start or activate a system.

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boot device
A device such as a disk drive, DDS tape drive, or network device that contains the appropriate program for booting the operating system.

boot ROM
An EEPROM memory which is incorporated into a system for the purpose starting the operating system, testing the terminal, and producing a standard display. Though loosely referred to as ROM, it includes a writable function to allow reconfiguration of path and boot configuration information.

Bourne Shell
A command interpreter, invoked as `/bin/sh`. The Bourne Shell is the default shell in HP-UX.

bus address
A number which makes up part of the address HP-UX uses to locate a particular device. The **bus address** is determined by a switch setting on a peripheral device which allows the computer to distinguish between two devices connected to the same interface.

CD-ROM
Compact Disk Read-Only Memory.

CD-ROM file system
A read-only memory file system on compact disk. Typically, you can read data from a CD-ROM file system, but you cannot write to one.

character
An element used for the organization, control, or representation of text. Characters include graphic characters and control characters.

click
To press *and release* a mouse button rapidly.

cluster
A group of workstations connected via a LAN. One computer, the **cluster server**, performs as a file-system server for the **cluster clients**.
(For information on clusters, see *Managing Clusters of HP 9000 Computers*.)

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cluster client
A cluster node that does not have a local HP-UX file system. Its file system resides on the cluster server. A **client** can also refer to any process run by a server.

cluster node
Any workstation networked into an HP-UX cluster. (Also called "cnode".)

cluster server
The cluster node which acts as a file system server and operating system server for all the cluster nodes in an HP-UX cluster. Also called **cluster root server**.

cnode
Abbreviation for **cluster node**.

CPU
Central Processing Unit. The instruction-processing module of the computer. *See also* **SPU**.

C Shell
An HP-UX command interpreter, invoked as `csh`.

current working directory
The directory in which relative path name searches begin. It is also called the "current directory" or "working directory", and is identified by entering the command `pwd`.

device driver
A software program that provides the communication interface between the operating system kernel and a hardware device.

device file
A file used for the computer to communicate with a device such as a tape drive or a printer.

DDS
Digital Data Storage. HP-supported format for data storage.

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directory
A table of identifiers and references (such as file names) that refer to corresponding files and items of data. Used in a typical HP-UX organizational structure to provide an organizational and logical identity for a given group of files and directories.

environment
The set of defined shell variables (some of which are PATH, TERM, SHELL, HOME) that define the conditions under which your commands run. These conditions can include your terminal characteristics, home directory, and default search path.

file access permissions
File name characteristics (including *read*, *write*, and *execute*) which determine whether a process can perform a requested operation on the file (such as opening a file for writing). Access permissions can be changed by the *chmod*(1) command.

fileset
A logically-defined, named set of files on an update or installation tape.

file system
The organization of files on a given storage device, possibly including hierarchical directories.

$HOME
The value of the environment variable representing the **home directory**.

home directory
The directory name given by the value of the shell variable HOME. This is the directory where the user starts after logging in, typically `/users/`*login*, where *login* is your login name.

host name
Refers to a string which uniquely identifies a system in a network. There are generally different **host name** domains associated with different networks.

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HP-HIL
Hewlett-Packard Human Interface Link.

HP-IB
Hewlett-Packard Interface Bus (IEEE 488 standard).

HP-UX cluster
A group of workstations connected via a LAN. One computer, the **cluster server**, performs as a file-system server for the **cluster client**.

IPL
Initial Program Loader (such as the ISL program).

ISL
Initial System Loader. This implements the operating system-independent portion of the boot process.

kernel
The part of the HP-UX operating system that manages the computer's resources, such as memory, file system, and input/output.

Korn Shell
An HP-UX shell, featuring command history recall and line-editing. Invoked as `/bin/ksh`.

LAN
See **Local Area Network**.

LED
Light-emitting diode.

Local Area Network
The systems and/or clusters which share data, hardware, and software resources via Networking Services software.

locally-mounted file system
A file system mounted on a disk attached to a cluster client and shared by other nodes in the cluster.

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login
Your login name, the name by which you are known to the workstation. This may be any group of characters, so long as it meets system rules.

mainframe
A VXIbus cardcage which allows instruments on a card to be plugged in and operate in a VXI environment. The HP E1401 is an example of an HP mainframe.

mount
To add an auxiliary (removable) file system to an active existing file system.

mount directory
The directory in an existing file system that is the root directory of a mounted auxiliary file system.

multiuser state
The condition of the HP-UX operating system in which the cluster nodes (and console) allow communication between the system and all its users.

MXI
Multiple (VMEbus) Extensions for Instrumentation.
MXIbus is a multidrop system bus that connects multiple devices at the hardware bus level in a software-transparent manner. Multiple VXIbus mainframes with VXI-MXI interfaces can be connected to form a single multiframe VXIbus system.

NFS
Network File Services.

NFS file system
A file system accessible over a network via the NFS Services product.

node name
A unique string used to identify each node in a cluster.

operating system
The contents of `/hp-ux`, including the kernel, commands, input-output control, system accounting, storage assignment, and other services. *Also see* **kernel**.

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owner
The owner of a file is usually the creator of that file. However, the ownership of a file can be changed by the superuser or the current owner with the *chown*(1) command or the *chown*(2) system call.

password
An encrypted sequence of characters used by HP-UX to identify an authorized user and to permit authorized login on a system.

path name
A sequence of directory names, separated by slashes, which specify the location of any file or directory.

PDC
Process Dependent Code. Firmware that implements all processor-dependent functionality, including initialization and self-test of the processor.

PID
Process identity (number).

Posix Shell
POSIX-compliant version of the Korn Shell.

primary boot path
The first address at which the firmware searches for a boot device.

process
An invocation of a program. Generally, **process** refers to a program running in memory, while **program** is the code stored on disk.

process ID
A unique identification number assigned to all processes by the operating system. *Also see* PID.

pty
Pseudo-terminal.

RAM
Random-access memory.

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relative path name
The name of a file, listing all the directories leading to that file in relation to the current working directory.

resource manager
This runs at power on and identifies all plug-in modules installed in the mainframe.

The resource manager also controls commander/servant hierarchies, allocates interrupt lines, performs address mapping, and starts the system operation.

RFI
Radio Frequency Interference.

ROM
Read-only memory.

root directory
The highest level directory of the hierarchical file system, from which all other files branch. In HP-UX, the slash (/) character refers to the "root directory." The root directory is the only directory in the file system that is its own "parent directory."

root file system
The file system mounted on the cluster server.

root server
The node in a cluster to which the storage device containing the root file system of the cluster is physically attached. *Also* **cluster server**.

root user
The user with root permission, having a separate "root" account and password.

run-level
The system state determined at boot which defines, among other things, multi- or single-user status.

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SAM
System Administration Manager. A subsystem of HP-UX that does a wide range of system administration tasks interactively.

SCPI
Standard Commands for Programmable Instruments.

script
A file that contains commands that a shell can interpret and run.

SCSI
Small Computer System Interface.

servant area
The area of a commander which defines a range of logical addresses in which all instruments within the address range specified report to the commander. This cannot be changed.

server
A computer program that provides file access, login access, file transfer, printing and other services across a network. Sometimes, but not always, a server consists of a dedicated computer.

shell
An HP-UX command interpreter (Bourne, Korn, Key, Posix or C), providing a working environment interface for the user. The shell takes command input from the keyboard and interprets it for the operating system. See *Shells: User's Guide* for information on the characteristics of the various shells.

shell script
A file that contains commands that a shell can interpret and run. Also "shell program."

shut down
To take the system from multi-user state to a state in which no processes are running, using the `shutdown` command.

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SICL
Standard Instrument Control Library.

single-user state
The state of a computer where there is little or no process activity and no users logged in. The system is only accessible to the current system administrator (root). This mode is brought about by execution of *shutdown*(1). Also called **single-user mode**.

SPU
System Processing Unit. The instruction- and graphics-processing module of the computer (in this case, the Model V743 VXI controller) containing the CPU and I/O processors. Also called the "SPU module".

standard input
The source of input data for a program. The standard input file is often called stdin, and is automatically opened by the shell for reading on file descriptor 0 for every command invoked.

standard output
The destination of output data from a program. Standard output appears on the display unless it is redirected otherwise.

su
Super User. *See* **root user**.

system name
The eight-character (or less) string which uniquely identifies a system. Usually identical with the system's host name found in `/etc/hosts`. The Internet Protocol (IP) number is sometimes used instead of a system name to identify the system.

tree structure
The HP-UX method of organizing files and directories into a branching hierarchical structure. This structure looks like an inverted tree with the "root" directory at the top, descending into multiple directory/file branches that end in clusters of files.

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user
Any person who interacts directly with a computer system.

user interface
The medium through which users communicate with their workstations. The command-line prompt is one type of interface. The graphical objects of HP VUE are another type of interface.

VME
Versa Module Eurocard.
A backplane connector protocol, used for networking customized arrays of processor boards in the same chassis.

VMEbus
The bus/protocol for VME cards.
VME cards are networked together into a VMEbus chassis.

VXI
VMEbus extensions for instrumentation.
An open architecture instrument interface for card cage instrumentation. Since VXIbus is an open standard, a multi-vendor environment is possible.

VXIbus
The bus/protocol for VXI cards.
VXI cards are networked together into a VXIbus chassis.

working directory
This is the directory in which relative path name searches begin. It is also called the current directory, or the current working directory.

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