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Model 744 Owner's Guide

This guide contains installation instructions.



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Preface

This owner’s guide describes how to install and use the HP Model 744 Board Computer.

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Audience

This guide is intended for HP 9000 Model 744 Board Computer users.

Safety and Regulatory Statements

Safety

For safety information see the owner's guide that came with the system in which you are installing your Model 744 board computer.

Regulatory Statements

Emissions Regulations

Federal Communications Commission (FCC) This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules and interference causing regulations of Industry Canada. These limits are designed to provide reasonable protection against harmful interference in a non-residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception (determined by turning the equipment off and on), you can correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

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Hewlett-Packard's system certification tests were conducted with HP-supported peripheral devices and HP shielded cables, such as those you receive with your computer. Changes or modifications not expressly approved by Hewlett-Packard could void the user's authority to operate the equipment.

Korean Regulations on EMI, 1991V3

Please note that this device has been approved for business purposes with regard to electromagnetic interference.

VCCI Class A ITE

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Electrostatic Discharge (ESD) Precautions

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

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

Release Document(s)

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

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Related Manuals

If you are using HP-UX version 10.20, refer to the following manuals for more information:

- *Model 748 Owner's Guide* (A4511-90607)
- *Using Your HP Workstation* (A2615-90003)
- *Installing and Updating HP-UX* (B2355-90050)
- *Graphics Administration Guide* (B2355-90109)
- *Configuring HP-UX for Peripherals* (B2355-90053)
- *HP Visual User Environment User's Guide* (B1171-90079)
- *Managing Clusters of HP 9000 Computers: Sharing the HP-UX File System* (B2355-90038)
- *HP-UX X User Environment User's Guide*

If you are using HP-RT, refer to the following manuals for more information:

- *Application Programming in the HP-RT Environment*
- *Driver Writing in the HP-RT Environment*
- *ELOG Library Programer's Guide*
- *HP Z5117A PCMCIA Adapter Installation and User's Guide*
- *HP-RT Reference*
- *HP-RT Quick Reference*
- *HP-RT System Administration Tasks*
- *VME Backplane Networking Administration Guide*
- *X11 SERVERrt Installation and Configuration Guide*
- *Using SNMP in the HP-RT Environment*
- *Using STREAMS in the HP-RT Environment*

To order manuals, please contact your local sales office.

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Revision History

The revision history for each edition of the manual is listed below:

HP Part No.	Edition	Revision History
A4500-90607	E0996	First printing
A4511-90602	E0897	Updated to include Model 744/165L, PMC, and memory enhancements
A4511-90606	E1199	Updated for new memory options

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Documentation Conventions

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

user-supplied values	Italic words or characters in formats and command descriptions represent values that you must supply.
sample user input	In examples, information that the user enters appears in color.
`output`	Information that the system displays appears in `this typeface`.
literal values	Bold words or characters in formats and command descriptions represent commands or keywords that you must use literally. Pathnames are also in bold.
KEY	Text with a line above and a line below denotes a key on your keyboard, or a key or button which is drawn on your workstation's graphic display. (In this manual we refer to the **Enter** key. On your keyboard the key may be labeled either **Enter** or **Return**.)

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Questions, Suggestions, or Problems

If you have any questions, suggestions, or problems with our hardware, software, or documentation, please contact your HP Response Center.

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Declaration of Conformity

Declaration of Conformity

according to ISO/IEC Guide 22 and EN 45014

Manufacturer: Hewlett-Packard Company
100 Domain Drive
Exeter, NH 03833
USA

Declares , that the:

Product Name: VME Board Computer
Model Numbers: 744i/132
Product Number: A4500A
Product Options: all

conforms to the following specifications:

Safety: IEC 950:1991+A1+A2 / EN 60950:1992+A1+A2

EMC: CISPR 11: 1990 / EN 55011: 1991 Class A
CISPR 22: 1985 / EN 55022: 1994 Class A
EN 50082-1:1992
IEC 801-2: 1991 / EN 55024-2: 1992 - 3kV CD, 8 kV AD
IEC 801-3: 1984 / EN 55024-3: 1991 - 3 v/m
IEC 801-4: 1988 / EN 55024-4: 1995 - 0.5 kV Signal Lines, 1 kV Power Lines
US FCC Part 15, Level A
Japan VCCI, Class 1

and is certified by:
British Standards Institute: ISO 9000-2 for Hewlett-Packard, OFG-E, Exeter,NH

supplementary information:
The product herewith complies with the requirements of the following Directives:
- the EMC directive 89/336/EEC

This product was tested in a typical Hewlett Packard s748i workstation configuration.

Exeter, NH, USA December 11, 1996 Debra T. Murphy
Date Debra Murphy, Site Quality and Engineering Manager

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1

Model 744 Board Computer Overview

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This chapter introduces the Model 744 Board Computer. Its purpose is to familiarize you with the board computer and its installation procedure.

The instructions in this chapter assume you are using either the HP-UX or HP-RT operating system.

The major sections within this chapter are:

- Product Description
- Installation Overview
- Supported Products
- Environmental Requirements
- Operating System Overview
- Manuals for System Information
- Online Sources of Information
- Installing HP-UX and HP-RT
- Audio

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Product Description

The HP 9000 Model 744 is a high-performance Precision Architecture board computer based on the Hewlett-Packard PA-RISC 7300LC technology. It contains the following key features:

- Model types (the *rt* designates models that operate under the HP-RT operating system - the models are physically the same):

  Model 744/132L
  Model 744*rt*/132L
  Model 744/165L
  Model 744*rt*/165L

- VME slot configuration

  Single slot
  Dual slot (requires PCI Mezzanine Card (PMC) bridge board or General System Connect (GSC) expansion kit
  Three slots (requires PMC bridge and expander boards)

- CPU PA-RISC PA7300-LC, processor performance

  Model 744/132L - 132 MHz
  Primary internal cache - 128 KB: 64 KB instruction, 64KB data
  Model 744/165L - 165 MHz
  Primary internal cache - 128 KB: 64 KB instruction, 64KB data
  Secondary cache - 512 KB

- Clocks

  Battery-backed real-time clock
  Interval timers (One 32 bit, Two16 bit)
  Watchdog timer

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- Operating systems

  HP-UX 10.20 (or later). The Model 744 typically boots from a hard disk drive. HP-UX may also be installed from an external DDS or CD-ROM drive.

  If the Model 744 is a client on a LAN, HP-UX can be booted over the LAN.

  HP-RT 2.21 (or later).

- User interface

  CDE or HP VUE graphical user interface (HP-UX only).

- Compatibility

  Source and binary code compatible with Series 700 product family.

- Monitors

  Single or multiple display depending on number of installed graphics options (on-board and/or external).

  Color monitors:
  17-inch, resolution 1280 x 1024
  19-inch, resolution 1280 x 1024

  Terminal (text only) connected to RS-232 port.

- Optional Graphics Capability

  Graphics chip set providing on-board (including accelerated I/O) graphics.

  PMC bridge and expansion adapters each provide two slots for HP A4979A graphic cards.

  HP-RT supports a PMC adapter with an HP A4979A graphics card when on-board graphics is not used.

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NOTE: The HP-RT operating system supports only one graphics display, and HP-UX 10.x supports up to four graphics displays.

- Main Memory

  Single VME slot 744: 64, 128, or 256 MB RAM
  Single VME slot 744 with HP-RT: 64 to 256 MB RAM
  Dual VME slot 744: 32 to 1024 MB RAM
  Dual VME slot 744 with HP-RT operating system: 64 to 756 MB RAM (Dual slot means an expansion kit must be installed.)

NOTE: A Model 744 configured for more than one RAM card requires installation of a PMC bridge board, or a GSC expansion kit, thereby occupying two VME slots.

  Up to four RAM cards may be installed.
  When mixing memory card capacities that include 128 or 256 MB cards, the 128 or 256 MB card(s) must be installed into the lowest memory slots before adding cards of other capacities.

- Standard Features

  Internal SCSI-2 single-ended bus
  2 asynchronous RS-232-C ports (requires a conversion cable)
  1 HP parallel port (requires a conversion cable)
  1 LAN AUI port (requires a conversion cable)
  2 mini-DIN PS/2 ports
  1 slot for RAM memory (memory cards can be stacked)
  CD-quality audio, supported only by HP-UX and requires a conversion cable

- Dual Slot Upgrades

  PMC bridge board (with two PMC sites)
  GSC Expansion kit (with two GSC sites)

- 3-slot Upgrade

  PMC Expander board (with two PMC sites, requires PMC bridge)
  ATM Network Card (up to 2, GSC expansion kit required)

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Installation Overview

Chapter 2 provides step-by-step instructions for attaching and installing accessories in a typical VME card cage, and connecting external devices.

Accessories are products that attach to the computer's system board. They must be attached **before** installing the board computer in a VME card cage. Devices are products used externally to the board computer. Examples are keyboards, monitors, and mass storage devices. Other devices are connected through cables. Depending on your specific application, you may need one or more accessory and device products. Installation instructions for most products used directly with your Model 744 Board Computer are explained in this manual.

Chapter 3 presents the installation tasks required to install and configure your board computer.

Installation Notes

Your Model 744 Board Computer uses micro-miniature connectors for several interface ports. Cable connectors for these ports are very small, but may be positioned so that a slight angle exists between them. This situation has been tested by HP and full functionality is maintained.

CAUTION: The Model 744 Board Computer's P2 connector has a local bus on the user-defined pins. Verify that your VME card cage's backplane makes no connections to J2/P2, rows A and C. Refer to IEEE STD 1014-1987, Chapter 7, for more information on use of user-defined pins in VME backplane connectors.

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Supported Products

Only products with Hewlett-Packard approved parts, accessories, peripherals, operating systems, and application programs are supported by Hewlett-Packard. Any product with other than HP approved hardware or software connected or installed must have the non-HP approved hardware and software removed by the customer before on-site repair is conducted. The following lists describe the products supported by HP.

Accessory Cards

The Model 744 supports the following accessory cards:

- HP A4219A expansion kit
- Memory; one or more of the following RAM cards is supported on either the HP-UX or HP-RT operating system:

  HP A4503A 64 MB RAM card
  HP A4449A 128 MB RAM card
  HP A6005X 256 MB RAM card

- Mezzanine (GSC expansion kit) cards:

  HP J3420A ATM Network Card (supported only by HP-UX)

Typical External Devices

The Model 744 supports the following external devices:

- LAN transceiver

  HP A2670A ThinLAN ETHERNET Transceiver
  HP A2671A EtherTWIST Transceiver

- Speaker; 8 ohm impedance with $^{1}/_{8}$-inch sub-miniature stereo connector (HP-UX only).

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Conversion and Standard Cables

Model 744 Board Computers use micro-miniature connectors for several interface ports and standard connectors for others. You need conversion cables to connect from the micro-miniature connectors to standard size interfaces. The Model 744 supports the following cables:

- Conversion cables:

  HP A4300A HP parallel; high-density 25-pin to standard 25-pin F
  HP A4301A RS-232; high-density 9-pin to standard 9-pin M
  HP A4302A audio; high-density 9-pin to stereo line-in
  HP A4303A LAN; high-density 15-pin to 15-pin AUI
  HP A4223A video; high-density 15-pin to standard 15-pin,
  HP A4305A video; high-density 15-pin to EVC connector
  HP A4167A video; standard 15-pin to EVC connector (for use with optional GSC 8-plane graphics card and EVC monitor

- Standard cables:

  HP K2296 SCSI; high-density 50-pin to standard bail lock
  HP 92284A HP parallel; 25-pin M to 25-pin M
  HP 24542G RS-232 terminal cable; 9-pin F to 25-pin M
  HP 24542M RS-232 modem cable; 9-pin F to 25-pin F

Keyboard and Mouse

The Model 744 supports the following:

- HP A2840A keyboard with mini-DIN connector
- HP A2839A mouse with mini-DIN connector

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Environmental Requirements

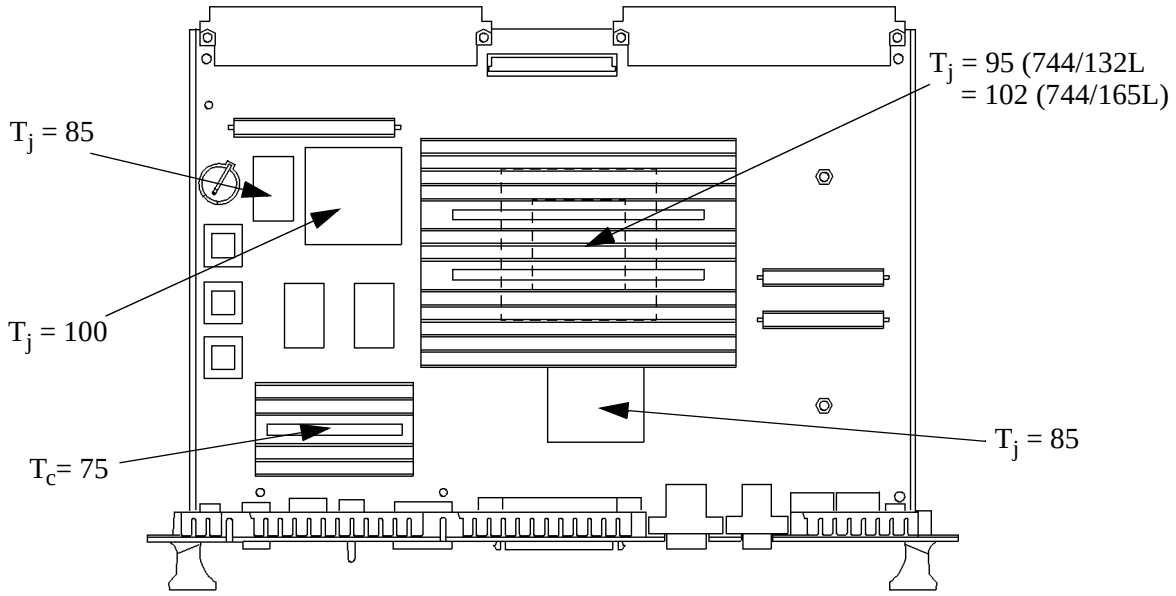
Table 1-1 shows the environmental requirements for the Model 744.

Table 1-1 Environmental Requirements

Temperature	Operating: 0° to 55°C; 10°c/min rate of change maximum Non-operating: -40° to 70°C
Humidity	Operating: 40°C: 95% RH max
Altitude	Operating: 4,600m (15,000 ft) to 40°C Non-operating: 15,300m (30,000 ft) to 70°C
Air Flow	150 linear feet per minute, 0° to 35°C 200 linear feet per minute, 35° to 55°C

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CAUTION: Integrated circuit case and junction temperatures must not exceed those shown in Figure 1-1.



T_j = Maximum junction temperature in degrees centigrade
T_c = Maximum case temperature in degrees centigrade

Figure 1-1 Model 744 Board Computer (Top View)

NOTE: The Model 744 should only be operated in an environment that is free from conductive pollution, including dry non-conductive pollution that may become conductive due to expected condensation.

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Operating System Overview

The Model 744 can be used with either of two operating systems, HP-UX or HP-RT. This manual provides basic information you will need for booting and running HP-UX. It also provides some overview information for HP-RT.

The Model 744 uses the standard HP-UX 10.20 or later operating system, a highly versatile system for multitasking, running your application programs, and performing a variety of development tasks. Refer to *HP-UX System Administration Tasks* for detailed installation and operation procedures for HP-UX.

The Model 744*rt* uses HP-RT 2.21 or later, a real-time operating system. HP-RT is HP's real-time operating system for PA-RISC VME board computers. It is a runtime-oriented product based on industry-standard application programming interfaces. HP-RT is designed around the real-time system principles of determinism (predictable behavior), responsiveness, user control, and reliability for "mission-critical" applications.

Refer to *HP-RT System Administration Tasks* for detailed installation and operation procedures for HP-RT.

The HP-RT development environment consists of the following:

- An HP-UX host system (for example, a Model 748*i*), running the supported HP-UX operating system, with CDE, X Window System, or HP VUE installed.
- DDS-format tape drive or CD ROM for loading HP-RT on the host system.
- The HP-RT target system (such as a Model 744*rt*).

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Manuals for System Information

HP-UX

After you have completed the installation procedures in this book, you may consult the following sources for further information:

- For HP-UX administration information, see HP-UX *System Administration Tasks.*
- For a quick reference to commonly-used HP-UX commands, see the appendix in *Using HP-UX.*
- HP VUE or CDE is the default interface for HP-UX. At some point, you may want to interact with the Model 744 using CDE or 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. All interfaces are included in HP-UX. For further information, refer to *Using the X Window System*, *Using HP-UX, CDE User's Guide,* or *HP VUE User's Guide*.

The following manuals are also useful:

- If you have not yet installed your HP-UX OS, see *Installing HP-UX*.
- For troubleshooting HP-UX, see Chapter 6 of this manual, and the manual *Solving HP-UX Problems.*
- For VME configuration information, refer to the appropriate VME manual for your operating system.

HP VUE

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

HP CDE

For information on using and configuring the CDE interface with HP-UX, see *CDE User's Guide*. For information on installing CDE, refer to *CDE 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 through the shell command line on a character terminal.

- Man pages: The HP-UX information found in *HP-UX Reference* is online and accessible by clicking on the Toolbox button at the right of your Front Panel, or by entering **man *command*** on a command line, 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 results in a display listing commands having the keyword in their description.

  Similar reference information on HP-RT, found in *HP-RT Reference*, can be displayed by entering **rtman *name*** on your HP-UX host system, where *name* is the name of the HP-RT command, system call, or function call you want to get information about.

On your HP-UX system, there are also a variety of files 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 come 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 resides in the **/usr/share/doc** directory, named by its release number; for example, **10.20RelNotes** for HP-UX 10.20.
- 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.

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- Newconfig: The directory **/usr/newconfig/etc** 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 onto 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.

In HP-RT, you will find an HP-RT specific README file in **/opt/HP-RT/etc/newconfig/**, on the HP-UX host system. This file contains version-specific information.

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Installing HP-UX and HP-RT

For procedures to install and configure HP-UX, refer to *HP-UX System Administration Tasks.*

For information on clusters, refer to *Managing Clusters of HP-UX Computers,* and *HP VUE User's Guide*.

For procedures to install and configure HP-RT, refer to *HP-RT System Administration Tasks*.

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Audio

HP-UX includes audio software comprising an audio editor, Audio Application Program Interface (AAPI), and some sample programs. Audio output is available through the audio port on the front panel of the Model 744. For highest quality audio, an external headphone set or speaker is recommended.

Audio is implemented using a CODEC (coder-decoder) combining CD-quality stereo audio-digital converters for microphone and line-input levels. The input sampling rate and format are programmable, as are the input gain and output attenuation.

A $^{1}/_{8}$-inch mini-jack is used for the speaker output connection. The remaining audio signals are via a 9-pin D-sub connector. Output impedance is nominally 8 ohms, but higher impedance devices can also be driven.

For information on programming for audio, refer to *Using the Audio Developer's Kit* (B2355-90069) and the man page *audio.*

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2

Installing Accessories

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This chapter describes the accessories you can install on the Model 744 Board Computer and tells you how to install them.

The instructions in this chapter assume you are using either the HP-UX or HP-RT operating system.

The major sections within this chapter are:

- Tools Required and Preliminary Procedures
- Safety Precautions
- Memory
- GSC Expansion Kit
- GSC Mezzanine Cards
- PMC Bridge and Expansion Boards

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Tools Required and Preliminary Procedures

Tools Required for Installation

All field replaceable parts can be accessed with these tools:

Static grounding wrist strap

No. 1 Pozidriv screwdriver

Small flat-tipped screwdriver

5mm (3/16-inch) nutdriver (RAM standoffs require this tool)

Preliminary Procedures

Perform the following steps before installing or removing accessories:

1. Exit application programs.
2. Shut down the operating system and power off the VME chassis. (See Chapter 5 for detailed instructions.)
3. Remove all cables connected to the board computer.
4. Set up a static-free place on which to work.

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Safety Precautions

It is essential to practice safety precautions when working with any electrical or electronic products. Following these safety precautions can help protect both you and the equipment from injury and possible permanent damage.

Whether the ICs are installed on a printed circuit board or lying on a table, integrated circuit components can be damaged by electro-static discharge. Static charges can build up in people to a potential of several thousand volts by simply walking across a room.

Protect integrated circuits by:

- Using a static-free work place and wearing clothes that do not hold static charges before handling any of the workstation's PC boards.
- Unplugging the power supply before removing or installing a part.
- Touching sheet metal with your fingers before touching the printed circuit assembly.

If the assembly is not going to be re-installed, place the assembly in an anti-static bag and set it aside. Following these precautions extends the life of the computer products you maintain.

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Memory

This section provides step-by-step instructions for installing RAM cards in the Model 744. The Model 744 memory kit contains a memory card, a set of standoffs, a set of screws, and a wrist strap.

Preliminary Requirements

Perform the following steps before you install a RAM card into the Model 744:

1. If the Model 744 is already installed in your system chassis, you must remove it. See Chapter 3 of this manual for instructions on removing and replacing the Model 744.
2. Place the Model 744 on a static-free mat on a clean, level surface.

RAM Card Installation

For a Model 744 in a single slot configuration (no expansion adapter installed), only one RAM can be installed. In a two-slot configuration, up to four RAM cards may be stacked. Use these steps and Figure 2-1 to install the RAM cards:

NOTE: When mixing memory card capacities that include 128 or 256 MB cards, the 128 or 256 MB card(s) must be installed into the lowest memory slots before adding cards of other capacities.

1. Begin with the Model 744 placed so that you face the front bezel.
2. If the Model 744 has RAM card(s) already installed, remove the screws that secure the topmost RAM card, and then install the new standoffs that came with your RAM card onto the topmost card (see Figure 2-1).
3. Hold the RAM card you are installing so that the conferred corner is the upper-left corner (see Figure 2-1).
4. While placing the new RAM card over the CPU or topmost installed card, align the holes in the RAM card with the spacers/standoffs underneath it.

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5 Properly align the connectors by slightly rotating the RAM card until you can feel the connectors fit together.

6 Gently and evenly push on the top of the connectors with both of your thumbs until the RAM cards are about 1/3 seated.

7 After the connectors are 1/3 seated, continue to push evenly with your thumbs, while pushing harder. The connectors will fully snap together.

8 Examine the connector seating from both sides of the RAM card to ensure there are no gaps between the RAM card connectors and the connectors underneath it.

9 Secure the topmost card with the screws you removed in Step 2.

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RAM Card Removal

When removing RAM cards from the Model 744 CPU or the RAM card stack, remove the cards one at a time. Carefully lift the card by the edge near the connectors. Do not try to pry the card up with a tool.

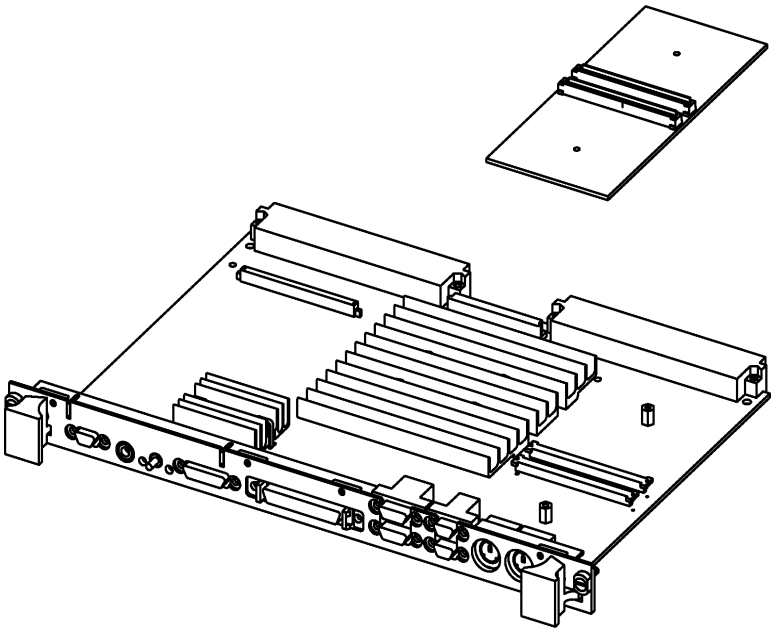


Figure 2-1 Installing RAM Cards

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GSC Expansion Kit

The GSC expansion kit consists of two parts: the adapter fixture and the front panel extension. This section provides step-by-step instructions for installing the GSC expansion kit onto the Model 744.

Preliminary Requirements

Perform the following steps before installing the adapter (GSC expansion kit) fixture onto your Model 744 Board Computer:

1. If the Model 744 Board Computer is already installed in your system chassis, you must remove it. See Chapter 3 of this manual for instructions on removing and replacing the Model 744.
2. Place the Model 744 on a static-free mat on a clean, level surface.

GSC Expansion Kit Installation

Follow these steps to install the expansion kit onto the Model 744:

1. Place the expansion adapter so that you line up the four M2.5x12 screw holes that flank the DIN connectors. See Figure 2-2.
2. Insert the four M2.5x12 screws one at a time, finger tighten, then snug down with a screwdriver. Do not overtighten.
3. Insert the two M2.5x6 screws, finger tighten, then snug down with a screwdriver.
4. Remove the copper EMI gasketing from the front panel of the Model 744 Board Computer.
5. Place the panel extension over the front panel so that the four tabs on the bottom of the extension panel line up and slip into their respective slots on the top of the front panel.
6. Insert the four front panel screws, finger tighten, then snug down with a screwdriver, as shown in Figure 2-3.

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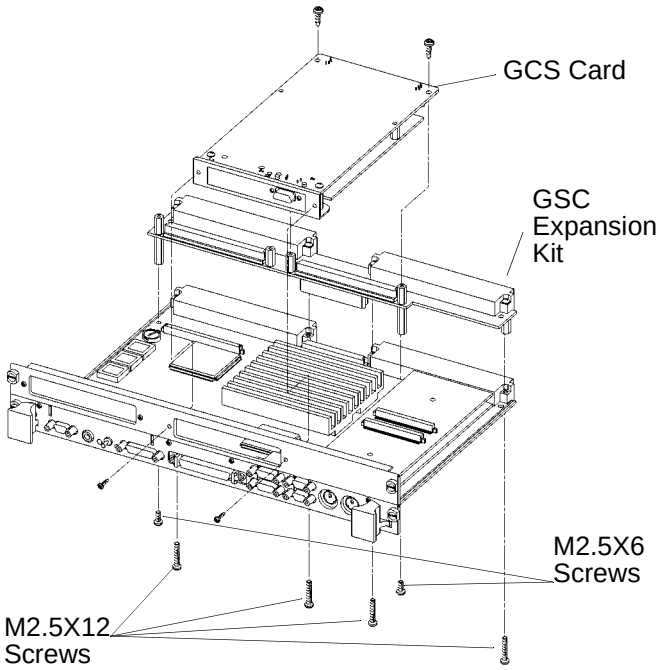


Figure 2-2 Installing the GSC Expansion Kit (Exploded View with GSC Card)

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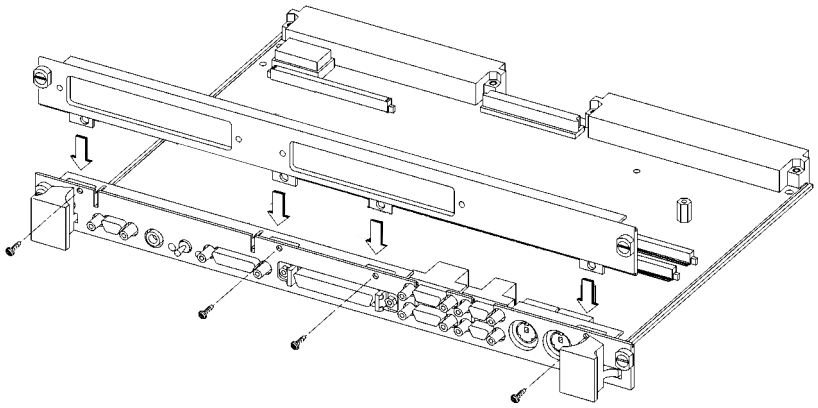


Figure 2-3 Adding the Front Panel Screws

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GSC Mezzanine Cards

Installing GSC Mezzanine Cards

This section provides step-by-step instructions for installing GSC mezzanine cards into your Model 744 Board Computer.

Preliminary Requirements

Perform the following steps before you install a GSC card:

1. The Model 744 Board Computer must already have a GSC expansion kit installed.
2. If the Model 744 Board Computer is already installed in your system chassis, you must remove it. See Chapter 3 of this manual for instructions on removing and replacing the Model 744.
3. Place the Model 744 Board Computer on a static-free mat on a clean, level surface.

GSC Mezzanine Card Installation

Follow these steps to install a GSC card onto your Model 744 Board Computer:

1. Working from the back of the Model 744 Board Computer, you can install GSC graphics cards into either the right-hand or center position, shown in Figure 2-4.
2. Using Figure 2-4 as a guide, position a card and line up its connector over the GSC connector on the board computer.
3. Press the card down to seat the connectors.
4. Insert the two M2.5x6 screws that hold the GSC card to the adapter fixture and screw them into place.
5. Insert the two M2.5x5 screws that hold the card to the front panel expansion plate and screw them into place.

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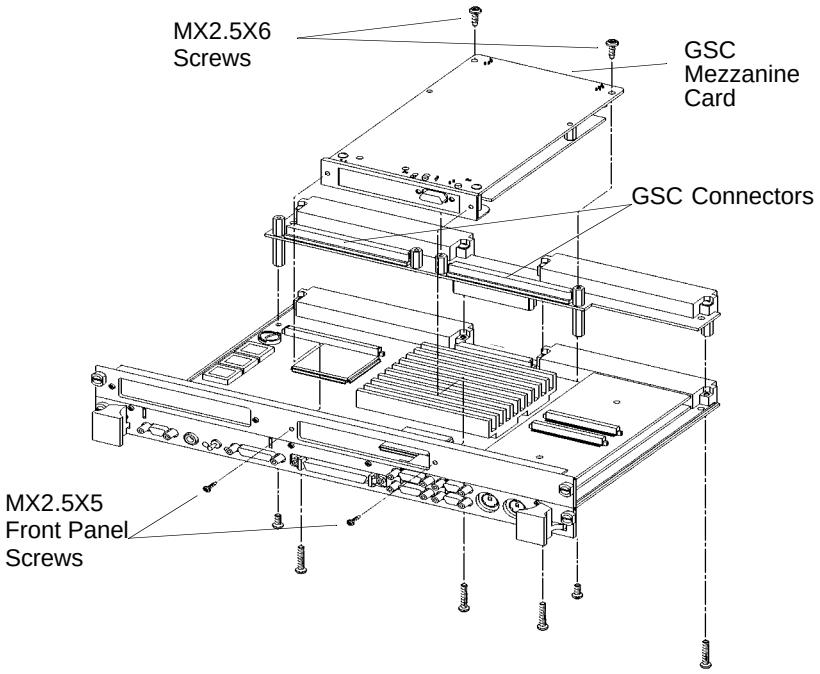


Figure 2-4 Installing a GSC Mezzanine Card (Exploded View with Adapter)

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PMC Bridge Adapter and Expansion Adapter

This section provides step-by-step instructions for installing the PMC bridge and expansion adapters onto the Model 744 board computer. When the PMC bridge adapter is installed onto the Model 744, the result is a two-board assembly that is the installed into your VME card cage. When both the PMC bridge and expansion adapters are installed onto the Model 744, the result is a three-board assembly that is the installed into your VME card cage.

Preliminary Requirements

Perform the following steps before installing the adapters onto your Model 744 Board Computer:

1. If the Model 744 is already installed in your system chassis, you must remove it. See Chapter 3 of this book for instructions on removing and replacing the Model 744 Board Computer.
2. Place the Model 744 on a static-free mat on a clean, level surface.

PMC Bridge Adapter and Expansion Adapter Installation

1. Refer to your third party PMC card installation manual, and set any configuration switches or jumpers that may be required for your application.
2. On the PMC bridge adapter, at the sites where you will be installing the PMC card(s), remove the two screws that secure the bezel blank(s), and remove the blanks. See Figure 2-5.

NOTE: When installing a PMC card, ensure that the O-ring type gasket near the bezel remains in place.

3. Install the PMC card(s) onto the bridge adapter by aligning the front of the card with the front bezel, and on the rear of the card with the connectors and post. See Figure 2-5. There are four screws that secure the PMC card from the bottom of the bridge adapter.

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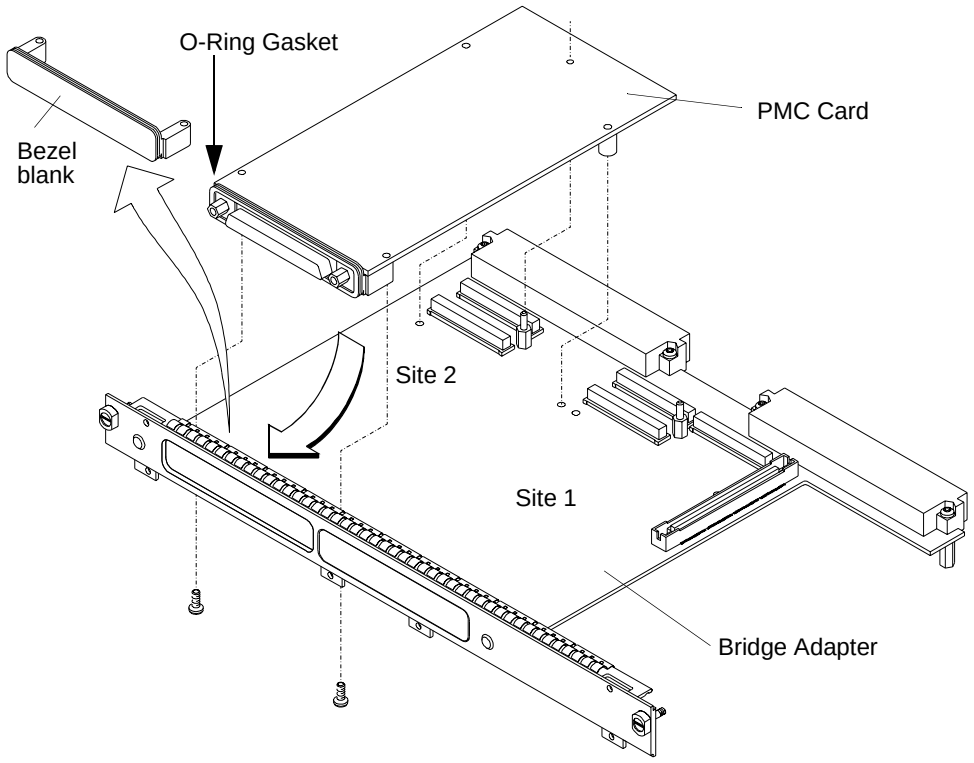


Figure 2-5 Installing a PMC Card onto the PMC Bridge Adapter

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4 Remove the copper EMI gasketing from the front panel of the board computer.

5 Install the PMC bridge adapter onto the board computer as shown in Figure 2-6. There are four screws that secure the front bezel, and four screws that secure the VME connectors.

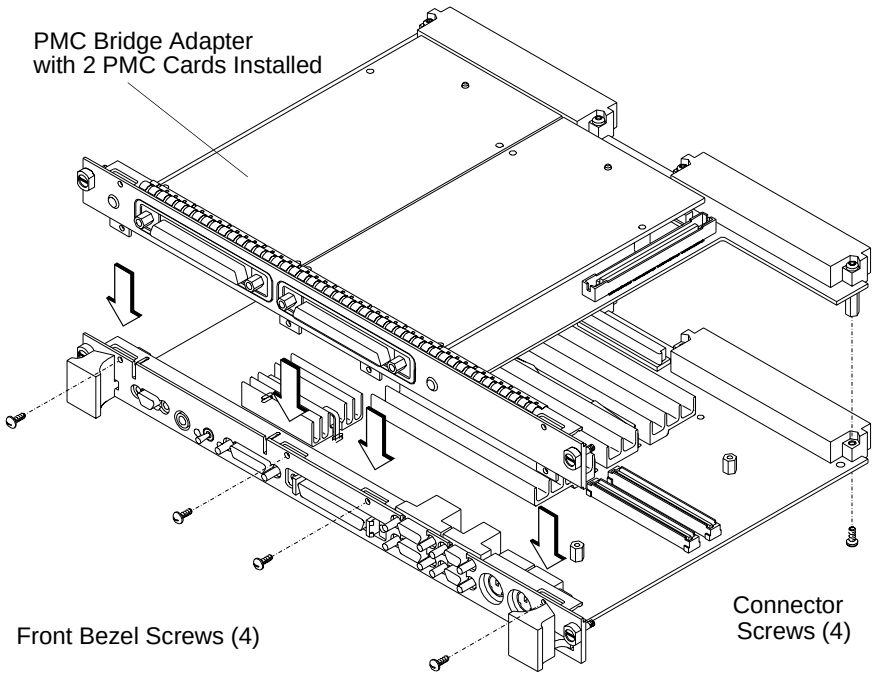


Figure 2-6 Installing the PMC Bridge Adapter onto the Board Computer

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6 If you are installing the PMC expansion adapter, refer to your third party PMC card installation manual, and set any configuration switches or jumpers that may be required for your application.

7 On the PMC expansion adapter, remove the bezel blank(s) from the sites where you will be installing the PMC card(s). See Figure 2-7.

NOTE: When installing a PMC card, ensure that the O-ring type gasket near the bezel remains in place.

8 Install the PMC card(s) onto the expansion adapter by aligning the front of the card with the front bezel, and onto the rear of the card with the connectors and post. See Figure 2-7.

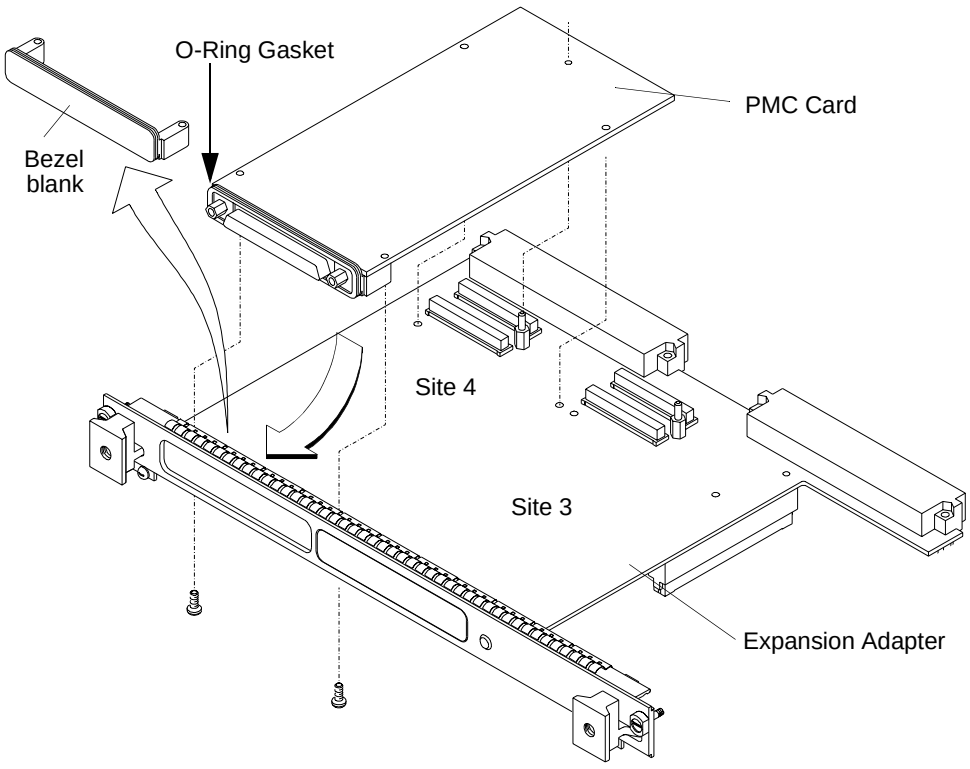


Figure 2-7 Installing a PMC Card onto the Expansion Adapter

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9 **Remove** the four screws from bridge adapter VME connectors, as shown in Figure 2-8.

10 Using a small screwdriver or razor, remove the copper EMI gasket on the front bezel of the bridge adapter, as shown in Figure 2-8.

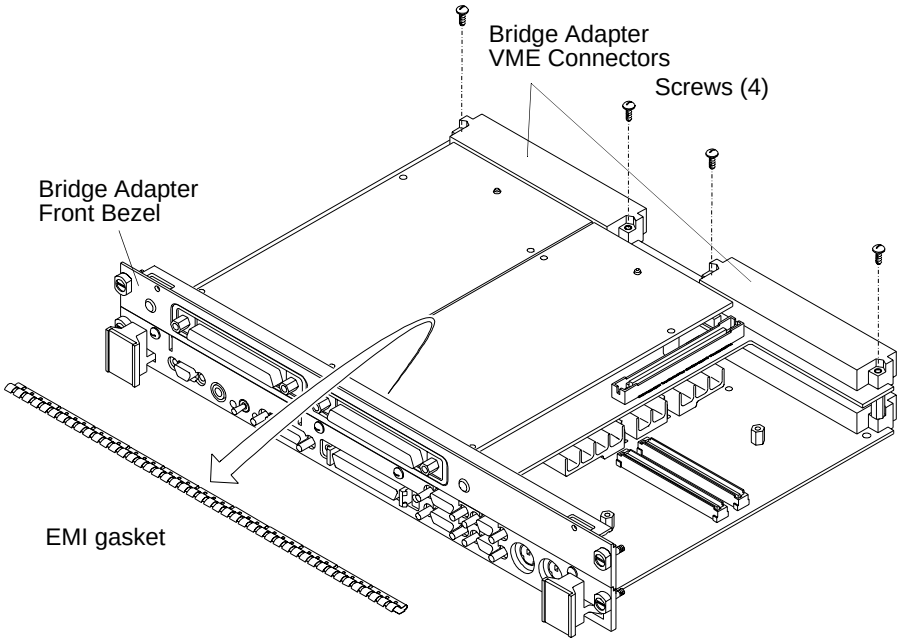


Figure 2-8 **Removing Bridge Adapter Screws and EMI Gasket**

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11 Screw the four threaded standoffs into the bridge adapter's VME connectors.

12 Making sure that the connector and bezels are properly aligned, install the PMC expansion adapter onto the bridge adapter, as shown in Figure 2-9. Ensure that the interboard connector seats properly by applying pressure to the top of the expansion board and to the bottom of the bridge board. You may have to remove memory cards to access the underside of the bridge board. There are two screws that secure the front bezel, four standoffs between the VME connectors, and four screws to secure the VME connectors.

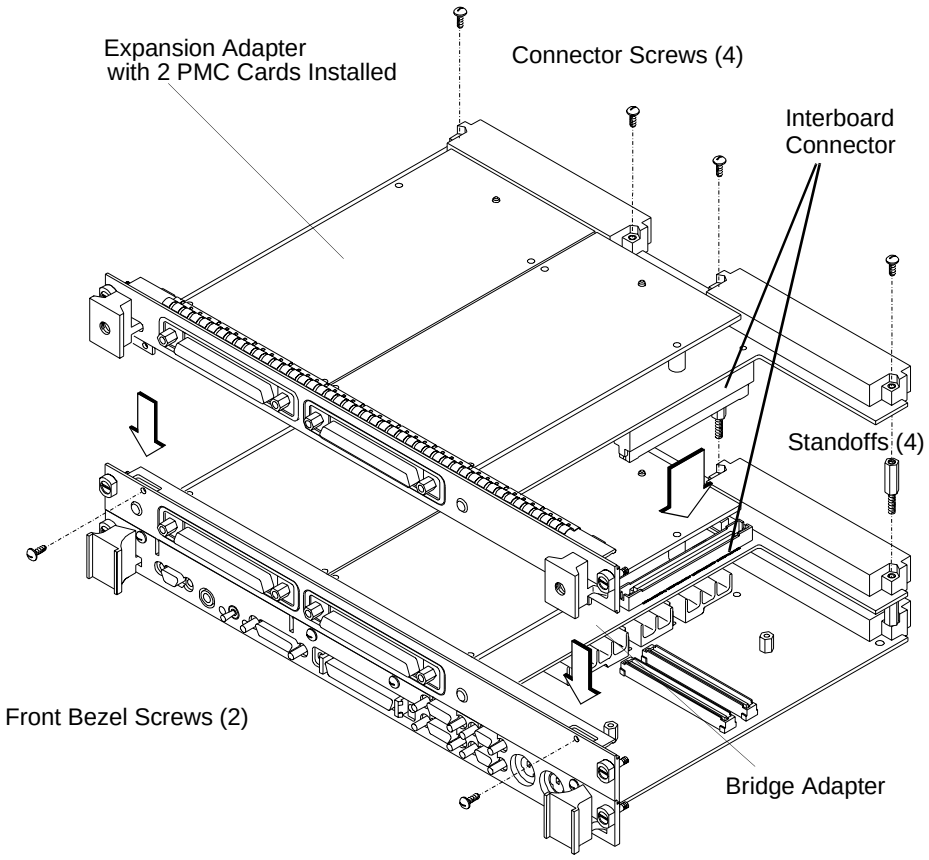


Figure 2-9 Installing the Expansion Adapter onto the Bridge Adapter

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13 If you have installed a PMC expansion adapter, resulting in a three board assembly, we recommend that you install the ejector handle sleeves included in your kit. The procedure is as follows:

a Remove the logo and model labels from the ejector handles on your board computer, as shown in Figure 2-10.

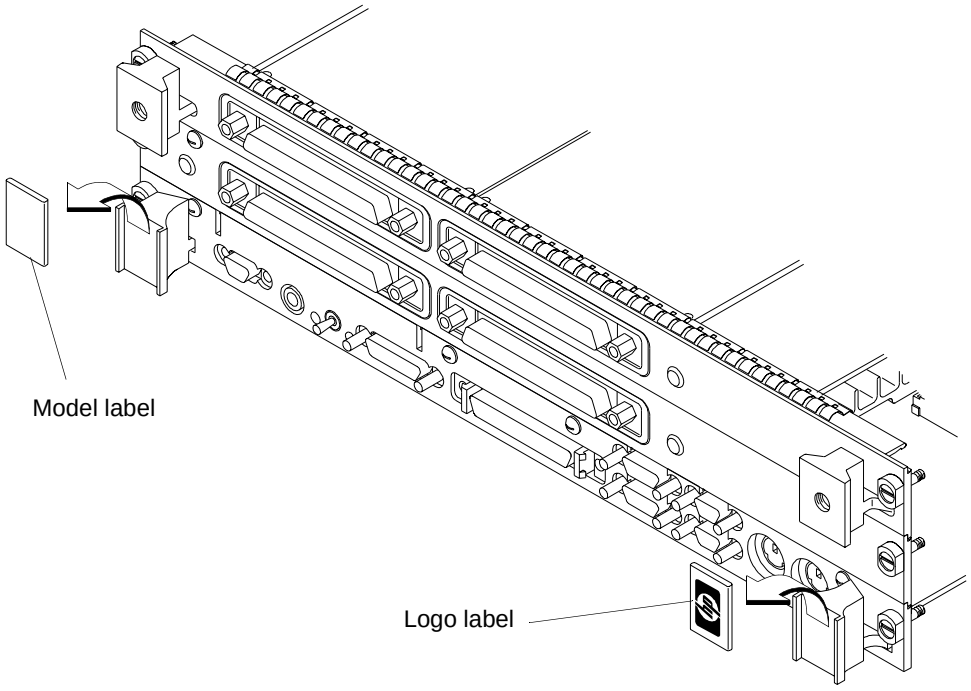


Figure 2-10 Removing Ejector Handle Labels

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b Slide the sleeves over each set of handles, as shown in Figure 2-11.

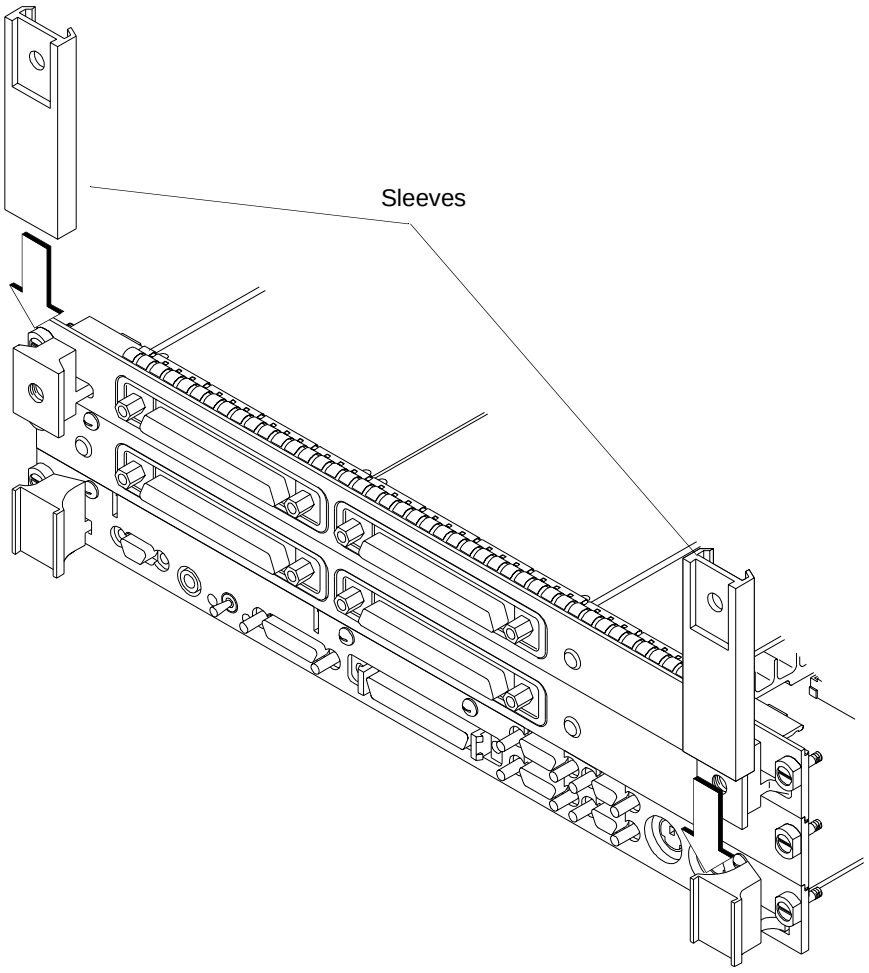


Figure 2-11 Installing Ejector Handle Sleeves

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c Thread the springs included in the kit into the ejector handles on the PMC expansion board, and with the springs compressed, slide the labels from the Model 744 Board Computer into the sleeves, as shown in Figure 2-12.

NOTE: To properly identify the board computer model and manufacturer, we strongly advise that the original labels from the board computer be placed into the ejector handle sleeves.

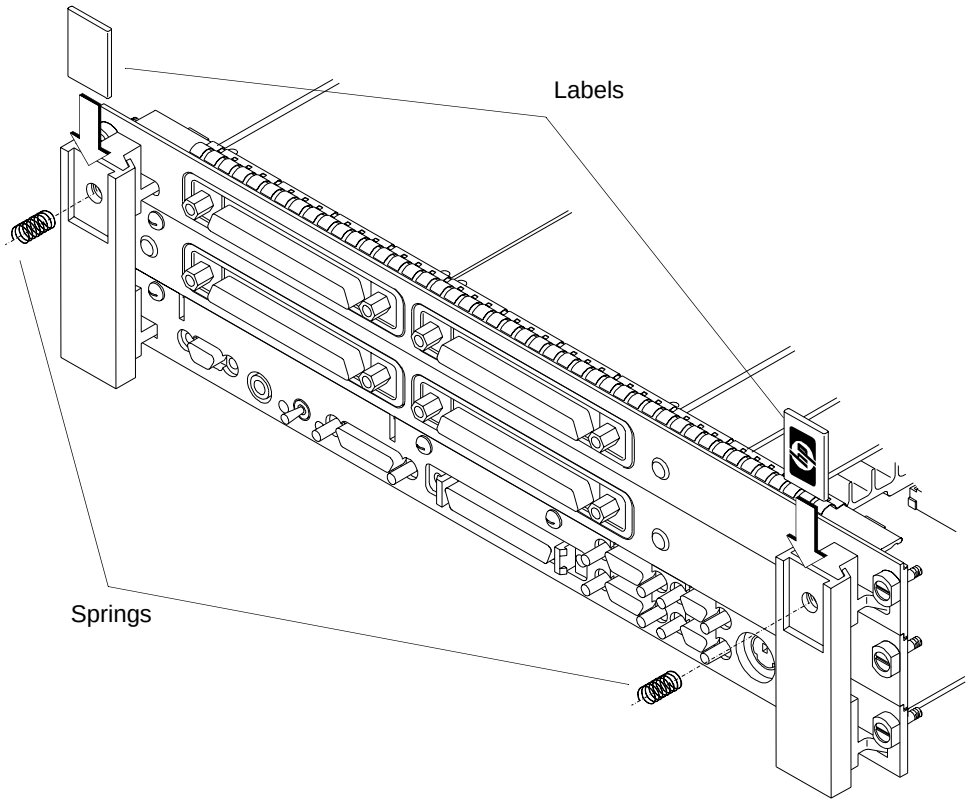


Figure 2-12 Installing the Springs and Labels

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14 Remove the VME slot cover plate(s) from the VME card cage, as required to open the slots the new assembly will occupy.

15 Insert the Model 744 with the attached PMC adapter(s) into card cage slots until the they seat properly and the front panels are flush against the card cage.

CAUTION: Do not tighten any captive screws until you have started to thread *each* captive screw into its hole.

16 Engage all captive screws before tightening each screw of the board computer/PMC assembly. See Figure 2-13

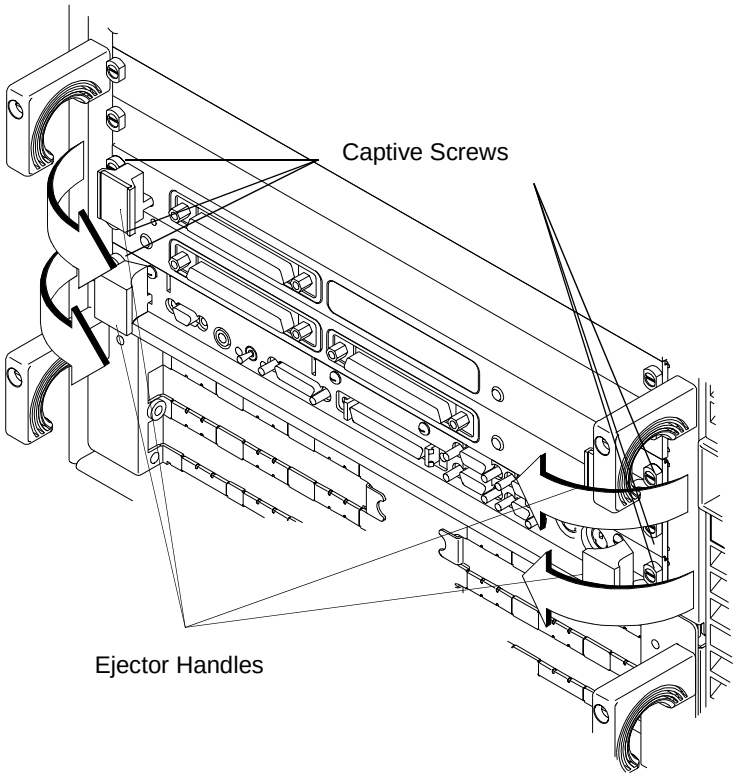


Figure 2-13 Installing the Board Computer with PMC into VME Card Cage

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17 Plug in the power cord(s), and then turn on the power for the VME card cage and boot the operating system.

18 Log in as **root** and use the **SAM** utility to configure the HP-UX kernel for PCI support. (PMC cards require PCI drivers in the kernel.)

19 When SAM has started, choose the `Kernel Configuration ->` menu.

20 From the Kernel Configuration menu, choose `Drivers`

21 From the Drivers menu, select `GSCtoPCI Driver.`

22 Go to the `Actions` menu and select `Create a New Kernel.`

23 When the new kernel is built, SAM asks if you want to move the kernel into place and reboot. Choose **Yes.**

The system reboots with the PCI driver loaded.

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3

Typical Installation in a VME Card Cage

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This chapter describes the Model 744 Board Computer and tells you how to install it.

The instructions in this chapter assume you are using either the HP-UX or HP-RT operating system.

The major sections within this chapter are:

- Configuring the VME Card Cage
- Keyboard and Mouse
- Board Computer Installation
- Non-HP Installation
- HP Installation (Other than in Primary CPU)
- Board Computer Removal

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Configuring the VME Card Cage

This section provides step-by-step instructions for configuring the VME card cage.

Use Table 3-1 to determine the configuration for the VME card cage.

Table 3-1 Determining the VME Card Cage Configuration

If your Model 744 Board Computer...	Then...
has an HP A4219A Expansion Kit attached, and will be installed in an HP 9000 Series 700 Model 748 VME System,	the Model 744 Board Computer must be installed in either: Slots 1 and 2; the bottom two slots Slots 3 and 4, or any other higher-numbered slot pair See the CAUTION text.
is single-board configured,	the VME card can be installed in any slot.
was removed from its VME card cage to change or add accessories,	see “Model 744 Installation” on page 3-8.
is going to be installed for the first time in a VME card cage,	follow the step-by-step instructions below.

CAUTION: In the Model 748 card cage, slots 1 and 2 are powered by the bottom power supply. Slots 3 through 8 are powered by the top power supply. A Model 744 Board Computer with its expansion kit attached, installed in slots 2 and 3, will cause the power supplies to shut down.

To determine the board computer’s power needs, follow these instructions:

1 Determine the board computer’s current requirements from the Computer Current Requirements Worksheet (Table 3-4).

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2 To determine the maximum current usage of the Model 744 memory cards, either use Figure 3-1 and Table 3-2 (for Model 744/132L) or Table 3-3 (for Model 744/165L). You must work with the worst case power draw to correctly determine power usage. Determine worst case power draw by examining active memory bank configurations, using the following steps:

a Examine your memory card configuration, noting which size card is in each memory slot.

b The worst case active memory bank configuration depends on the slot position of the memory cards, and the size of the cards. The 32 MB memory card has two banks per card, and the 16, 64, and 128 and 256 MB cards each have only one memory bank per card.

- When 32 MB cards are used as a pair in memory slots 2 and 3 they can use three memory banks concurrently.
- When used as a pair in slots 0, 1, or 2, the 32 MB cards can have two active memory banks.
- The 16, 64, 128 and 256 MB cards each have only one memory bank that is active at any one time.

The worst case power draw is when your system has two 32MB cards in slots 2 and 3 (these banks would be considered active, all other memory cards/banks would be considered inactive). The next worst case is a 256 MB card in any slot (all other memory cards in the system would be inactive), followed by a 64 MB card in any slot (all other memory cards in the system would be inactive), followed by two 32 MB cards in slots 0, 1, or 2 (all other memory cards in the system would be inactive), followed by a 128 MB card in any slot, and finally a 16 MB card in any slot (all other memory cards in the system would be inactive).

c Inactive memory banks are those banks on cards in your configuration in addition to the worst case active memory banks, and must also be added to the calculation.

d Fill in the information in Table 3-2 or Table 3-3.

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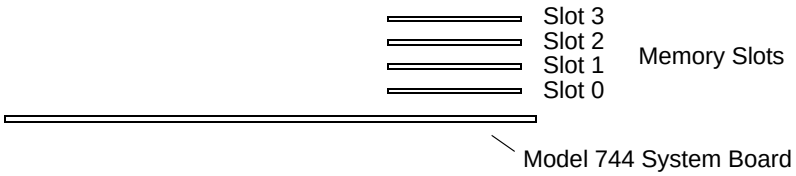


Figure 3-1 Model 744 Memory Slots

Table 3-2 Model 744/132L Memory Card Current Usage Worksheet

Memory Card Size	First Active Bank[1]	Second Active Bank	Third Active Bank	Inactive Banks	Totals (+5V)
32 MB[2]	1.15 A	1.15 A	1.15 A	0.05A x ___	_____
64 MB	2.6 A	N/A	N/A	0.1 A x ___	_____
128 MB	1.45A	N/A	N/A	0.07 A x ___	_____
16 MB	1.15 A	N/A	N/A	0.05A x ___	_____
256 MB	2.90 A	N/A	N/A	0.14 A	_____
Total memory current					_____

[1] Choose the worst case active bank(s) for your calculation.

[2] Slot positions and amount of 32MB cards determine the number of active banks.

Table 3-3 Model 744/165L Memory Card Current Usage Worksheet

Memory Card Size	First Active Bank[1]	Second Active Bank	Third Active Bank	Inactive Banks	Totals (+12V)	Totals (+5V)
32 MB[2]	0.53 A (+12V)	0.53 A	0.53 A	0.023A x ___	_____	
64 MB	1.2 A (+12V)	N/A	N/A	0.05 A x ___	_____	
128 MB	1.45 A (+5V)	N/A	N/A	0.07 A x ___		_____
16 MB	0.53 A (+12V)	N/A	N/A	0.023A x ___	_____	
256 MB	2.90 A	N/A	N/A	0.14 A		_____
Total memory currents					_____	_____

[1] Choose the worst case active bank(s) for your calculation.

[2] Slot positions and amount of 32MB cards determine the number of active banks.

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Table 3-4 Model 744 Current Requirements Worksheet

Each Model 744 Board Computer	+5V dc Amps	+12V dc Amps	-12V dc Amps
If 132 MHz, current for +5V dc is 4.7A [1] If 165 MHz, current for +5V dc is 6.3A	_____	0.1A	0.1A
RAM cards (see Table 3-2 or Table 3-3)	_____	_____	
Graphics subsystems [2] x 0.9A each =	_____		
FWD SCSI GSC card x 0.7A each =	_____		
HCRX graphics board 2.0A	_____		
PMC bridge adapter 0.6A	_____		
PMC cards on bridge adapter [3]	_____	_____	_____
Totals for Model 744 board computer	_____	_____	_____

1. Does not include on-board graphics, if installed.
2. On-board graphics and graphics accessory cards are each separate graphics subsystems.
3. PMC cards may also draw +3.3 current that is provided through the +5 on the bridge adapter. The **+3.3 current** FOR ALL PMC CARDS ON THE BRIDGE ADAPTER AND EXPANSION ADAPTER (do not include other expansion adapter currents) must be entered into the +5 column after multiplying the +3.3 current by .75 to convert to the actual +5 current draw.

3 Verify that your VME card cage has sufficient power to meet the total power needs of the Model 744 from Table 3-4.

4 Shut down your VME application and power off the VME card cage.

If your VME card cage backplane is autoconfiguring, see “Model 744 Installation” later in this chapter. If not, refer to your VME card cage documentation for configuring the VME backplane. Go to Step 5.

5 Ensure the backplane IACK and Bus Grant (0, 1, 2, and 3) daisy-chains are:

- Enabled from the previous slot(s) into the slot in which the Model 744 will be installed.
- Passed through all other empty backplane slots.

6 Set the backplane switches/jumpers to enable the Model 744 operation.

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Keyboard and Mouse

This section provides step-by-step instructions for connecting a keyboard and mouse to your Model 744.

1 Unpack your new keyboard and place it near your Model 744.

2 Plug the keyboard cable connector into your Model 744 at the PS/2 connector labeled **PS/2 0 Kbd**.

NOTE: The keyboard must be connected to PS/2 0 to be operational.

3 Unpack your new mouse and locate the mouse's black rubber ball in the mouse box.

4 Remove the ball plate from the bottom of the mouse. Insert the ball and replace the ball plate.

5 Plug the mouse cable connector into your Model 744 at the PS/2 connector labeled **PS/2 1**.

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Model 744 Installation

Tools Required

Model 744 installation requires the following tools:

Tool	Used For
Static grounding wrist strap (supplied with the installation kit)	Preventing static discharge problems
No. 1 Pozidriv screwdriver	Attaching accessory cards
5 mm (3/16 inch) nutdriver	Attaching accessory cards
Light-duty flat-tipped screwdriver	Attaching accessory cards

Preliminary Requirements

Perform the following procedure before you install the board computer into the VME card cage:

1 Read the steps in “Configuring the VME Card Cage,” earlier in this chapter.

Installing a Single-Slot Model 744 into an HP Card Cage

Follow these steps to install the Model 744 into the VME card cage:

1 Position the board computer at the desired slot and slide it into the card cage until it seats properly and the front panel is flush against the card cage.

2 Push both ejector levers in until they are flush with the front panel.

3 Engage and tighten the captive screws (labeled 1 and 2 in Figure 3-2) at each end of the board computer. These screws hold the computer in the VME card cage.

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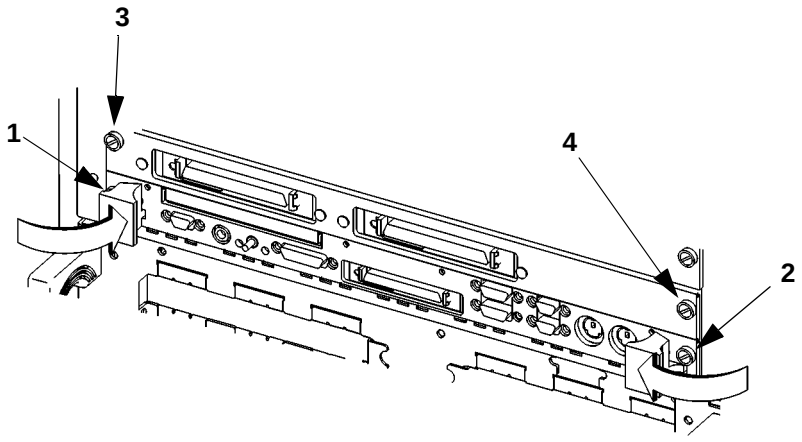


Figure 3-2 **Board Computer Captive Screws**

Installing a Dual-Slot Model 744

1 Put the Model 744 at the desired slot. Position and slide it into the card cage until it seats properly with the front panel and front panel extension flush against the card cage.

2 Engage all captive screws (labeled 1 and 2, 3 and 4, in Figure 3-2) before tightening each screw of the Model 744 and the extension panel(s).

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Non-HP Installation

The Model 744 Board Computer's P2 connector has a local bus on user-defined pins. Verify that your VME card cage backplane makes no connections to J2/P2, rows A and C.

Refer to Chapter 7 of IEEE STD 1014-1987 for more information on user-defined pins used in VME backplane connectors.

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HP Installation (Other Than Primary CPU)

The Model 744 Board Computer's P2 connector has a local bus on user-defined pins. The VME slot used by the Model 744 must make no connections to J2/P2, rows A and C.

Refer to IEEE STD 1014-1987, Chapter 7, for more information on user-defined pins used in VME backplane connectors.

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Model 744 Removal

Tools Required

Model 744 removal requires the following tools:

Tool	Used For
Static grounding wrist strap	Preventing static discharge problems
Light-duty flat-tipped screwdriver	Loosening card cage screws

Preliminary Requirements

Perform the following procedure before you remove the board computer from the VME card cage:

1 Read the steps in “Turning Off the System,” in Chapter 5.

Removing a Model 744

Follow these steps to remove the Model 744 from a VME card cage:

1 Loosen the captive screws at each end of the board computer that hold the computer in the VME card cage (in Figure 3-3, the screws are labeled 1 and 2 for a single-slot board computer, or 1 through 4 for a dual-slot board computer).

2 Pull both ejector levers out until the board ejects from the card cage.

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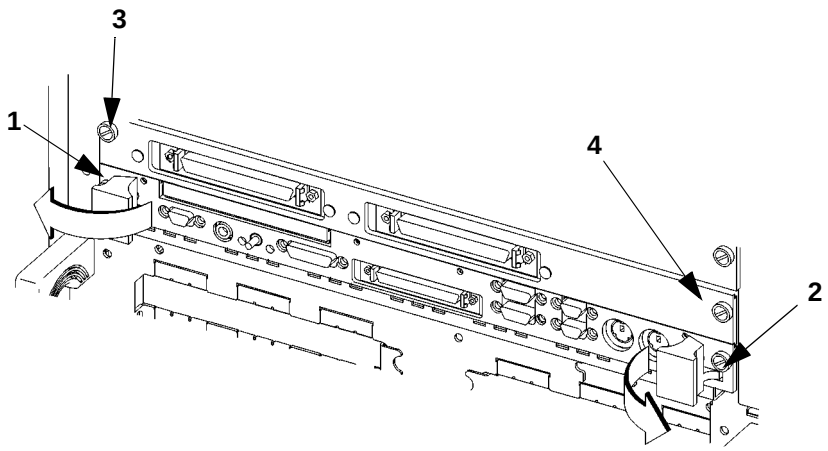


Figure 3-3 Board Computer Captive Screws

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4

Cables

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Cables

This chapter describes the various cable connections you will make when installing the Model 744 Board Computer.

The instructions in this chapter assume you are using either the HP-UX or HP-RT operating system.

The major sections within this chapter are:

- Connecting a Single Monitor, Multi-Display System, or Text-Only Terminal
- Audio Connection
- Video Connection
- Keyboard and Mouse Connections
- Network Connection
- Printer Connections
- SCSI Connection

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Introduction

This chapter discusses connecting cables to one of the following ports on your Model 744 Board Computer from a peripheral or accessory:

- Text terminal (RS-232) connection
- An audio connection
- A video (graphics circuit) connection
- A keyboard or mouse (PS/2 ports) connection
- A Network (AUI LAN) connection
- Printer (HP parallel and RS-232) connections
- A SCSI port connection

Figure 4-1 shows the front panel connectors for the Model 744.

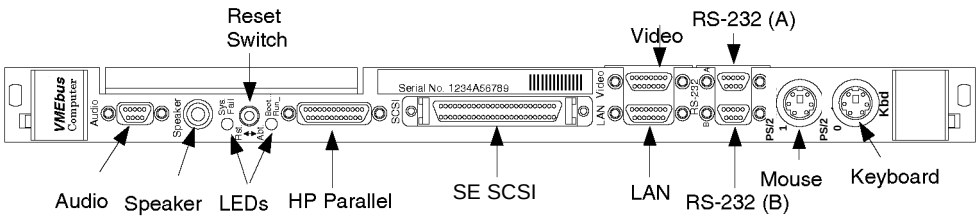


Figure 4-1 Model 744 Front Panel Connectors

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Connecting a Single Monitor, Multi-Display System, or Text-Only Terminal

The Model 744 typically uses one of two types of display:

- CRT-based color monitor connected to a video port
- Terminal connected to a serial port

Depending on your operating system, the Model 744 supports a maximum of four monitors at the same time. For more information on connecting multiple monitors to your Model 744, see “Multi-Display Systems,” later in this chapter. (HP-RT supports only one monitor at a time.)

Configuration Requirements

This section provides information on configuration requirements and step-by-step instructions for connecting one or more display devices to your Model 744.

Monitors

If your board computer does not have on-board graphics, it must have a PMC bridge adapter and an HP A4979 PMC graphics card installed. For instructions on installing a PMC bridge adapter and HP A4979A graphics card refer to Chapter 2 of this guide.

NOTE: Monitors are supplied with a video cable. Use this cable either directly or with the conversion video cable, depending on what graphics capability you have installed.

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Table 4-1 lists the video conversion cables required to connect a monitor to a video connector.

Table 4-1 Monitor Conversion Cables Required

Graphics Type	Cable Type from Monitor	
	Standard 15-pin connector	EVC connector
On-board graphics	A4223A	A4305A

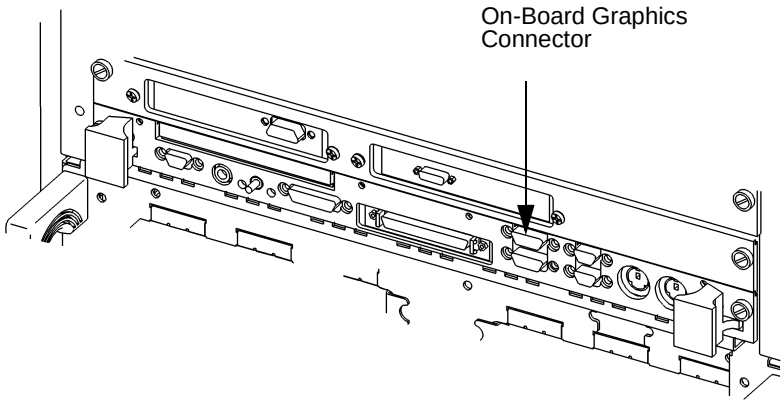
Multi-Display Systems

HP-UX 10.20 ACE and later supports up to four monitors simultaneously. See the *Graphics Administration Guide* (B2355-90109) for more information about setting up multiple displays.

Connecting the Monitor

This section provides step-by-step instructions for connecting a monitor to your Model 744 Board Computer with on-board graphics or PMC graphics. Refer to Figure 4-2 for help when connecting your monitor.

CAUTION: Some CRT-based monitors are heavy. Use caution when lifting and unpacking the monitor.



Note: On-board connectors require conversion cable.

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Figure 4-2 **Connecting a Monitor**

1 Plug the small connector of the conversion video cable into the video connector of your board computer.

2 Connect the monitor cable to the conversion cable.

3 Connect the monitor cable to your monitor as follows:

- Red to R (RED)
- Green to G (GREEN)
- Blue to B (BLUE)

Power Cord

If your monitor has an attached power cord, connect the plug to a power source. If your monitor has a separate cord, connect the cord to the monitor, then connect the plug to a power source.

WARNING: **Do not connect your monitor to a power extension strip. Doing so can cause a shock hazard.**

NOTE: Do not turn on your monitor at this time.

Connecting a Terminal

This section provides step-by-step instructions for connecting a terminal to your Model 744 Board Computer. Refer to Figure 4-3.

1 Using the HP A4301A conversion RS-232C Cable, plug its micro-miniature connector to one of the RS-232 connectors as follows:

- The recommended port for connecting a terminal is the (A) port.
- Using the (B) port for terminal connection is not recommended.

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NOTE: Use of the (B) port requires that VME Services software be installed in the kernel under HP-UX. The (B) port *is not* supported during "cold installs" of HP-UX because VME Services is not installed in the "install kernel".

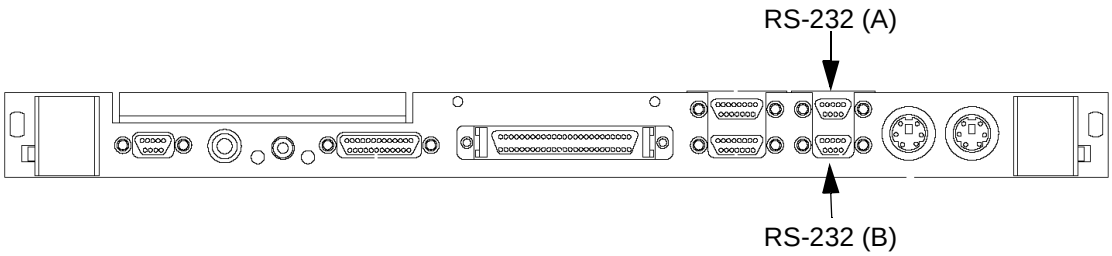


Figure 4-3 Connecting a Terminal to the RS-232 Ports

2 Plug the standard end of the conversion cable into the appropriate connector of RS-232 serial cable HP 24525G.

3 Plug the other end of the serial cable into the serial connector on the terminal.

Once you have connected and powered on your terminal and board computer, you may need to reconfigure your board computer for the terminal to be the console (see Appendix A).

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Audio Connection

Model 744 Board Computers provide compact disc-quality audio input and output in stereo with a 16-bit coder-decoder (CODEC) over a frequency range of 25-20,000 Hz. Output is provided by a small internal speaker and a stereo headphone mini-plug (8 ohms impedance). Input is provided by a stereo line-in and mono microphone mini-plugs.

The CODEC combines CD quality stereo A/D converters for microphone and line input levels. D/A converters for driving headset and line outputs are used. The input sampling rate and format are programmable, as are the input gain control (used for software control of recording levels) and output attenuation.

A $^{1}/_{8}$-inch mini-jack is used for the speaker out connection. The other audio signals are on a 9-pin micro D-sub connector. The output is capable of driving 8 ohms; it can also be used for higher impedance devices with little or no additional distortion. A line-level input can be driven by the headset output.

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Table 4-2 lists the audio specifications, Figure 4-4 shows the audio connector, and Table 4-3 shows the audio connector pinouts.

.

Table 4-2 Audio Specifications

Function	Range
Headphone maximum output level	2.75 V pp at 50 ohms
Input sensitivity	Line in, 2.0 V pp at 47 K ohms microphone, 22 mV at 1 K ohm
Programmable input gain	0 to 22.5 dB in 1.5 dB steps
Programmable output attenuation	0 to 96 dB in 1.5 dB steps
Programmable rates	8, 11.025, 16, 22.05, 32, 44.1, 48 KHz
Signal to noise ration	Headphone, 61 dB Line in, 61 dB Microphone, 57 dB

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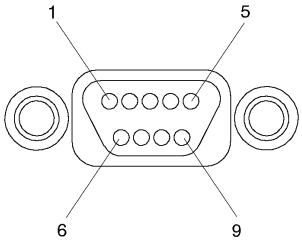


Figure 4-4 Audio Connector

Table 4-3 Audio Connector Pinouts

Pin Number	Signal
1	Mic GND
2	Line-in left
3	Line-in right
4	Headset right
5	Headset left
6	Mic-in A
7	Mic-in B
8	Line-in GND
9	Headset GND

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Video Connection

Model 744 Board Computers with on-board graphics circuit have the display RAM and can be configured for several types of monitors. Graphic monitors connect to the 15-pin video connector. Figure 4-5 shows the video connector, and Table 4-4 shows the video connector pinouts.

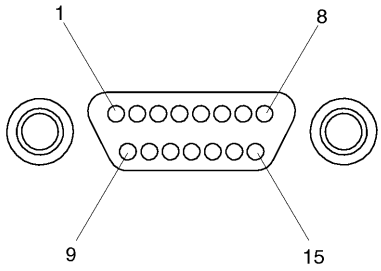


Figure 4-5 Video Connector

Table 4-4 Video Connector Pins and Signals

Pin Number	Signal	Pin Number	Signal
1	DDC	9	GND
2	GND	10	HSYNC
3	RED	11	+5V
4	GND	12	GND
5	GREEN	13	SSYNC
6	GND	14	GNC
7	BLUE	15	VSYNC
8	GND		

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Keyboard and Mouse Connections

There are two PS/2 style serial ports: one PS/2 keyboard port and one PS/2 mouse port. In the Boot Console Handler's hardware menu, they are listed as PS/0 and PS/1. Figure 4-6 shows the PS/2 connector. Also refer to Figure 4-1; the two ports on the right, labeled Mouse and Keyboard.

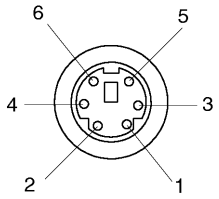


Figure 4-6 **PS/2 Connector**

Table 4-5 shows the PS/2 connector pinouts.

Table 4-5 **PS/2 Connector Pinouts**

Pin Number	Signal
1	Data
2	Not used
3	GND
4	+5
5	Clock
6	Not used

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Network Connection

LAN circuits use the Ethernet/IEEE 802.3 standard interface. Only the Attachment Unit Interface (AUI) version is used; no BNC connector is provided for ThinLAN. Figure 4-7 shows the AUI LAN connector. Also refer to Figure 4-1.

The AUI connector enables connections to an external MAU.

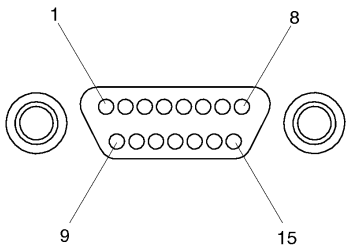


Figure 4-7 AUI LAN Connector

Table 4-6 shows the AUI LAN connector pinouts.

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Table 4-6 AUI LAN Connector Pinouts

Pin Number	Signal
1	GND
2	CI-A
3	DO-A
4	DI-S (GND)
5	DI-A
6	GND
7	CO-A (NC)
8	CO-S (NC)
9	CI-B
10	DO-B
11	DO-S (GND)
12	DI-B
13	+12V
14	GND
15	CO-B (NC)

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Printer Connections

Preparing for HP-UX Installation

You may have to do some configuration for appropriate data interchange with a new printer. This section 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 performs 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 use HP-UX commands directly to accomplish the same tasks. For information on using manual system administration procedures, see *HP-UX System Administration Tasks*.

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 to have this reference information available during the software installation process. In the following checklist, fill in the items relevant to your printer:

Printer Interface

- Parallel:_____
- 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):_____

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Printer Cables

For connection to the board computer high-density parallel port, depending on what printer you have and whether you select parallel or serial data exchange, you will need to select from the following:

- HP A4300A (HP Parallel): high-density 25-pin to standard 25-pin “F”
- HP A4301A (Serial): 9-pin high density to standard 9-pin “M”

Other standard cables may be required, depending on the selected printer.

Installation Procedure

Follow these steps to install your printer:

1 Log in as **root**. If you do not know how, or do not have permission to log in as root, ask your system administrator for help.

2 Run SAM by typing the following command:

/usr/sbin/sam Enter

If you need help using SAM, press the **F1** key to obtain context-sensitive information for the object at the location of the cursor.

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 the following:

```
Printers and Plotters
```

4 Choose **Printers/Plotters** from the next screen.

The system displays a message if there are no printers connected to your system. 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 the following:

```
Add Local Printer/Plotter
```


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6 Choose an appropriate selection on the sub-menu giving options for Parallel, Serial, HP-IB, and so on.

   A screen provides you with the information on available parallel or serial interfaces.

7 If you chose **`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 your printer is connected.

8 Choose **OK**.

   A display opens for **`Add Local Printer/Plotter`**.

9 Choose the box labeled **`Printer Name`** and enter your printer name for the new printer (see "Printer Interface," earlier in this chapter).

10 Choose **`Printer/Model Interface`**.

11 Use the arrow keys to scroll down the next screen. Find the Model Name of your printer. Choose **OK** or press **Enter** when your printer is highlighted.

12 In the **`Add Local Printer/Plotter`** display, select and choose the box labeled:

```
Make this the system default printer
```

13 Choose **OK**.

14 If the print spooler was not previously running, a screen appears with the question: **`Do you want to start the print spooler now?`** Choose **Yes** or press **Enter**.

15 The system displays 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**.

16 The system displays the message **`Task completed`**. Press **Enter**.

17 Exit the task and press the **Exit SAM** function key.

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18 Enter the following to exit root and return to user status:

exit Enter

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) is not listed as the default system printer, enter the following command to test it:

lp -d*printername* **.profile Enter**

The file named **.profile** should print out on your new printer.

NOTE: For information on printer-related problems, see Chapter 6 of this book.

HP Parallel

The parallel port is compatible with Centronics® standards, plus some additional features found in HP Series 700 workstations. It supports a bi-directional register model interface in addition to printer-only DMA. Series 700 Scanjet interfaces are not supported.

A high-density micro D-sub connector is used for the HP Parallel interface. An HP A4300A conversion cable is required to convert to a standard PC compatible 25-pin female D-sub cable.

Figure 4-8 shows the HP parallel connector. Also refer to Figure 4-1.

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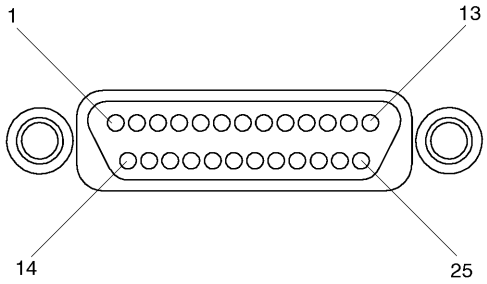


Figure 4-8 HP Parallel Connector

Table 4-7 shows the connector pinouts for the HP parallel connector.

Table 4-7 HP Parallel Connector Pinouts

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal
1	NSTROBE	10	NACK	19	GND
2	Data 0	11	BUSY	20	GND
3	Data 1	12	PE	21	GND
4	Data 2	13	SLCT	22	GND
5	Data 3	14	NAFD	23	GND
6	Data 4	15	NERROR	24	GND
7	Data 5	16	NINIT	25	GND
8	Data 6	17	NSCT IN		
9	Data 7	18	GND		

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RS-232 Port A

There are two PS/2 type serial interfaces - Port A and Port B. The serial ports use a high-density connector. An HP A4301A conversion cable is required to convert to a standard PC-compatible 9-pin male D-sub cable. Figure 4-9 shows the RS-232 serial connector. Also refer to Figure 4-1. Table 4-8 shows the RS-232-C connector pinouts.

NOTE: The RS-232 Port B is not functional until VME services are operational.

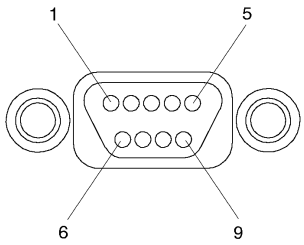


Figure 4-9 RS-232 Serial Connector

Table 4-8 RS-232-C Connector Pinouts

Pin Number	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

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SCSI Connection

The built-in SE SCSI port is implemented using an NCR710 macrocell inside the I/O ASIC chip. This 8-bit single-ended implementation is compatible with the current Series 700 products and supports 5 MB/sec data transfer rates.

The SCSI bus is terminated to 3.3 volts through 127 Ohms on the system board. If the board computer is used in a VMEbus chassis having internal mass storage devices, those devices must have their terminators removed. If an external disk drive is used, an active terminator must be used on the last drive's uncabled connector.

Figure 4-10 shows the SCSI connector.

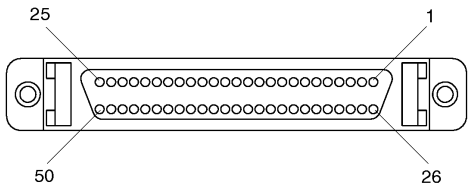


Figure 4-10 SCSI Connector

Table 4-9 shows the SCSI connector pinouts.

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Table 4-9 SCSI Connector Pinouts

Pin Number	Signal	Pin Number	Signal	Pin Number	Signal
1	GND	21	GND	41	ATN
2	GND	22	GND	42	GND
3	GND	23	GND	43	BSY
4	GND	24	GND	44	ACK
5	GND	25	GND	45	RST
6	GND	26	DATA 0	46	MSG
7	GND	27	DATA 1	47	SEL
8	GND	28	DATA 2	48	CD
9	GND	29	DATA 3	49	REQ
10	GND	30	DATA 4	50	IO
11	GND	31	DATA 5		
12	GND	32	DATA 6		
13	NC	33	DATA 7		
14	GND	34	Data Parity		
15	GND	35	GND		
16	GND	36	GND		
17	GND	37	GND		
18	GND	38	+5		
19	GND	39	GND		
20	GND	40	GND		

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5

Powering On and Off

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This chapter discusses how to turn on and turn off the system.

The instructions in this chapter assume you are using the HP-UX or HP-RT operating system.

The major sections within this chapter are:

- Turning On the System
- Turning Off the System

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Turning On the System

To turn on the system, perform the following, with all peripheral devices turned off:

1. Turn on the power to your display. The power indicator LED on the display unit shows that it is turned on, even if the screen remains dark. Make sure of the following:
   - For systems using a graphics display, there must be a keyboard connected (the monitor will not initialize if no keyboard is present).
   - The appropriate LAN connection has been made to the Model 744.
   - If you use a remote graphical display host connected via LAN, make sure the remote system is configured to host the board computer. Normally, you will use a character terminal connected to the RS-232C (Port A) on the board computer.
2. Check the SCSI connections and power on any peripheral devices.
3. Turn on the VMEbus chassis. Your Model 744 system turns on with the VMEbus chassis that it is plugged into.

NOTE: If your Model 744 does not have on-board or supplementary graphics, the default console display is available through the RS-232C (Port A).

If there is a problem arising from the console path having been changed, you can boot your Model 744 to display on any console device. See “Configuring the Console Path and Display Format” and “Using the Emergency Interactive Console Search” in Appendix A.

The green LED (on the right) on the panel blinks slowly until the OS is booted; then remains *on*. The red LED (on the left) will be *on* when power is activated and before HP-UX boots. After VME services is booted, the red light is off.

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4 The system displays a sequence of boot messages. The Model 744 boots from the host system unless it has its own external disk or another LAN-configured system from which to boot. See Appendix A for configuring an automatic boot selection. Otherwise, allow the boot to continue.

NOTE: The remaining steps apply for HP-UX. If you are using HP-RT, refer to *HP-RT System Administration Tasks* for information on booting an HP-RT system.

5 During the boot process, a new system displays 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 the following after you log in as root:

set_parms initial Enter

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 address, 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 address 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 determine your IP address by entering **nslookup *host_name***, at the system prompt.

6 The system prompts you to set a root password at this time.

The system completes the boot sequence and displays the following prompt:

```
Console login:
```


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Turning Off the System

This section provides step-by-step instructions for powering down your Model 744.

CAUTION: If you have a local disk attached to the Model 744, do not turn off power to the system without first shutting down the 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 shut-down process to completion first.

1 Exit all processes currently running.

2 Enter the following command to bring the system to a halted state

reboot -h

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

3 After completing several shutdown procedures, the system eventually displays one of the following messages:

HP-UX Message

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

HP-RT Message

```
**** HP-RT OS is down ****
Halting (in tight loop) -- OK To Hit Reset Button
```

4 At this time the system no longer responds to keyboard input and you may turn off the power. Turning the system back on initiates the boot sequence.

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

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

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Using SAM to Stop the HP-UX System

If you are using SAM, you might also want to use it to shut down your system.

CAUTION: If you are using a local disk with the Model 744, do not turn off power to your system without first shutting down the 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.

Follow these steps to use SAM to shut down your system.

1 Log in as root and type the following command, followed by **Enter**:

/usr/bin/sam

2 Choose **`Routine Tasks`** from the opening menu.

3 Choose **`System Shutdown`**.

4 The system provides you with the following choices:

- Halt the system. All currently executing processes except those essential to the system are terminated. Then the system is halted.
- Reboot (restart) the system. The system is shut down and rebooted automatically.
- Go to **`Single User State`**. The system is put in single-user mode for administrative purposes such as backup or file system consistency checks.

5 Exit SAM using the appropriate function key.

Using the Command Line

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

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6

Solving Problems

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This chapter provides information on troubleshooting various problems.

The instructions in this chapter assume you are using the HP-UX operating system.

The major sections within this chapter are:

- Interpreting the LEDs
- Managing a Boot Failure
- Printer Problems

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Interpreting the LEDs

The Model 744 provides two LEDs, located to the left and right of the reset switch, as shown in Figure 6-1. The red LED is labeled SYSFAIL and the green LED is labeled POWER.

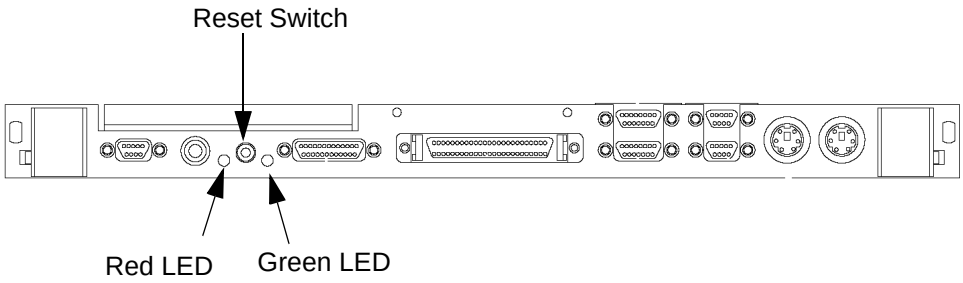


Figure 6-1 Model 744 LED Location

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Table 6-1 provides information on the red and green LEDs.

Table 6-1 LED Indicators

SYSFAIL (Red)	POWER (Green)	Meaning	Possible Solution
Off	Off	No Power	Check for board seating in chassis.
On	2Hz Flash	Normal Power-on/self-test	
On	Off	Memory Failure	Troubleshoot for failed RAM card or problem with the RAM connection.
On	1 Flash/sec.	CPU (board) Failure	Replace the system board.
On	4 Flash/sec.	No console identified	Check the console search path and keyboard connections. If no problem is found, replace the system board.
On	On	OS is booted with VME services failure	Check the Operating System VME services. Check that VME services is configured in the kernel.
Off	On	OS is booted with VME services OK	

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Managing a Boot Failure

The boot program is located in the firmware of your Model 744. You can configure the behavior of the boot process by interacting with the Boot Console Handler (BCH). See Appendix A for procedures dealing with the boot console handler.

Problems during the first stage of the boot process are rare. If you have indications that the boot process has failed, check the following items with the power to the system off:

- No power to the host system. Check the local circuit breakers and the power connections to your VMEbus chassis.
- The Model 744 is not fully plugged into its VME slot.
- The LAN MAU connector is loose.
- The SCSI cable is not properly connected.
- Proper connection of interface/option cards

After checking these items wait five or ten seconds and power on the system.

If the problem recurs, record the following information and report it to your HP service representative:

Symptoms

Status of the LED indicators

Messages that appear on your system console

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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 is not 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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A

The Boot Console Interface

This chapter describes the interface to the Boot Console Handler (BCH).

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Boot Console User Interface Features

There are times when you want to interact directly with the hardware of your single board computer **before** it boots the operating system. Your 744 system provides a menu-driven **boot console interface** that allows you to perform special tasks, display information, and set certain system parameters, even if the operating system is unavailable.

Here are some of the things you can do:

- Boot your workstation
- Search for bootable media
- Reset your workstation
- Display and set boot paths
- Display and set your monitor type
- Display memory configuration information
- Display the status of the EISA slots
- Set Auto Boot and Auto Search
- Set Fastboot
- Display LAN information
- Display system information
- Display PIM information
- Display and Set VME backplane networking
- Display and Set VME backplane boot ROM
- Display and Set the VME Chassis Codes Mode flag
- Restore the factory default VME configuration in the EEPROM

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The **boot console** menus follow, showing the various tasks you can perform and the information available.

The shortened version of all commands is indicated by the uppercase letters.

Help is available for all menus and commands by using either **help**, **he**, or **?** and the menu or command you want help on.

Main Menu

```
------ Main Menu ----------------------------------------
Command                          Description
-------                          -----------
BOot [PRI|ALT|<path>]            Boot from specified path
PAth [PRI|ALT|CON|KEY][<path>]   Display or modify a path
SEArch [DIsplay|IPL] [<path>]    Search for boot devices

COnfiguration [<command>]        Access Configuration menu/commands
INformation [<command>]          Access Information menu/commands
SERvice [<command>]              Access Service menu/commands
VME  [<command>]                 Access VME menu/commands

DIsplay                          Redisplay the current menu
HElp [<menu>|<command>]          Display help for menu or command
RESET                            Restart the system
------
Main Menu: Enter command >
```


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Configuration Menu

```
------ Configuration Menu -------------------------------------------
Command                              Description
-------                              -----------
AUto [BOot|SEArch] [ON|OFF]       Display or set specified auto flag
BootID [<proc>] [<boot ID>]       Display or modify processor boot ID
BootINfo                          Display boot-related information
BootTimer [0 - 200]               Seconds allowed for boot attempt
DEfault                           Set the system to predefined values
FastBoot [ON|OFF]                 Display or set boot tests execution
MOnitor [LIST|<path> <type>]      Change the current monitor type
PAth [PRI|ALT|CON|KEY] [<path>]   Display or modify a path
SEArch [DIsplay|IPL] [<path>]     Search for boot devices
SECure [ON|OFF]                   Set/show security mode
TIme [c:y:m:d:h:m:[s]             Read or set real time clock in GMT

BOot [PRI|ALT|<path>]             Boot from specified path
DIsplay                           Redisplay the current menu
HElp [<menu>|<command>]           Display help for menu or command
RESET                             Restart the system
MAin                              Return to Main Menu
------
Configuration Menu: Enter command >
```


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Information Menu

```
------ Information Menu ------------------------------------------
Command                   Description
-----------               -----------
ALL                       Display all system information
BootINfo                  Display boot-related information
CAche                     Display cache information
ChipRevisions             Display revisions of VLSI and firmware
COprocessor               Display coprocessor information
FwrVersion                Display firmware version
IO                        Dispay I/O interface information
LanAddress                Display built-in system LAN address
MEmory                    Display memory information
PRocessor                 Display processor information
WArnings                  Display selftest warning messages

BOot [PRI|ALT|<path>]     Boot from specified path
DIsplay                   Redisplay the current menu
HElp [<menu>|<command>    Display help for menu or command
RESET                     Restart the system
MAin                      Return to Main Menu
------
Information Menu: Enter command >
```

Service Menu

```
------ Service Menu -----------------------------------
Command                          Description
-------                          -----------
ChassisCodes [<proc>]            Display chassis codes
CLEARPIM                         Clear (zero) the contents of PIM
EepromRead [<addr>] {<len>]      Read EEPROM locations
MemRead <addr> [<len>] [a]       Read memory locations
PIM [<proc> [HPMC|TOC]]          Display PIM information

BOot [PRI|ALT|<path>]            Boot from specified path
DIsplay                          Redisplay the current menu
HElp [<menu>|<command>]          Display help for menu or command
RESET                            Restart the system
MAin                             Return to Main Menu
------
Service Menu: Enter command >
```


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VME Menu

```
------- VME Menu ------------------------------------------------------------
Command                           Description
-------                           -----------
BPNconfig <cpu> <anchor> <am>     Show or set VME BPN parameters
BPRconfig <addr> <am>             Show or set VME BPR parameters
ModeFlags [CC [ON|OFF]]           Show or set state of mode flags
NV_SECTIONS DEfault ALL           Restore NV sections factory defaults

BOot [PRI|ALT|<path>]             Boot from specified path
DIsplay                           Redisplay the current menu
HElp [<menu>|<command>]           Display help for menu or command
RESET                             Restart the system
MAin                              Return to Main menu
-------
VME Menu: Enter command >
```


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Accessing the Boot Console Interface

To access the boot console interface, follow these steps:

NOTE: This procedure should be done by a system administrator with **root** user privileges.

1 Close any files and applications on your workstation.

2 In a terminal window, enter the following command:

reboot -h

3 When the system has completely shut down, power off the system then power it back on.

If **Autoboot** is turned off, the boot sequence automatically stops at the boot console Main Menu.

If **Autoboot** is turned on, you will see the following messages:

```
Processor is starting Autoboot process. To discontinue,
press any key within 10 seconds.
```

If **Autoboot** and **Autosearch** are both turned on, you will see the following messages:

```
Processor is booting from first available device.To
discontinue, press any key within 10 seconds.
```

NOTE: If you are using a power-saving monitor, you will have less than 10 seconds from the time this message appears to press a key. Power saving monitors usually indicate the presence of a live video sync signal through the power LED on the monitor. When the LED is on, press **ESC** .

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4 Press a key. You will then see the following message:

```
Boot terminated
```

The Main Menu of the boot console appears.

```
------ Main Menu ----------------------------------------
Command                          Description
-------                          -----------
BOot [PRI|ALT|<path>]            Boot from specified path
PAth [PRI|ALT|CON|KEY][<path>]   Display or modify a path
SEArch [DIsplay|IPL] [<path>]    Search for boot devices

COnfiguration [<command>]        Access Configuration menu/commands
INformation [<command>]          Access Information menu/commands
SERvice [<command>]              Access Service menu/commands
VME  [<command>]                 Access VME menu/commands

DIsplay                          Redisplay the current menu
HElp [<menu>|<command>]          Display help for menu or command
RESET                            Restart the system
------
Main Menu: Enter command >
```


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Booting Your Workstation

Usually, you start your workstation by turning it on and waiting for the operating system to boot automatically. However, you may not always want the usual sequence to occur.

For example, you may want to start your workstation 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.

Here are some situations and examples:

- If you know which device you want to boot from, and you know that it contains a bootable operating system, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

  `Main Menu: Enter command >` **boot** *device*

  where *device* is the **hardware path** to the device, specified in Mnemonic Style Notation. When prompted whether or not to interact with the ISL enter **n** for no.

  For example, if you wish to boot an operating system that is stored on a DDS-format tape in a drive that is located at ''sescsi.1.0'', follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following command at the prompt:

  `Main Menu: Enter command >` **boot sescsi.1.0**

  Interact with ISL (Y,N,Q)> **n**

  The operating system on the specified device is used to start your workstation.

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- The Initial System Loader (ISL) is the program that actually controls the loading of the operating system. By interacting with ISL, you can choose to load an alternate version of the HP-UX operating system. If you wish to interact with the ISL before booting your workstation, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

  `Main Menu: Enter command >` **boot** *device*

  You are prompted:

  ```
  Interact with ISL (Y,N,Q)>
  ```

  Answering quit (**q**) aborts the boot and returns you to the boot console handler.

  Answering no (**n**) continues the boot sequence with the device specified from the main menu prompt.

  Answering yes (**y**) causes the ISL to be loaded from the specified device. After a short time, the following prompt appears on your screen:

  ```
  ISL>
  ```

  For example, if the usual kernel (**/stand/vmunix**) on your root disk (**fwscsi.6.0**) has become corrupted, and you wish to boot your workstation from the backup kernel (**/stand/vmunix.prev**), type the following at the `ISL>` prompt:

  `ISL>` **hpux /stand/vmunix.prev**

  To quit out of the ISL without booting, you must power cycle to board computer.

- If you do not know which media in your file systems have bootable operating systems, you can find them with the **search IPL** command. See the section "Searching for Bootable Media".

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Searching for Bootable Media

To list devices that contain bootable media, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

```
Main Menu: Enter command > search ipl
```

The search command searches all buses. The search may turn up more devices than there are lines on your display. If you are using a text terminal, you may control the progress of the search from your terminal's keyboard by using the following commands:

- To hold the display temporarily, press **Ctrl** **S**
- To continue the display, press **Ctrl** **Q**
- To halt the search, press any other key

These flow-control commands do not work with a bitmapped display, but such a display can show more than forty lines of text, so you are unlikely to need them.

To search for devices of *just one type* that actually contain bootable media, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

`Main Menu: Enter command >` **search ipl** *device_type*

Where *device_type* is one of the following:

sescsi is the built-in single-ended SCSI bus

lan is all connections to the built-in LAN

gsc*n* is an optional fast, wide SCSI interface in slot number *n*

bpn is VME backplane networking

bpr is VME backplane ROM boot

ata is a PCMCIA card (supported by HP-RT operating system only)

pci*n* is an optional PCI card in slot *n*

pmc*n* is an optional PMC card in site *n*

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Restoring the Factory Default Configuration

To restore the factory default values in the EEPROM, follow the directions in “Accessing the Boot Console Interface” earlier in this chapter, and then type the following at the prompt to access the Configuration Menu:

```
Main Menu: Enter command > co
```

When the Configuration Menu appears, type the following at the prompt:

```
Configuration Menu: Enter command > default
```

The process takes less than 30 seconds and messages similar to the following are displayed:

```
Initializing...


TEST 30CD
INIT 30CD
Configuration Menu: Enter command >
```

The factory default EEPROM settings are now restored. This process does not affect the VME configuration in the EEPROM.

The defaults are as follows:

OS_ID:	HP-UX
Fast Size:	0xF (all memory is tested)
Primary Path:	sescsi.6.0
Alternate Path:	sescsi.5.0
Console Path:	GRAPHICS(*n*) where *n* is the lowest numbered device installed. If no graphics devices are installed this is set to SERIAL_1.
Keyboard Path:	PS2
Autoboot:	OFF
Autosearch	OFF
Autostart	ON

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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 workstation. The **path** command sets the system paths shown in Table A-1.

The **path** command sets and displays the hardware address of a specified device attached to the I/O bus of your workstation.

Table A-1 System Paths

Path Type	Device
primary or **pri**	Your workstation's default boot device (usually the root disk)
alternate or **alt**	Your workstation's alternate boot device (usually a DDS-format tape device)
console or **con**	Your workstation's primary display device
keyboard or **key**	Your workstation's primary ASCII input device

To display the current settings for the system paths, type the following at the prompt:

```
Main Menu: Enter command > path
```

To obtain a full listing of currently supported boot device "mnemonic" paths, use the following command:

```
Main Menu: Enter command > pa prim ?
```

To obtain a full listing of currently supported console "mnemonic" paths, use the following command:

```
Main Menu: Enter command > pa con ?
```


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The paths are displayed in **Mnemonic Style Notation,** as shown in Table A-2.

Table A-2 Mnemonic Style Notation

I/O Type	Specification Format
Built-in SCSI	**sescsi.***scsi_address***.***logical_unit_number*
Optional	**gsc***n***.***scsi_address***.***logical_unit_number*
Built-in LAN	**lan.***server_address***.***init_retries***.***io_retries*
VME Backplane Networking	**bpn.***server_address***.***init_retries***.***io_retries*
VME Backplane ROM Boot	**bpr.***vme_addr***.***VME_addr_mod*
PCMCIA	**ata**
PCI Slot	**pci***n*
PMC Slot	**pmc***n*
On-board Graphics	**graphics(0)**
Optional Graphics 1	**graphics(1)**
Optional Graphics 2	**graphics(2)**
PS/2 Keyboard	**ps2**
HIL Keyboard	**hil**
RS232(A)	**serial_1.***baudrate.wordlength.parity*
RS232(B)	**serial_2.***baudrate.wordlength.parity*

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To display the current setting for a particular system path, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

```
Main Menu: Enter command > path path_type
```

where *path_type* is one of the path types listed in Table A-1.

For example, to get the path to the primary boot device, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

```
Main Menu: Enter command > path primary
```

To set a system path to a new value, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

```
Main Menu: Enter command > path path_type path
```

where *path_type* is one of the path types listed in Table A-1 and *path* is the specification of the path in Mnemonic Style Notation (as described in Table A-2). For example, to set the primary boot path to a SCSI disk with an ID of 6.0, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter, and then type the following at the prompt:

```
Main Menu: Enter command > path pri escsi.6.0
```


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Displaying and Setting the Monitor Type

Your system ships from the factory preset to use a monitor with a specific resolution and frequency. If you replace your workstation's monitor with a different type of monitor, you must reconfigure your workstation to support the new monitor.

The Monitor Command

The **monitor** command lets you change your workstation's graphics configuration. This command is available in the Configuration Menu of the boot console interface.

To display the current graphics and console information, enter the following command:

```
Configuration Menu: Enter command > monitor
```

The correct usage for setting the graphics configuration is:

```
Configuration Menu: Enter command > monitor graphics_path type
```

where valid *graphics_path* parameters are:

graphics(0) - The on-board 8-plane graphics adapter.

graphics(1) - Graphics adapter installed in option slot 1.

graphics(2) - Graphics adapter installed in option slot 2.

and *type* is the numerical monitor type as shown with the **monitor list** command.

NOTE: Standalone boards are shipped from the factory configured to monitor type 0 to force a monitor type polling loop on initial boot.

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Displaying the Current Monitor Configuration

To display the current monitor configuration for your system from the Configuration Menu of the boot console interface, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter. Once you are in the Boot Console Interface Main Menu, type:

```
Main Menu: Enter command > configuration
```

This places you in the Configuration Menu. From here type:

```
Configuration Menu: Enter command > monitor
```

The screen displays a list of the current graphics adapters and their monitor types configured for your workstation.

```
MONITOR INFORMATION

   Path       Slot  Head    HPA      Resolution  Freq  Type  Class
----------    ----  ----  ------    ----------  ----  ----  --
GRAPHICS(0)    0     1    f8000000  1280x1024    72Hz   12

Configuration Menu: Enter command >
```

In this example, only the built-in graphic adapter graphics(0) is configured. The monitor type for graphics(0) is set to type 12, which is a 1280 by 1024 monitor that uses a frequency of 72 Hz.

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Setting the Monitor Type

You can set the monitor type for a graphics adapter from the configuration menu by entering the following:

```
Configuration Menu: Enter command > monitor graphics(n) tt
```

Where *n* is the number of the graphics adapter and *tt* is the monitor type.

To display a list of supported monitors, enter the following command;

```
Configuration Menu: Enter command > monitor list
```

A list of valid monitor types similar to the following is displayed;

```
MONITOR INFORMATION

Path         Slot Head Type   Size     Freq  Class
----         ---- ---- ---- ---------  ----  -----
  GRAPHICS(0)  0    1    1   1280x1024  75Hz  VESA
*GRAPHICS(0)  0    1    2   1280x1024  75Hz  VESA, Double buffered
  GRAPHICS(0)  0    1    3   1280x1024  75Hz  VESA, Greyscale
*GRAPHICS(0)  0    1    4   1280x1024  75Hz  VESA, Double Buffered,Greyscale
  GRAPHICS(0)  0    1    5   1024x768   75Hz  VESA
  GRAPHICS(0)  0    1    6   800x600    75Hz  VESA
  GRAPHICS(0)  0    1    7   640x480    75Hz  VESA
*GRAPHICS(0)  0    1    8   1600x1200  75Hz  VESA
*GRAPHICS(0)  0    1    9   1600x1200  75Hz  VESA,Greyscale
*GRAPHICS(0)  0    1   10   1200x1600  75Hz  VESA
*GRAPHICS(0)  0    1   11   1200x1600  75Hz  VESA,Greyscale
  GRAPHICS(0)  0    1   12   1280x1024  72Hz
*GRAPHICS(0)  0    1   13   1280x1024  72Hz  Double buffered
  GRAPHICS(0)  0    1   14   640x480    60Hz
  GRAPHICS(0)  0    1   15   --------user defined-------

Configuration Menu: Enter command >
```

* These monitor types are not supported on the Model 744 on-board graphics.

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To set the monitor type for graphics(0) to monitor type 2 you would enter the following;

```
Configuration Menu: Enter command > monitor graphics(0) 2
```

This will take effect on the next reboot.

```
MONITOR INFORMATION

   Path        Slot  Head    HPA      Resolution  Freq  Type  Class
-----------    ----  ----  --------   ----------  ----  ----  -----
GRAPHICS(0)       0     1  f8000000    1280x1024  72Hz    2
```

The boot console displays a message that tells you that your new monitor selection will take effect the next time you reboot your system.

The boot console also displays the new monitor information.

Trying to change the monitor type to a number not listed for that graphics device fails and gives you the following warning message:

```
Value of monitor type n out of range (n - nn)
```


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Setting the Monitor Type at Power On

If you replace your workstation's monitor with a different monitor type, and do not set the workstation's graphics parameters by using the monitor command before doing so, you need to perform the following steps at power on:

If your keyboard connects to the PS/2 connector on your system, wait 2 seconds after the Num Lock light flashes near the end of the boot sequence, then press **Tab** to initiate the automatic monitor selection process.

If you have a keyboard that connects to the HIL connector on your system, press **Tab** every three seconds during the boot sequence to initiate the automatic monitor selection process.

The system cycles through all of the available monitor types one at a time. When you can see a message similar to the following clearly and legibly, select that monitor type by pressing **Enter**.

```
MONITOR INFORMATION

   Path        Slot  Head   Type      Size     Freq  Class
-----------    ----  ----   ----   ----------  ----  -----
GRAPHICS(0)      0     1     n     nnnnxnnnn   nnHz
Press [RETURN] to select this monitor type (type n of n types).
```

NOTE: If you are using a power saving monitor, the power LED will light when the monitor senses a valid video synch signal.

The system queries you to confirm your selection. Press **Y** to save this monitor type.

If you press any key other than **Y**, the following message is displayed:

```
Monitor type not saved.
```

At this point, the new monitor type is active, but not saved. Because you didn't save the monitor type, the next time you reboot the system, the original monitor type will be used.

Next, the following message is displayed:

```
To select a new Graphics Monitor Type press the <TAB> key now,
otherwise EXIT by entering any other key (or will time out in
15 seconds)...
```

To restart the monitor selection process, press **TAB**.

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Using the Emergency Interactive Console Search

If the system console is set to a device that is not installed in the system, you can use the emergency interactive console search to set the console to one of the terminal devices that is currently connected.

Use the following procedure to set the console with the emergency interactive console search:

1 Make sure that the monitor(s) and/or terminal(s) are powered on.

2 Hold the Model 744 board computer's reset/abort switch in its **Abort** position, then turn on power to the VMEbus chassis.

3 A message similar to the following is displayed on each monitor connected to a graphics device recognized by the system:

```
GRAPHICS(s) MONITOR INFORMATION
Slot        Model        Type  Resolution  Freq  Class
----  ----------------  ----  ----------  ----  -----
   0  INTERNAL_EG_1280     12  1280x1024   75Hz
The following keyboard(s) are available:
        PS2
        HIL
Press the <n> key to select GRAPHICS(s) as the CONSOLE or
press the <Tab> key to select the next monitor type.
```

Where n is a single-digit number or a keyboard key.

When the message is displayed clear and undistorted on the monitor for your console device, enter the number or key that corresponds to the display device that you are selecting.

NOTE: The message is displayed for sixty seconds before proceeding to the next monitor resolution.

If you are using a power saving monitor, the power LED will light when the monitor senses a valid video synch signal.

If this message is not displayed on your monitor, review the procedures in Chapter 1 and Chapter 2 to make sure that you correctly installed the option board.

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If no keyboards are found the following message is displayed:

```
WARNING: No keyboard(s) found. Turn off system
        power, check keyboard connection(s) and
        repeat interactive console search.
```

To advance all graphics adapter monitors to the next resolution, press the <Tab> key **one** time and wait five seconds for all monitor types to change. Do not hold down the <Tab> key or press it multiple times as this will cause the monitor types to advance for each press of the <Tab> key.

4 When the following message is displayed, press the <Esc> key to confirm selection of the device as the console:

```
Press the <Esc> key to confirm selection of GRAPHICS(s) as
the CONSOLE.
This selection will timeout in 10 seconds if not confirmed.
```

NOTE: The message is displayed for only ten seconds before console search is resumed. Press <Esc> as soon as possible after the message is displayed.

The following message is displayed on the selected display:

```
GRAPHICS(s) MONITOR INFORMATION
Slot        Model        Type  Resolution  Freq  Class
----  ----------------  ----  ----------  ----  -----
   0  INTERNAL_EG_1280     12  1280x1024   75Hz
Selected CONSOLE path is: GRAPHICS(s)
Selected KEYBOARD path is: PS2
```


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Displaying the Current Memory Configuration

The **memory** command shows the memory configuration table.

To display the current memory configuration for your system, from the Information Menu of the boot console interface, follow the directions in "Accessing the Boot Console Interface" earlier in this chapter. Once you are in the Boot Console Interface Main Menu, type:

```
Main Menu: Enter command > information
```

This places you in the Information Menu. From here type:

```
Information Menu: Enter command > memory
```

The screen displays status and configuration information for the memory modules installed in your workstation.

Memory Information Example

If a memory card failure is detected during power-on selftest, the following message is displayed on the console (after completing all selftests) and the autoboot/autosearch process is automatically stopped:

```
WARNING: One or more memory banks were not configured due
         to a SIMM size mismatch or a SIMM failure. For
         more details, use the MEMORY command in the
         INFORMATION menu.
```

NOTE: The above condition occurs only after the testing and successful configuration of at least one memory card.

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The following listing is a sample memory configuration table when memory modules are properly installed and configured:

```
MEMORY INFORMATION


MEMORY STATUS TABLE
Slot   Size   Status
----------------
0      64MB   Configured
1      32MB   Configured
2      64MB   Configured
---------
TOTAL  160MB
```

If the power-on selftest detects a defective or damaged memory card, using the **memory** command (from the Information Menu prompt) displays the following information:

```
WARNING: One or more memory banks were not configured due
         to errors in the following SIMM(s).

  Physical Slot   Error Type
  -------------   -----------
  3               SIMM hardware error

              Memory Card Stack
         +-------------------------+
  Slot 3 |         Failed          |
         +-------------------------+
         +-------------------------+
  Slot 2 |         64MB OK         |
         +-------------------------+
         +-------------------------+
  Slot 1 |         32MB OK         |
         +-------------------------+
         +-------------------------+
  Slot 0 |         64MB OK         |
         +-------------------------+
============================================================
Side view of Model 9000/744/165L Single Board Computer PCB.

SUGGESTION: If possible, turn off the computer and check to
        see if the memory card(s) are seated properly.

    Memory
    HVERSION            SVERSION
    ---------------  ---------------
    0x0740              0x0900
```


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Displaying the Status of the System I/O

The **IO** command is available from the information menu. It lets you identify all built-in I/O devices and optional I/O devices installed in the option slots.

To use the **IO** command from the Information Menu of the boot console interface, type:

`Information Menu: Enter command >` **IO**
Information about the built-in and optional I/O devices is displayed as shown in the following example:

```
I/O MODULE INFORMATION
                                                                    IODC IODC
Path           Decimal   Type                Location  HVER SVER Vers Dep
-------------  -------   -----------------   --------------- ---- ---- ----
8              8         Bus Converter       built-in  5040 0000 0x00 0x00
8              8         Bus Converter       built-in  5050 0000 0x00 0x00
GRAPHICS(1)    8/0       HPA208LC1024        GSC slot1 0080 8500 0x01 0x00
GSC2           8/8       A DMA I/O           GSC slot2 0141 8980 0x96 0x00
8/16           8/16      Bus Adapter         built-in  04b0 8100 0x00 0x00
8/16/0         8/16/0    Parallel            built-in  04b0 7400 0x00 0x00
8/16/1         8/16/1    Audio               built-in  04b4 7b00 0x00 0x00
SERIAL_1       8/16/4    RS232               built-in  04b0 8c00 0x01 0x00
SESCSI         8/16/5    SE SCSI             built-in  04b0 8200 0x96 0x00
LAN            8/16/6    LAN                 built-in  04b0 8a00 0x02 0x00
PS2            8/16/7    Keyboard            built-in  04b0 8400 0x00 0x00
8/16/8         8/16/8    Mouse               built-in  04b0 8400 0x00 0x00
8/20           8/20      Bus Adapter         EISA      0110 8e00 0x00 0x00
HIL            8/20/1    HIL                 EISA      0110 7300 0x00 0x00
EISA           8/20/5    Bus Adapter         EISA      0110 9000 0x00 0x00
GRAPHICS(0)    8/24      INTERNAL_EG_1280    built-in  04b0 8500 0x01 0x00
8/28           8/28      Bus Adapter         built-in  04a0 9300 0x00 0x00
VME            8/28/0    Bus Adapter         built-in  04a0 7800 0x00 0x00
BPN            8/28/1    BPN                 built-in  04a0 8800 0x00 0x01
SERIAL_2       8/28/2    RS232               built-in  04a0 8c00 0x01 0x00
BPR            8/28/3    BPR                 built-in  04a0 8f00 0x00 0x01
62             62        Native Processor    built-in  50f0 0481 0x00 0x00
63             63        Proc Dep Memory     built-in  0740 0900 0x00 0x00

EISA Cards
Path      Type                    EISA ID
----      ----                    -------
20/5/1    100VG AnyLAN adapter cardHWP1990
20/5/2    Unknown EISA card or empty slot
20/5/3    Smart 16/4 Ringnode cardMDG0002
20/5/4    PSI card                HWP1870
20/5/5    Unknown EISA card or empty slot
20/5/6    Unknown EISA card or empty slot
20/5/7    Unknown EISA card or empty slot
20/5/8    Unknown EISA card or empty slot

PCI Cards
Slot      Path                          Bus  Class
----      ----------------------------  ---  --------------

VME Cards
Path      Type               VME ID
----      ----               -------

Information Menu: Enter command >
```


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Setting the Auto Boot and Auto Search and Auto Start Flags

The **auto boot, auto search,** and **auto start** flags are variables stored in your workstation's nonvolatile memory. (Nonvolatile memory retains its contents even after power is turned off.) If you reset these flags to a new value, the change takes effect the next time you reboot the workstation.

The **auto boot** variable boots the operating system whenever your workstation is turned on.

To examine the state of **auto boot** and **auto search**, type the following at the prompt:

```
Configuration Menu: Enter command > auto
```

If **auto boot** is set to **on**, your workstation automatically attempts to boot the operating system when turned on. If **auto boot** is set to **off**, your workstation enters the boot administration mode of the boot console user interface.

The state of **auto search** determines how your workstation seeks a boot device during autoboot. If **auto search** is set to **on**, your workstation will search for other boot devices if the primary boot device is not available. If **auto search** is **off**, your workstation will default to the boot administration mode if it can't see the primary boot device.

To change the state of **auto boot** or **auto search**, enter either of the following commands at the prompt:

```
Configuration Menu: Enter command > auto boot state

Configuration Menu: Enter command > auto search state
```

where *state* is **on** or **off**.

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Autosearch searches for devices in the following order:

Primary Boot Path
Alternate Boot Path
FW SCSI in GSC Slot 1
FW SCSI in GSC Slot 2
Built-in Single-Ended SCSI Devices
Built-in LAN bootp servers

NOTE: The following paths are not searched unless they are referenced by the primary or alternate boot paths:

bpn
bpr
ata

EISA and VME cards are not searched.

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Displaying and Setting the Security Mode

The **SECure** flag is a variable stored in non-volatile memory. (Non-volatile memory retains its contents even after power is turned off.) If you reset this flag to a new value, the change takes effect the next time you reboot the board computer.

When the **SECure** flag is set to **on**, **autoboot** and **autosearch** are enabled and cannot be stopped. The system boots from the default boot paths regardless of user intervention.

To display the current setting for the **SECure** flag, enter the following command:

```
Configuration Menu: Enter command > secure
```

To set the **SECure** flag on or off, enter one of the following:

```
Configuration Menu: Enter command > secure on

Configuration Menu: Enter command > secure off
```


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Displaying and Setting the Fastboot Mode

When **fastboot** is enabled (set to **on**), your workstation does a quick check of the memory and skips I/O interface testing during its power-on self tests. This enables your workstation to complete its boot process more quickly. The default factory setting is for **fastboot** to be disabled (**off**).

The **fastboot** mode allows your workstation to boot quickly by performing a less extensive check of the system's memory.

When **fastboot** is disabled (set to **off**), more extensive memory testing and I/O interface testing is performed during the selftests, causing the boot process to take longer.

If you are experiencing difficulty in booting your workstation, set **fastboot** to **off** and reboot the system. The more extensive testing may reveal the error condition.

To display the status of **fastboot**, type the following at the prompt:

```
Configuration Menu: Enter command > fastboot
```

To disable **fastboot**, type the following at the prompt:

```
Configuration Menu: Enter command > fastboot off
```

To enable **fastboot**, type the following at the prompt:

```
Configuration Menu: Enter command > fastboot on
```

CAUTION: If a graphics adapter is installed in the system, it must be selected as the console device. If additional graphics adapters are installed, Fastboot mode cannot be used.

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Displaying the LAN Station Address

It is sometimes necessary to supply a LAN station address of your workstation to other users. For example, if your workstation is to become a member of a cluster, the cluster administrator needs to know your LAN station address in order to add your workstation to the cluster.

A **LAN station address** of your workstation is the label that uniquely identifies the LAN connection for your workstation at the **link level** (the hardware level).

To display your workstation's LAN station addresses, type the following at the prompt:

```
Information Menu: Enter command > lanaddress
```

The LAN station address is displayed as a twelve-digit number in hexadecimal notation, similar to the following:

```
LAN Station Addresses:  0060b0-789abc
```

The address is for the system's built-in LAN.

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Displaying System Information

The **all** command allows you to display the system's processor revision and speed, cache size, memory size, flag settings, and the boot and console paths. To display system information from the Information Menu, type the following at the prompt:

```
Information Menu: Enter command > all
```

This information is paged to allow you to view it as necessary.

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Displaying PIM Information

The **pim** command allows you to display the most recent PIM information for the specified fault type. To display PIM information for a specific fault, type the following at the Service Menu prompt:

```
Service Menu: Enter command > pim processor_number
```

You can use **pim** in the following ways:

pim - Gives all fault types

pim 0 - Gives HPMC information on the processor

pim 0 *fault_type* -Provides fault type information on the processor. Where *fault_type* is **HPMC**, **LPMC**, or **TOC**

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Displaying and Setting VME Backplane Networking Configuration

On the VME menu, **BPNconfig** is used to display or set the VME backplane networking parameters stored in non-volatile memory.

To display the current VME backplane networking parameters enter the following at the VME menu prompt:

```
VME Menu: Enter command > bpn
```

The information is displayed similar to the following example:

```
Current BPN Configuration Parameters:
    CPU Number: 0
    Anchor:     0x00200000
    AM:         0x3d
```

Use the following syntax to set the VME backplane networking parameters:

BPNconfig - Show backplane networking configuration

BPNconfig *cpu* - Set CPU number only

BPNconfig *cpu anchor* - Set CPU number and VME anchor address

BPNconfig *cpu anchor am* - Set CPU number, VME anchor address and VME address modifier code

For example,

bpnconfig 1 0x200000 0x3d

sets the backplane networking resources for CPU number 1, with the VME anchor address set to 0x200000 and the VME address modifier code is set to 0x3d.

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Displaying and Setting VME Backplane ROM Boot Configuration

On the VME menu, **BPRconfig** is used to display or set the VME backplane ROM boot parameters stored in non-volatile memory.

To display the current VME backplane ROM boot parameters enter the following at the VME menu prompt:

```
VME Menu: Enter command > bpr
```

The information is displayed similar to the following example:

```
Current BPR Configuration Parameters:
    Address:    0x00000000
    AM:         0x3d

VME Menu: Enter command >
```

Use the following syntax to set the VME backplane ROM boot parameters:

BPRconfig - Show backplane ROM boot configuration

BPRconfig *addr* - Set VME address only

BPRconfig *addr am* - Set VME address and VME address modifier code

For example,

bprconfig 0x0 0x3d

sets the backplane ROM boot VME address to 0x0 and the VME address modifier code to 0x3d.

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Displaying and Setting the VME Chassis Codes Mode Flag

On the VME menu, **ModeFlags** is used to display or set flags which enable or disable the display of diagnostic chassis codes on SERIAL_1.

To display the current setting of the mode flag enter the following command:

```
VME Menu: Enter command > mf
```

The information is displayed similar to the following example

```
Diagnostic Chassis Codes to SERIAL_1:   ENABLED

VME Menu: Enter command >
```

Use the following syntax to set the VME chassis code mode flag:

ModeFlags - Shows current state of all mode flags

ModeFlags cc on - Enables the display of diagnostic chassis codes on SERIAL_1

ModeFlags cc off - Disables the display of diagnostic chassis codes on SERIAL_1

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Restoring the Factory Default VME EEPROM Configuration

The NV_SECTIONS command restores the non-volatile sections area of the system EEPROM to the default factory settings.

To restore the factory default settings, enter the following command:

```
VME Menu: Enter command >nv_sections de all
```

CAUTION: All VME system configuration data maintained in this area of the EEPROM is restored to the factory default setting. All **user data** contained in this area of the EEPROM **is ERASED**.

CAUTION: **Do not** reset the system or interrupt the power during the update process. The update requires approximately 6 minutes to complete.

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