Digital Alpha VME 2100

Owner's Guide

Order Number: EK–DALPH–OG. A01

Digital Equipment Corporation
Maynard, Massachusetts

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The postpaid Reader's Comments form at the end of this document request your critical evaluation to assist in preparing future documentation.

FCC NOTICE: 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. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Any changes or modifications made to this equipment may void the user's authority to operate this equipment. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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EC:

Warning! This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung! Dieses ist ein Gerät der Funkstörgrenzwerklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioeléctriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

ACOUSTICS: Preliminary declared values per ISO 9296 and ISO 7779:

	Sound Power Level L_{wAd}, B	**Sound Pressure Level L_{pAm}, dBA (Bystander Positions)**
Idle	6.5	50
Operating	6.5	50

Current values for specific configurations are available from Digital representatives. 1 B = 10 dBA.

SCHALLEMISSIONSWERTE: Verläufige Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779:

	Schalleistungspegel L_{wAd}, B	**Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)**
Leerlauf	6.5	50
Betrieb	6.5	50

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For Federal Republic of Germany
Pour la République féderale d'Allemagne

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Bescheinigung des Herstellers/Importeurs:
Hiermit wird bescheinigt, daß die Einrichtung in Übereinstimmung mit den Bestimmungen der DBP-Verfügung 523/1969, Amtsblatt 113/1969, und Grenzwertklasse "A" der VDE0871, funkentstört ist.

Das Bundesamt für Zulassungen in der Telekommunikation (BZT), hat diesem Gerät eine EMV-Zulassungsnummer zugeteilt.

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Hochfrequenzgeräte dürfen erst in Betrieb genommen werden, nachdem hierfür von der für den vorgesehenen Aufstellungsort zuständigen Außenstelle des Bundesamtes für Post und Telekommunikation (BAPT) die Genehmigung erteilt ist.

Als Antrag auf Erteilung einer Genehmigung dient eine Anmeldepostkarte (Anhang des Handbuches) mit Angabe der EMV-Zulassungsnummer.

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Externe Datenkabel:
Sollte ein Austausch der von Digital spezifizierten Datenkabel nötig werden, muß der Betreiber für eine einwandfreie Funkentstörung sicherstellen, daß Austauschkabel im Aufbau und Abschirmqualität dem Digital Originalkabel entsprechen.

Kennzeichnung:
Die Geräte werden bereits in der Fertigung mit der Zulassungsnummer gekennzeichnet und mit einer Anmeldepostkarte versehen. Sollte Kennzeichnung und Anmeldepostkarte übergangsweise nicht mit ausgeliefert werden kontaktieren Sie bitte das nächstgelegene Digital Equipment Kundendienstbüro.

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Preface

Purpose of This Guide

This guide describes how to install, operate, troubleshoot, and maintain the Digital Alpha VME 2100 systems.

Who Should Use This Guide

This guide is for system managers and other qualified personnel who install and manage computer systems.

Structure of This Guide

This guide is organized in the following manner:

- **Chapter 1 —** Introduces the system and describes the basic characteristics of the system.
- **Chapter 2 —** Describes how to install the drawer mount and vertical mount systems.
- **Chapter 3 —** Describes how to use the operator control panel (OCP).
- **Chapter 4 —** Explains the console commands and provides examples of some commands.
- **Chapter 5 —** Describes system options and upgrades.
- **Chapter 6 —** Explains how to identify and resolve system problems that prevent proper operation.
- **Appendix A —** Provides the system hardware specifications.

Related Documents

Other documents related to the Digital Alpha VME 2100 systems include the following:

- *Digital Alpha VME 2100 Service Guide* (EK–DALPH–SV)
- *Digital Alpha VME 2100 Read Me First* (EK–DALDC–IS)
- *Digital Alpha VME 2100 Vertical Rackmount Front Bezel Installation Information* (EK–DALVR–IS)
- *Digital Alpha VME 2100 Drawer Rackmount Front Bezel Installation Information* (EK–DALDR–IS)
- *Digital 2100 VME Adapter Driver, OpenVMS AXP Installation Guide* (AA–QCEVA–TE)
- *Digital 2100 VME Adapter Driver, OpenVMS AXP User's Guide* (AA–QCEWA–TE)
- *Digital 2100 VME Adapter Driver, DEC OSF/1 Installation Guide* (AA–QCEYA–TE)
- *Digital 2100 VME Adapter Driver, DEC OSF/1 User's Guide* (AA-QCEZA–TE)
- *OpenVMS AXP Alpha System Dump Analyzer Utility Manual* (AA–PV6UB–TE)
- *Guide to Kernel Debugging* (AA–PS2TA–TE)
- *DEC Verifier and Exerciser Tool User's Guide* (AA–PTTMA–TE)

Conventions Used in This Guide

This guide uses the following conventions:

Convention	Meaning
Note	A note calls the reader's attention to any item of information that may be of special importance.
Caution	A caution contains information essential to avoid damage to the equipment.
Warning	A warning contains information essential to the safety of personnel.
❶	Circled numbers provide a link between figures and text.
MONOSPACE	Text displayed on the screen is shown in monospace type.
bold type	Bold type denotes user input.
italic type	Italic type emphasizes important information, indicates variables, and indicates complete titles of manuals.
n.nn	A period in numerals signals the decimal point indicator. For example, *1.75* equals *one and three-fourths*.
Ctrl/*x*	Ctrl/*x* indicates that you hold down the Ctrl key while you press another key or mouse button (indicated here by *x*).
Return	Specific keys such as the Return key are represented in boxes.
x	A lowercase italic *x* indicates the generic use of a letter. For example, *xxx* indicates any combination of three alphabetic characters.
n	A lowercase italic *n* indicates the generic use of a number. For example, 19*nn* indicates a 4-digit number in which the last 2 digits are unknown.
[ ]	In format descriptions, brackets indicate optional elements. You can choose none, one or more, or all of the options.

For a listing of terms used in the Digital Alpha VME 2100 documentation, refer to the Glossary contained in this book.

Safety Symbols

The following symbols appear on the system. Please review their definitions:

This Attention symbol is used to alert readers about specific safety conditions. When this symbol appears on equipment, the user should read separate instructional material related to the particular safety condition being addressed.

Warning: CPU and Memory modules have parts that operate at high temperatures. Wait two minutes after power is removed before handling these modules.

Warning: This area contains electrical energy. Disconnect the ac power cord(s) to the system before accessing this area.

Warning: High voltage shock hazard present inside the power supply.

1
Introduction

In This Chapter

This chapter introduces the Digital Alpha VME 2100 drawer mount and vertical mount systems. This chapter also describes the location of the system components and controls.

The Digital Alpha VME 2100 System

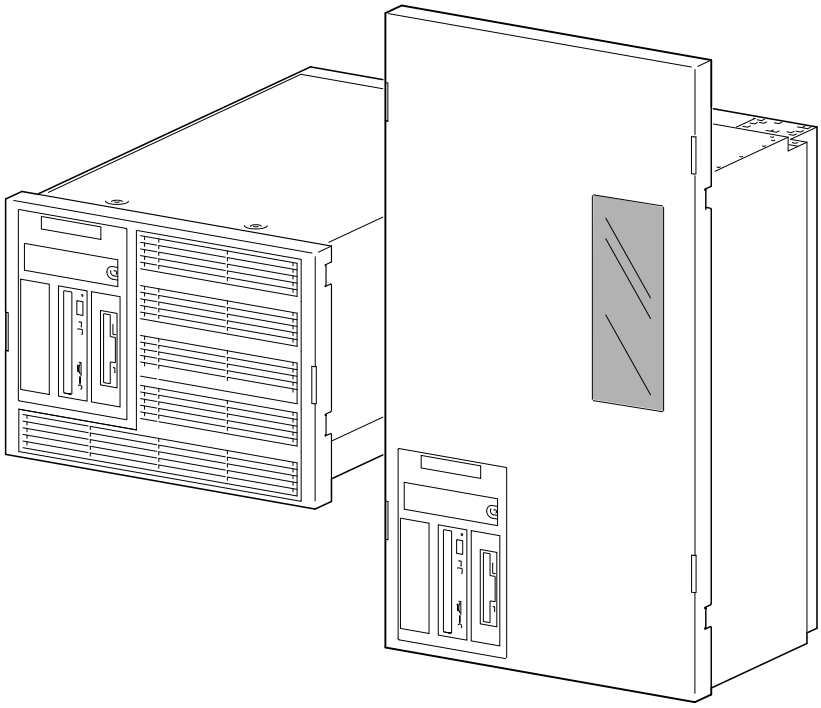
The Digital Alpha VME 2100 system (refer to Figure 1–1) is a high-performance superserver for multiuser environments. The drawer mount system is contained in a chassis that fits into a standard 48.26-cm (19-in.) drawer cabinet. The vertical mount system is the same chassis, but designed to fit into a vertical 48.26-cm (19-in.) cabinet.

The system complies with the Electronic Industries Association (EIA) standard 310C and the International Electrotechnical Commission (IEC) 297 standards that enable installation into a cabinet with rails with either the English RETMA (Radio Electronics Television Manufacturers Association) or metric IEC rail-hole pattern.

The Digital Alpha VME 2100 system is part of the AlphaServer 2100 product line. This product line is a family of Alpha symmetric multiprocessor, server systems that are supported by multiple operating systems. The Digital Alpha VME 2100 system is supported by the Digital UNIX operating system, (formally called DEC OSF/1), V3.0B (and later), and the OpenVMS Alpha V6.1 (and later) operating systems.

The server's CPU is based on the DECchip 21064 processor chip running at 190 MHz or the DECchip 21064A processor chip running at 275 MHz.

Figure 1–1 Digital Alpha VME 2100 Systems



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Characteristics

Table 1–1 highlights the specific characteristics of the Digital Alpha VME 2100 system.

Table 1–1 System Characteristics

Characteristic	Description
Four–processor capability	May be configured as a uniprocessor or up to four processors.
High-performance PCI I/O subsystem	Peripheral Component Interconnect (PCI) is the emerging industry-standard bus that supports Digital and third-party options.
VME bus	5-slot VME I/O bus that supports industry-standard options.
Internal mass storage	Up to two, 5.25-in. half-height hard-disc-drive storage devices. Up to 2 GB per drive.
External storage devices	Supports external storage devices, for low-cost, high-capacity, flexible configurations.
CPU chip technology	The DECchip 21064 is manufactured by using Digital's state-of-the-art CMOS process. This process uses a feature size of 0.75 micron and the chip contains 1.7 million transistors on one die.
CPU clock rate	190 MHz to more than 400 MHz over a lifetime.
CPU chip design features	Superscalar, superpipelined
System bus bandwidth	667 MB/s (128-bit, 24-ns cycle)
Memory	Up to 2 GB of main memory

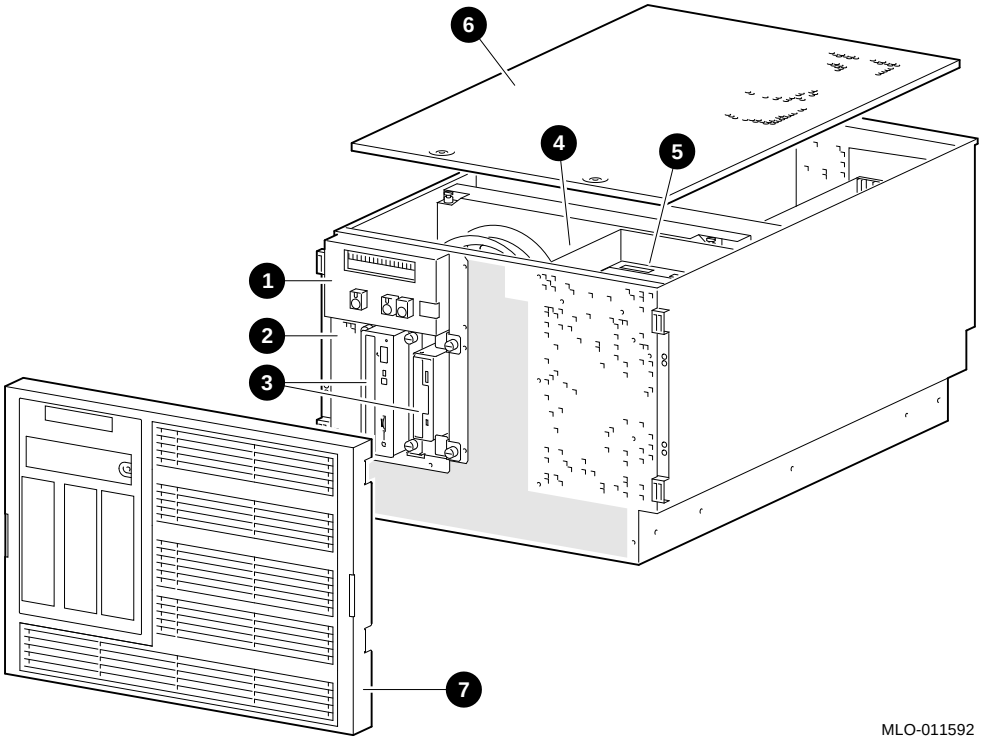
Components and Controls

Drawer mount and vertical mount system components and controls are located at the front, top, and rear of the system.

Drawer Mount System: Front Components

Figure 1–2 shows the components on the front of the system.

Figure 1–2 Drawer Mount System: Front Components

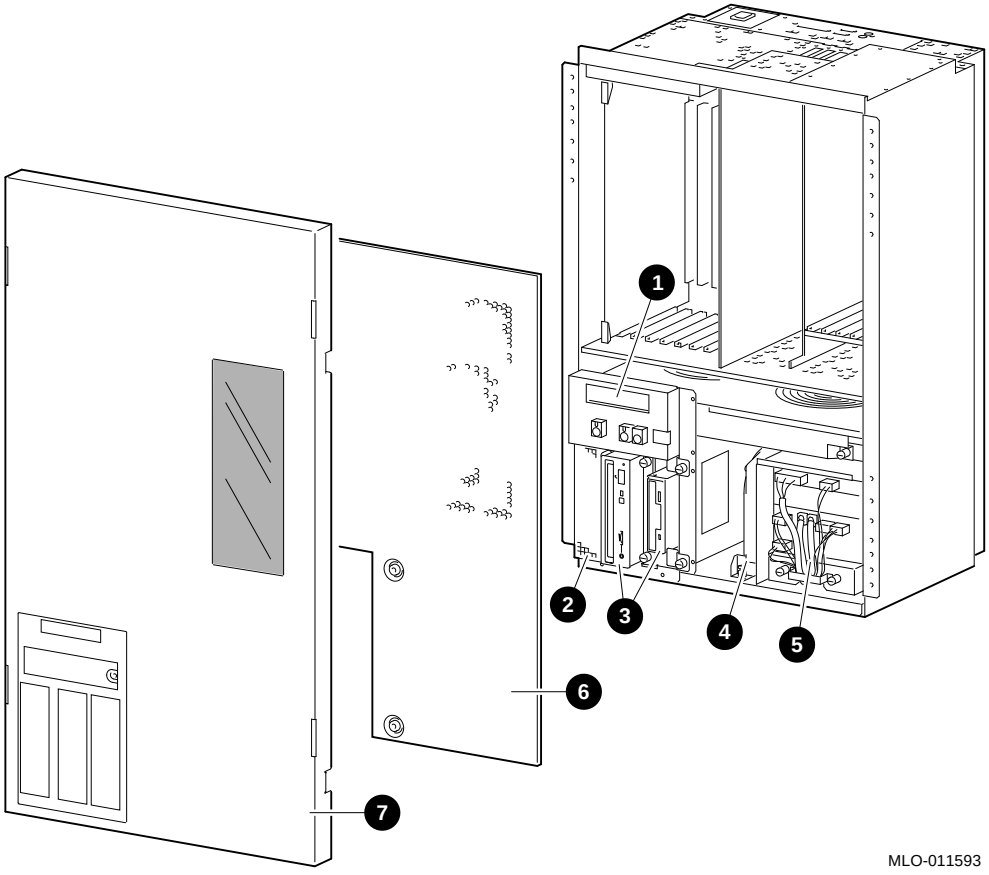


❶ Operator control panel (OCP)
❷ Optional slot for removable-media mass-storage devices
❸ Removable-media mass-storage devices
❹ Hard disk drives
❺ Power supply
❻ Top cover
❼ Front bezel (optional)

Vertical Mount System: Front Components

Figure 1–3 shows the components on the front of the system.

Figure 1–3 Vertical Mount System: Front Components



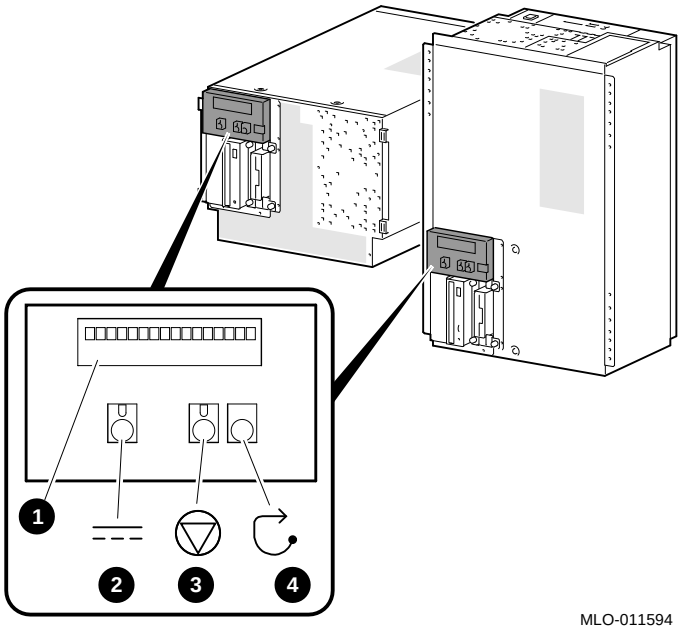
❶ Operator control panel (OCP)
❷ Optional slot for removable-media mass-storage devices
❸ Removable-media mass-storage devices
❹ Location of hard disks
❺ Power supply
❻ Front cover
❼ Front bezel (optional)

For information about mass-storage controls, refer to device-specific information in Chapter 5 of this guide.

Operator Control Panel (OCP)

Figure 1–4 shows the individual controls and indicators on the OCP. The OCP is the same on both the drawer mount and vertical mount systems.

Figure 1–4 Operator Control Panel (OCP)

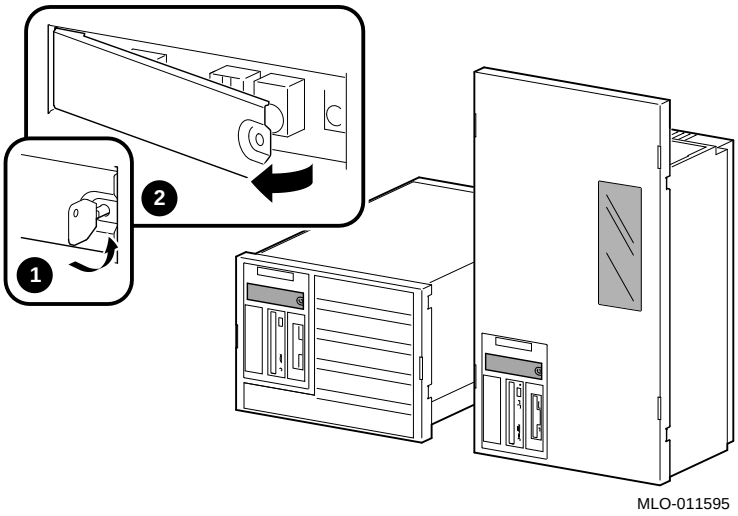


❶ Power-up/diagnostic display
❷ DC On/Off button
❸ Halt button
❹ Reset button

OCP Door

After the system is installed in a drawer or vertical cabinet, the OCP door permits access to the OCP controls without removing the front bezel. To open the OCP door, unlock the door ❶ and pull the upper-right edge ❷ of the door away from the system as shown in Figure 1–5.

Figure 1–5 Unlocking the OCP Door



Drawer Mount System: Top Access Cover

Figure 1–6 shows the location of the top access cover to the module card-cage area.

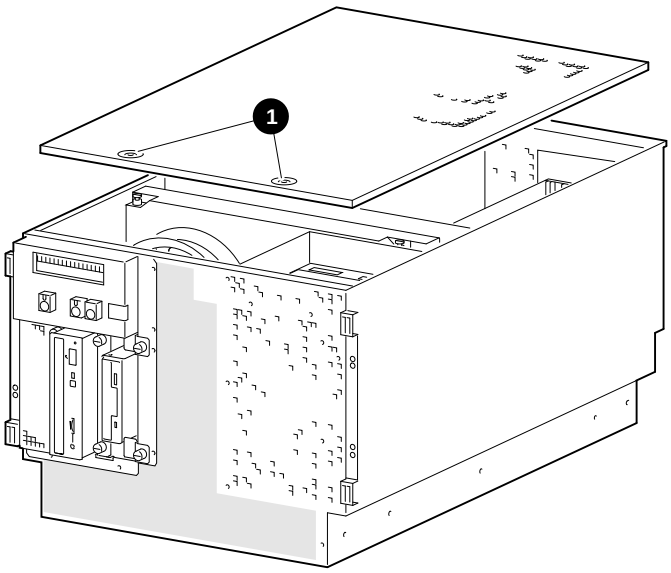
Warning: CPU and memory modules have parts that operate at high temperatures. Wait two minutes after power is removed before handling these modules.

Warning: This area contains electrical energy. Disconnect the ac power cord(s) to the system before accessing this area.

To open the top cover, follow these steps:

1. Turn off the power to the system, see ❷ in Figure 1–4.
2. Disconnect the power cord.
3. Turn each of the two screws in the pawl latches multiple times, see ❶ in Figure 1–6, until the latches release the cover to the chassis.

Figure 1–6 Drawer Mount System: Top Access Cover



MLO-011626

Vertical Mount System: Front Access Cover

Figure 1–7 shows the location of the front access cover over the module card-cage area.

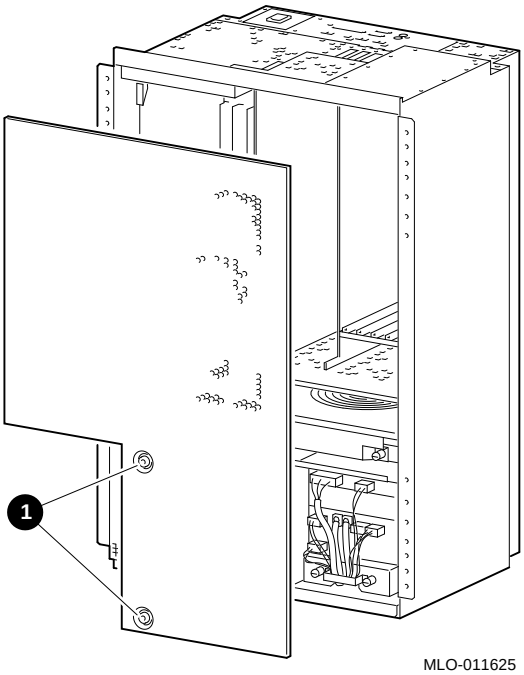
Warning: CPU and Memory modules have parts that operate at high temperatures. Wait two minutes after power is removed before handling these modules.

Warning: This area contains electrical energy. Disconnect the ac power cord(s) to the system before accessing this area.

To open the front access cover, follow these steps:

1. Turn off the power to the system, see ❷ in Figure 1–4.
2. Disconnect the power cord.
3. Turn the two screws in the pawl latches multiple times, see ❶ in Figure 1–6, until the latch releases the cover to the chassis.

Figure 1–7 Vertical Mount System: Front Access Cover

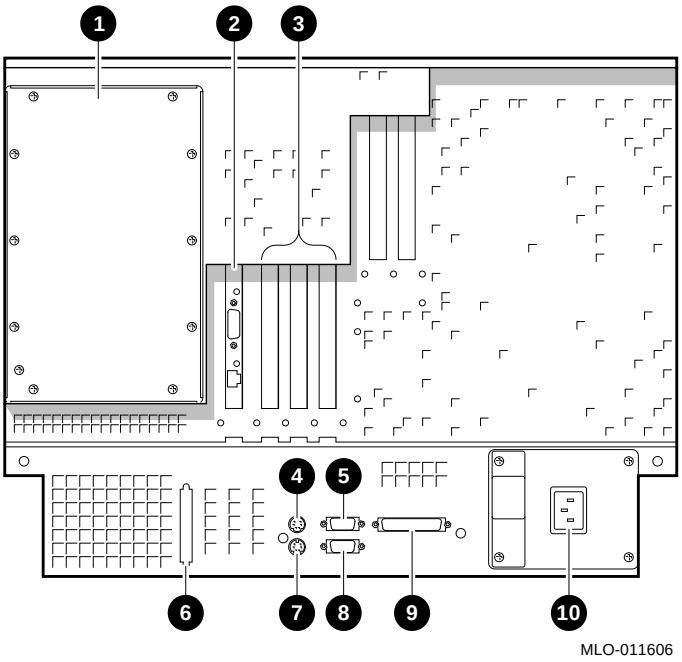


❶ Turn the screw in each pawl latch to release front access cover

Drawer Mount System: Bulkhead Components

Figure 1–8 shows the bulkhead components (rear of the system).

Figure 1–8 Drawer Mount System: Bulkhead Components

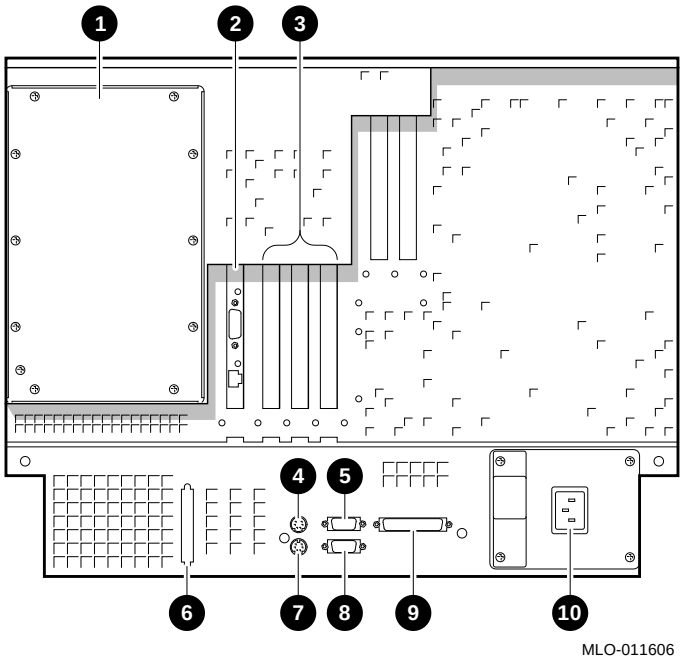


❶ VME I/O area, customer configurable
❷ Ethernet ports (2)
❸ 3 PCI-32 I/O slots
❹ Mouse port
❺ Serial port (COM1) console terminal
❻ SCSI port
❼ Keyboard port
❽ Serial port (COM2) modem connection
❾ Parallel port printer connection
❿ AC power input

Vertical Mount System: Bulkhead Components

Figure 1–9 shows the bulkhead components (top of the system).

Figure 1–9 Vertical Mount System: Bulkhead Components



❶ VME I/O area, customer configurable
❷ Ethernet ports (2)
❸ 3 PCI-32 I/O slots
❹ Mouse port
❺ Serial port (COM1) console terminal
❻ SCSI port
❼ Keyboard port
❽ Serial port (COM2) modem connection
❾ Parallel port printer connection
❿ AC power input

Power Requirements

Appendix A lists the electrical specifications and power requirements for your system.

Voltage selection is not required. This equipment is intended for use at all rated ac-input voltages.

Warning: High voltage shock hazard present inside the power supply.

Power Cords

Power cords for the Digital Alpha VME 2100 systems are country-specific. The system is shipped with a U.S. power cord (PN: 17-00083-51).

For a list of the available power cords and their appropriate part numbers, refer to Table 1–2 and note the following:

- If you are a customer, use the Power Cord BN Number to identify the power cord that you need.
- If you are a Digital service representative, use the Digital Number to identify the power cord that you need.

Table 1–2 Power Cord Order Numbers

Country	Power Cord BN Number	Digital Number
U.S., Japan, Canada [1]	—	17-00083-51
Australia, New Zealand	BN19J-2E	17-00198-13
Central European (Aus, Bel, Fra, Ger, Fin, Hol, Nor, Swe, Por, Spa)	BN19D-2E	17-00199-22
U.K., Ireland	BN19B-2E	17-00209-12
Switzerland	BN04B-2E	17-00210-12
Denmark	BN19L-2E	17-00310-06
Italy	BN19N-2E	17-00364-17
India, South Africa	BN19T-2E	17-00456-15
Israel	BN18Y-2E	17-00457-15

[1]This power cord is included with the system.

2
Installation

In This Chapter

This chapter covers the following topics:

- Verifying site preparation
- Unpacking the shipment
- Installing the drawer mount system
- Installing the vertical mount system
- Completing the installation of both systems
- Turning the system on
- Console port configurations
- Turning the system off
- Invoking console mode
- Connecting to networks
- Connecting peripherals

WARNING: Before Installing the System

Only a qualified service person should install the system. A qualified service person has the technical training and experience necessary to be aware of the:

- Hazards to which they are exposed in performing a task
- Measures to minimize the danger to themselves, other persons, and equipment.

A qualified service person need not be a Digital service representative.

Verifying the Site Preparation

Overview

The installation instructions that follow assume that:

- All cables that you plan to connect to your system are in place and clearly labeled. These cables are:

  Terminal data cables
  Telephone cables
  Network cables

- The specifications and conditions listed in Appendix A have been met.
- The system is located in an area that provides sufficient clearance for ventilation and servicing. Figure 2–1 and Figure 2–2 show the recommended clearances for the systems.

Caution

Inlet air at the bottom of the vertical mount system, and at the front of the drawer mount system, *must* be within the operating temperature range specified in Table A–4.

Warning

The Digital Alpha VME 2100 system weighs 49.94 kg (110 lbs). To prevent personal injury and equipment damage, ensure that the drawer mount system is contained in an enclosure that can be stabilized when the system is pulled out on its slides.

Figure 2–1 Drawer Mount System: System Clearance/Service Area

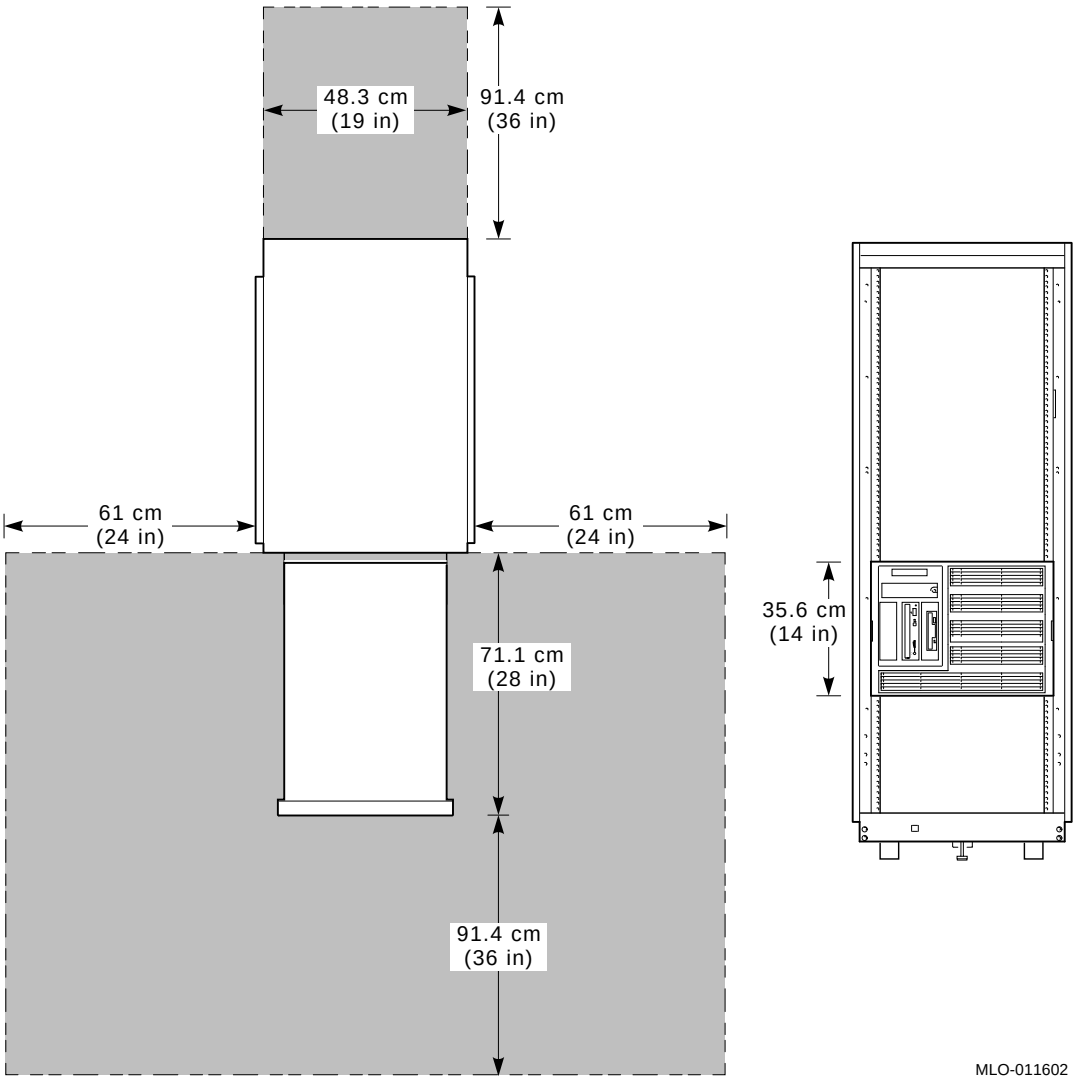
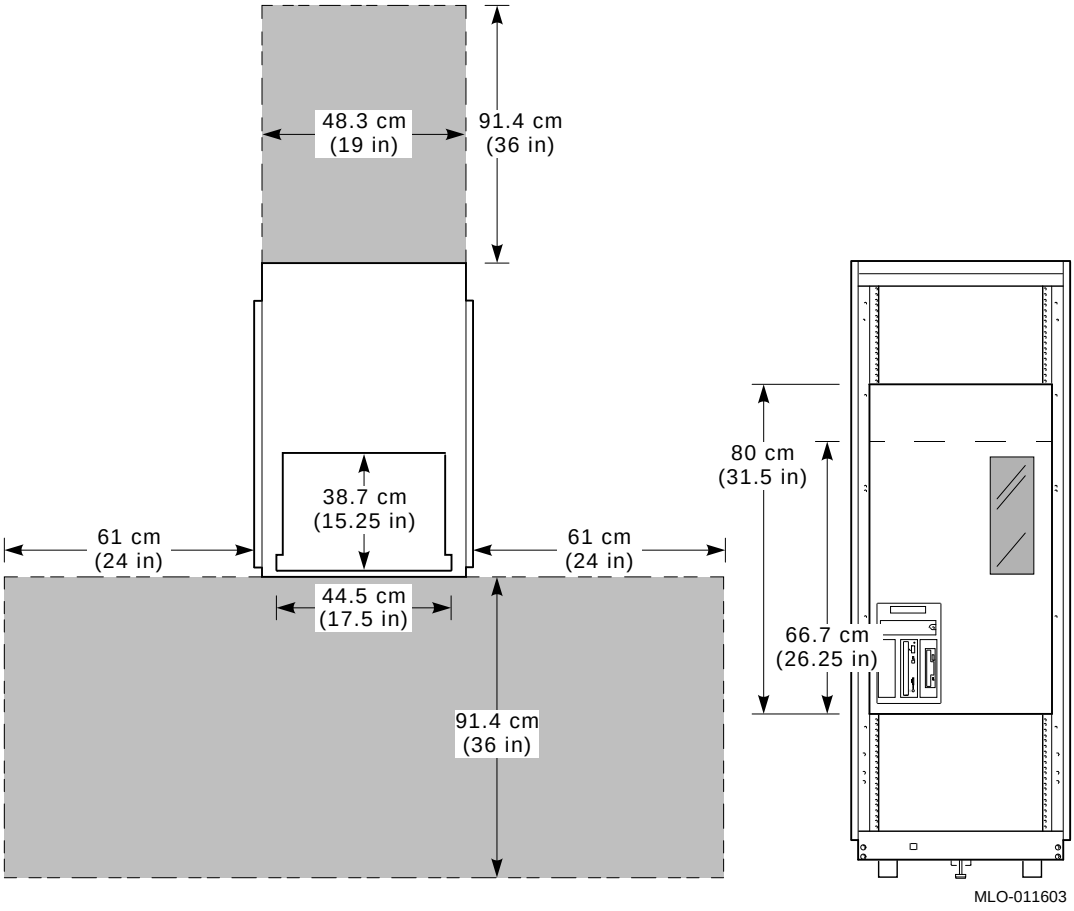


Figure 2–2 Vertical Mount System: System Clearance/Service Area



Reminder

A minimum of 5.25 inches of air space is required **above** and **below** the vertical mount system. Inlet air at the bottom of the vertical mount system *must* be within the operating temperature range specified in Table A–4.

When fully mounted in a rack, (support bracket installed above the chassis), the vertical mount system is:

- 66.7 cm (26.25 in) in height (chassis only).
- 80 cm (31.5 in) in height with optional front bezel installed over the chassis and support bracket.

Unpacking the Shipment

Checking the Shipment

Check the packing list to ensure that all items listed have been received. If any item is missing or damaged, contact your delivery agent immediately and notify your Digital sales representative.

Note

Save all packing materials in case you need to return the system for service or to reship the system.

Your shipment may include several cartons. One carton may contain the system, hardware documentation, software documentation, system software, diagnostic software, and software licenses.

Depending on your order, your shipment may also include some of the following components:

- Terminals
- Printers
- Modems
- Options
- Optional front bezel

Warning

The Digital Alpha VME 2100 system weighs 49.94 kg (110 lbs). Use sufficient personnel to remove the system from the shipping carton.

Accessories

Table 2–1 lists the mounting hardware, included with the drawer mount system, for installation in cabinets conforming to either English RETMA or metric IEC standards.

Table 2–1 Accessory Kit Contents (PN: 70–31884–02)

Description	Part Number	Quantity
SCSI terminator	12-37004-04	1
Ethernet loopback connector	12-22196-02	1
Female MMJ connector	12-23599-08	1
Power cord, term 3-14 SJT 125 V	17-00083-51	1
Rubber grommet	12-31734-01	4
Chassis slide assembly	12-42522-01	1 pair
Package assembly	37-01595-01	1
Drive plate	74-48242-01	1
Nut bar	74-48746-01	4
Stabilizer bracket	74-48996-01	1
Actuator latch	74-48997-02	1
Nut, bar, support bracket	74-48998-01	1
Interlock actuator bracket	74-48999-14	1
Bracket, slide for English/Metric systems	74-49345-01	2
Bracket, slide for English/Metric systems	74-49345-02	2
Pan-head sems screws, 8-32	90-00049-28	16
Screws, 10-32 truss-head	90-00063-37	2
Screws, 10-32 truss-head	90-00063-39	16
Set screws, 6-32	90-06291-10	2
Cable tie, 1.25-inch diameter	90-07031-01	10
U-nut, 10-32	90-07786-00	4
Flat-head machine screw, 6mm	90-40122-03	4

(continued on next page)

Table 2–1 (Cont.) Accessory Kit Contents (PN: 70–31884–02)

Description	Part Number	Quantity
Digital Alpha VME 2100 Owner's Guide	EK–DALPH–OG	1
Digital Alpha VME 2100 Read Me First	EK–DALDC–IS	1
ECU diskette V1.6 DEC AXP	AK–Q2CRF–CA	1
Tape drive insulator assembly	70-32518-01	1

Table 2–2 lists the mounting hardware included with the vertical mount system, for installation in a 19" vertical racks.

Table 2–2 Accessory Kit Contents (PN: 70–31884–01)

Description	Part Number	Quantity
Ethernet loopback connector	12-22196-02	1
Female MMJ connector	12-23599-08	1
Rubber grommet	12-31734-01	4
SCSI terminator	12-37004-04	1
Power cord, term 3-14 SJT 125 V	17-00083-51	1
Package assembly	37-01595-01	1
Drive plate	74-48242-01	1
Bracket - installation/top baffle	74-49581-01	1
Truss-head screws 10-32 .500 XRCS	90-00063-39	14
Cable tie, 1.25-inch diameter	90-07031-01	10
U-nut 10-32	90-07786-00	14
Flat-head machine screw, M3 x 6mm	90-40122-03	4
Digital Alpha VME 2100 Owner's Guide	EK–DALPH–OG	1
Digital Alpha VME 2100 Read Me First	EK–DALDC–IS	1
ECU diskette V1.6 DEC AXP	AK–Q2CRF–CA	1
Tape drive insulator assembly	70-32518-01	1

Installing the Drawer Mount System

Overview

The drawer mount system is shipped with one pair of slide assemblies (PN: 12–42522–01), which include:

- Four universal brackets for both English RETMA or metric IEC cabinet installation
- The slide assemblies
- Attaching hardware

Installing the system on the slides involves the following major steps:

1. Preparing the slides
2. Attaching the slide races
3. Attaching the slides to the cabinet rails
4. Mounting the system on the slides

Tools Required

A flat-blade screwdriver and a small adjustable wrench are needed to install the system.

Preparing the Slides

Refer to Figure 2–3 and prepare the slides as follows:

Caution

To avoid damaging the slides, the installation *must* be performed as instructed in the following procedure.

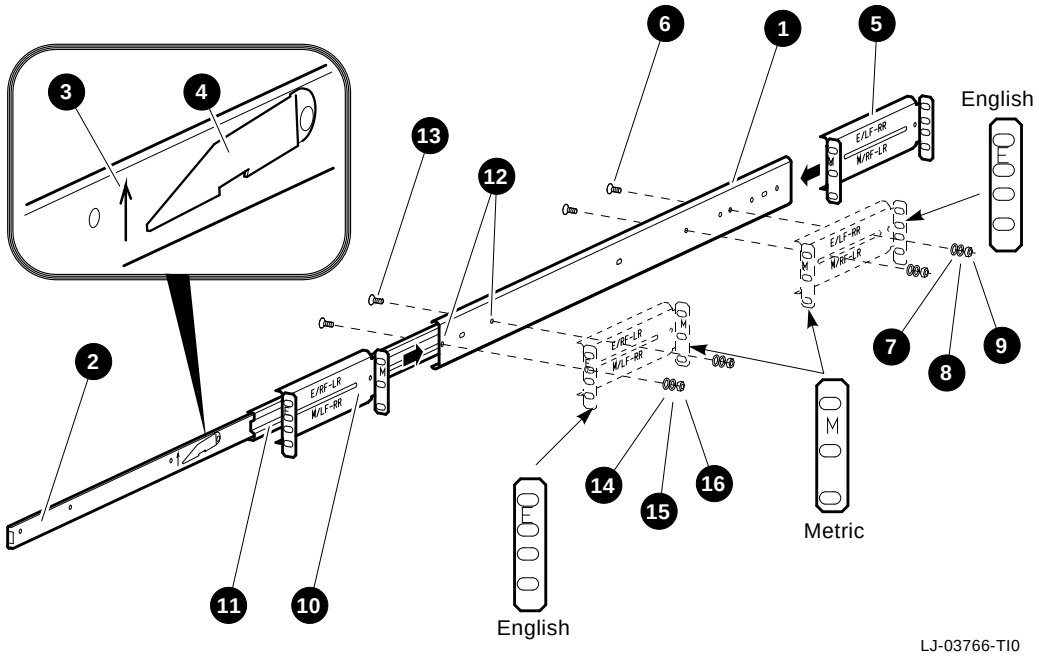
Note

Unless noted otherwise, the following instructions apply to both English RETMA and metric IEC cabinet installations.

1. Find the slide assembly ❶ labeled RH (for right-hand side) that is shipped with the system.
2. Pull out the inside race ❷ until it locks. *Do not* remove the race from the slide assembly at this time.
3. Orient the slide so that the arrow ❸ next to the locking lever ❹ is pointing upward.
4. For English RETMA cabinets, slide the E/LF-RR bracket ❺ onto the rear end of the slide assembly ❶ with the end stamped E facing away from the slide.

   For metric IEC cabinets, use the same procedure, except slide the M/LF-RR bracket onto the rear end of the slide assembly with the end stamped M facing away from the slide.

Figure 2–3 Attaching the Brackets to the Right Slide Assembly (English RETMA and Metric IEC)



5. Attach the rear bracket ❺ to the slide assembly ❶ using the mounting holes shown in Figure 2–3 and two 8-32 screws ❻, flat washers ❼, lock washers ❽, and nuts ❾, but do not tighten. The bracket must be loose enough to adjust later.
6. Press up on the locking lever ❹ (direction of the arrow ❸), and pull the race ❷ out of the slide assembly ❶.
7. For English RETMA cabinets, slide the E/RF-LR bracket ❿ onto the front end of the slide assembly ❶ with the end stamped E facing away from the slide.

   For metric IEC cabinets, use the same procedure, except slide the M/RF-LR bracket onto the front end of the slide assembly with the end stamped M facing away from the slide.
8. To fasten the front bracket to the slide assembly, proceed as follows:
   a. Pull out the inside slide ⓫ about halfway, enough to align two half-inch access holes on the inside slide with the mounting holes ⓬ on the slide assembly ❶ and the front bracket ❿. The first hole on the slide assembly aligns with the first hole on the bracket as shown in Figure 2–3.
   b. Attach the front bracket ❿ to the slide assembly ❶ using two 8-32 screws ⓭, flat washers ⓮, lock washers ⓯, and nuts ⓰. Tighten the screws.
   c. Slide the race ❷ back into the slide assembly, making sure that the arrow ❸ is pointing upward and the locking lever is pointing away from the slide assembly.
   d. Set this assembly aside.
9. Find the slide assembly labeled LH (for left-hand side) that is shipped with the system.

Caution

To avoid damaging the slides, the installation *must* be performed as instructed in steps 2 through 8.

10. Attach the rear and front brackets (following steps 2 through 8) using the brackets as follows:
    - For English RETMA cabinet installation, use bracket E/RF-LR for the rear end of the slide assembly and bracket E/LF-RR for the front end of the slide assembly.
    - For metric IEC cabinet installation, use bracket M/RF-LR for the rear end of the slide assembly and bracket M/LF-RR for the front end of the slide assembly.

Reminder

Figure 2–3 shows how to attach the front and rear brackets to a right slide assembly for an English RETMA cabinet. Use as reference only when assembling the left slide assembly.

Attaching the Slide Races

To attach the slide races, refer to Figure 2–4 and proceed as follows:

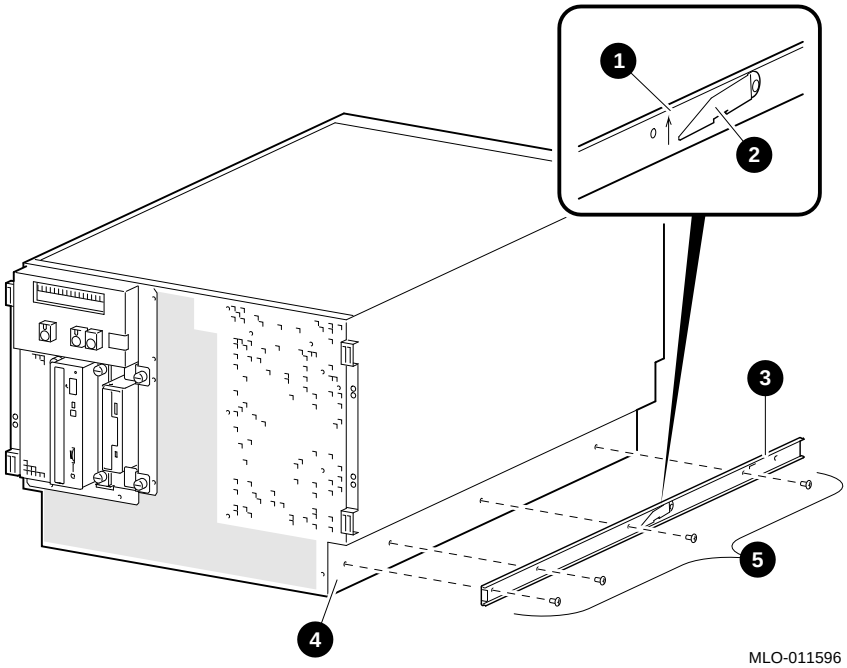
1. Remove the race from the slide assembly labeled RH.

Caution

When performing the next step, ensure that the arrow ❶ (shown in Figure 2–4) points upward and the locking lever ❷ points toward the front of the system. Otherwise, the slide will be damaged when the system is installed on the slides.

2. Attach the right slide race ❸ to the right side of the system chassis ❹ (as viewed from the front) using four pan-head screws ❺.
3. Remove the race from the slide assembly labeled LH.
4. Take note of the caution in step 1 and repeat step 2 to attach the left slide race to the left side of the system chassis.

Figure 2–4 Drawer Mount System: Attaching the Slide Races



Drawer Mount System: Cabinet Stability

Warning

To ensure cabinet stability, do not install the system in the top area of the cabinet.

Drawer Mount System: Rail-Hole Pattern English (RETMA)

In a cabinet conforming to the English RETMA standard, the holes in the cabinet rails follow a pattern of 1.27 cm (0.50 in.), 1.59 cm (0.625 in.), and 1.59 cm (0.625 in.). This pattern is repeated for the length of the cabinet rails.

Drawer Mount System: Installation Area English (RETMA)

To determine the installation area, perform the following steps at the front and rear cabinet rails (refer to Figure 2–5).

Step	Action
1	Select a section of the cabinet rail where there is a 1.27 cm (0.50 in.) space between two holes.
2	Make a mark between the holes. This is the starting point of the installation area.
3	Count up or down three holes. This is one *set* and equals 4.45 cm (1.75 in.).
4	Count up or down eight sets and make a mark. The area between the marks is the *installation area*.

The total installation area is 35.6 cm (14 in.). The equation for calculating the total installation area is:

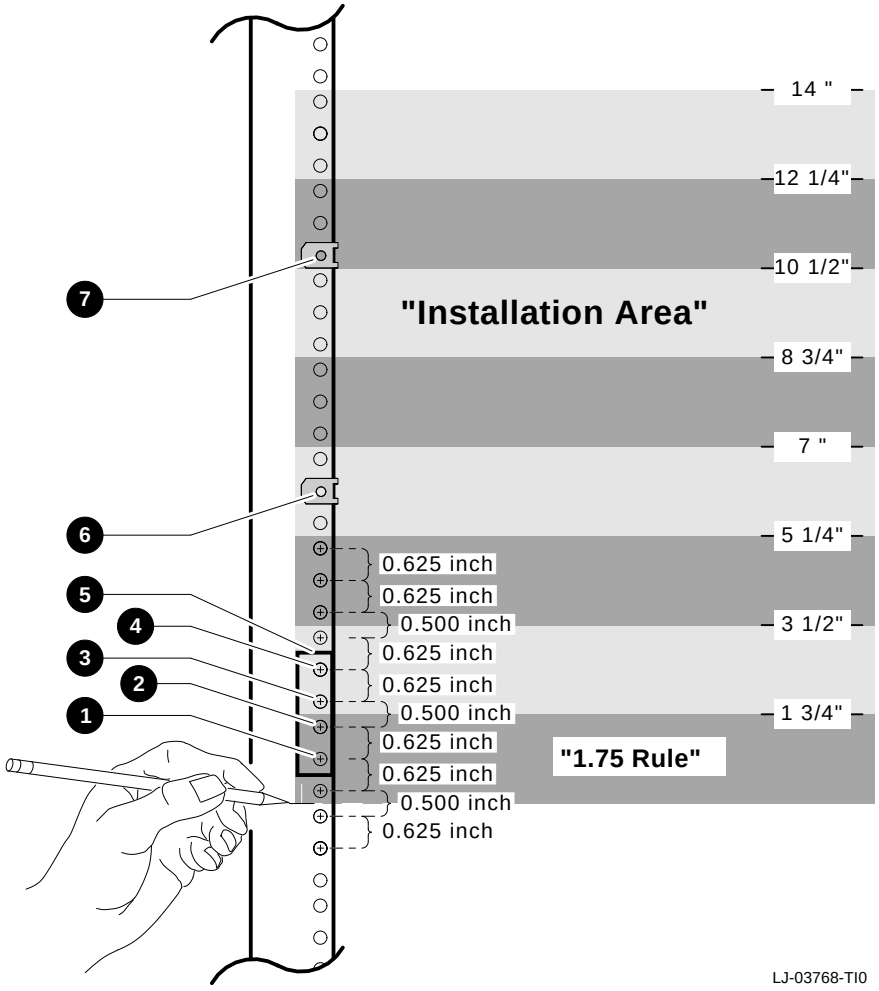
4.45 cm (1.75 in.) × 8 sets = 35.6 cm (14 in.)

Note

The hole count described in this section determines the system installation location in any 35.6-cm (14-in.) area of the cabinet.

Install the system with a minimum of 43 cm (17 in.) from the floor, to provide sufficient clearance for service through the bottom access door.

Figure 2–5 Drawer Mount System: Installation Area English (RETMA)



❶ Hole 2 for attaching slide bracket
❷ Hole 3 for attaching slide bracket
❸ Hole 4 for attaching slide bracket
❹ Hole 5 for attaching slide bracket
❺ Bar nut (placed behind rail (front and back rails))
❻ Hole 11 for clip nut used to secure system to front rails
❼ Hole 19 for clip nut used to secure system to front rails

Drawer Mount System: Rail-Hole Pattern Metric (IEC)

In a cabinet conforming to the metric IEC standard, the holes in the cabinet rails are 2.5 cm (0.98 in.) on center throughout the length of the cabinet rails.

Drawer Mount System: Installation Area Metric (IEC)

To determine the installation area, perform the following steps at the front and rear cabinet rails (refer to Figure 2–6).

Step	Action
1	Select a section of the cabinet rail where there are 14 consecutive holes unoccupied.
2	Make a mark between the first hole (bottom) and the one below it. This is the starting point of the installation area.
3	Count up 14 holes and make a mark halfway between the 14th and 15th hole. The area between the marks is the *installation area*.

The total installation area is 35 cm (13.78 in.). The equation for calculating the total installation area is:

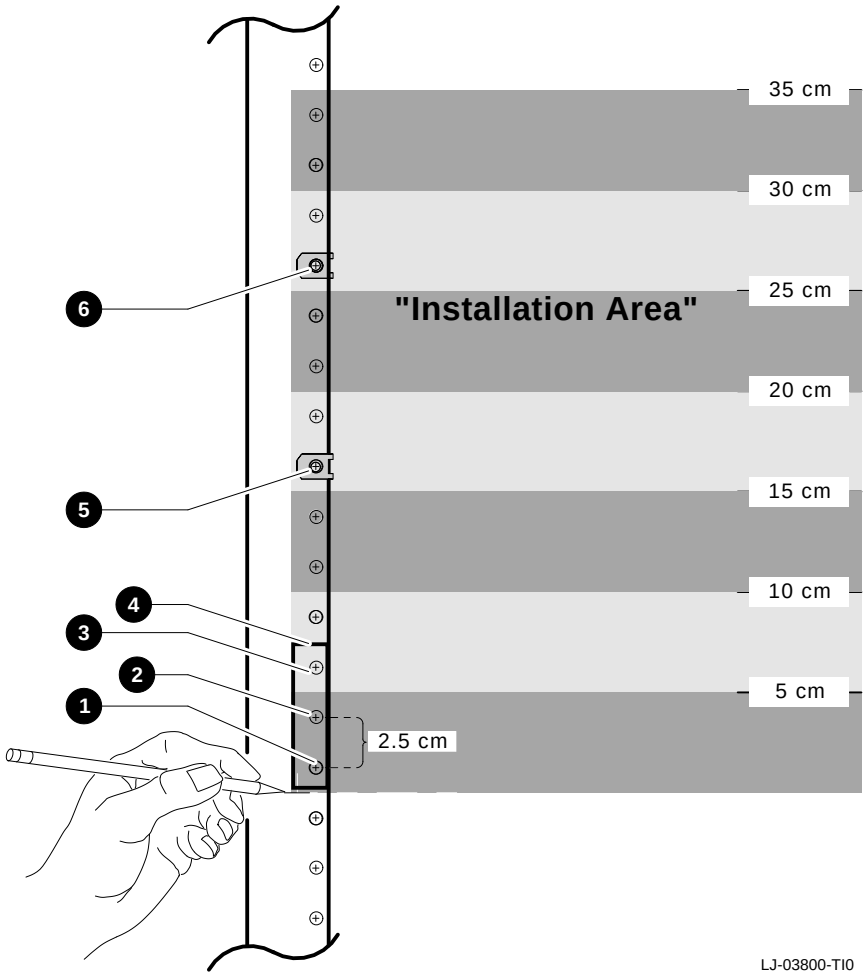
2.5 cm (0.98 in.) $\times$ 14 holes = 35 cm (13.78 in.)

Note

The hole count described in this section determines the system installation location in any 35-cm (13.78-in.) area of the cabinet.

Install the system with a minimum of 43 cm (17 in.) from the floor, to provide sufficient clearance for service through the bottom access door.

Figure 2–6 Drawer Mount System: Installation Area Metric (IEC)



❶ Hole 1 for attaching slide bracket
❷ Hole 2 for attaching slide bracket
❸ Hole 3 for attaching slide bracket
❹ Bar nut (placed behind front and back rails)
❺ Hole 7 for clip nut used to secure system to front rails
❻ Hole 11 for clip nut used to secure system to front rails

Drawer Mount System: Installing U-nuts

Four U-nuts must be installed on the cabinet rails to receive the screws that secure the system to the rails. To install the U-nuts, proceed as follows:

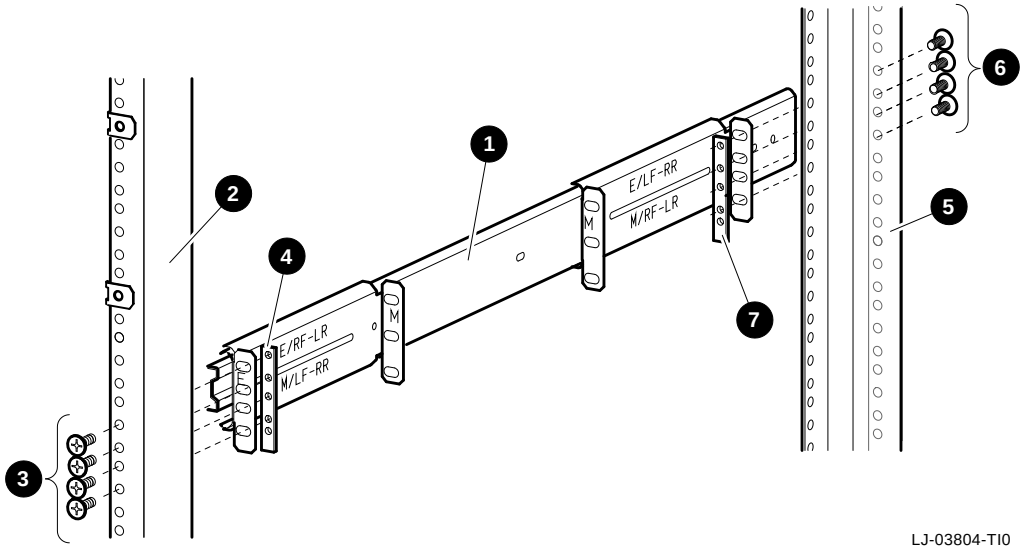
1. In a cabinet with the English (RETMA) hole pattern, locate the 11th and 19th holes on the front rails in the installation area (refer to Figure 2–5). In a cabinet with the metric (IEC) hole pattern, locate the 7th and 11th holes on the front rails in the installation area (refer to Figure 2–6).
2. Install a U-nut over each mounting hole identified in step 1 by sliding the U-nut over the edge of the cabinet rail and aligning it with the hole. Ensure that the threaded half of the U-nuts are toward the inside of the cabinet.

Drawer Mount System: Attaching the Slides

To attach the slides to the cabinet rails, refer to Figure 2–7 and proceed as follows:

1. Locate the slide assembly labeled RH. In English RETMA cabinets, attach the RH slide assembly ❶ to the right front cabinet rail ❷ (facing the front of the cabinet) using four 10-32 screws ❸ (for metric IEC, use three screws) and a bar nut ❹. Do not tighten the screws at this time.
2. Attach the RH slide assembly ❶ to the right rear cabinet rail ❺ using four 10-32 screws ❻ (for metric IEC, use three screws) and a bar nut ❼. Do not tighten the screws at this time.
3. Tighten the 8-32 screws attaching the rear bracket to the RH slide assembly (shown as ❻ and ⓭ in Figure 2–3).
4. Repeat steps 1 through 3 to attach the LH slide assembly to the left cabinet rails.
5. Tighten the screws on the front and rear cabinet rails only enough to allow play for the slides to self-align when the system is installed in the next procedure.

Figure 2–7 Drawer Mount System: Attaching the Slides to the Cabinet Rails



Drawer Mount System: Mounting the System on the Slides

To mount the system on the slides, refer to Figure 2–8 and proceed as follows:

Warning

The Digital Alpha VME 2100 system weighs approximately 49.94 kg (110 lbs). Use sufficient personnel and the proper equipment when lifting or moving the system.

Stabilize the cabinet before installing the system into the cabinet. Figure 2–8 shows an example of a cabinet with the stabilizer foot ❶ extended.

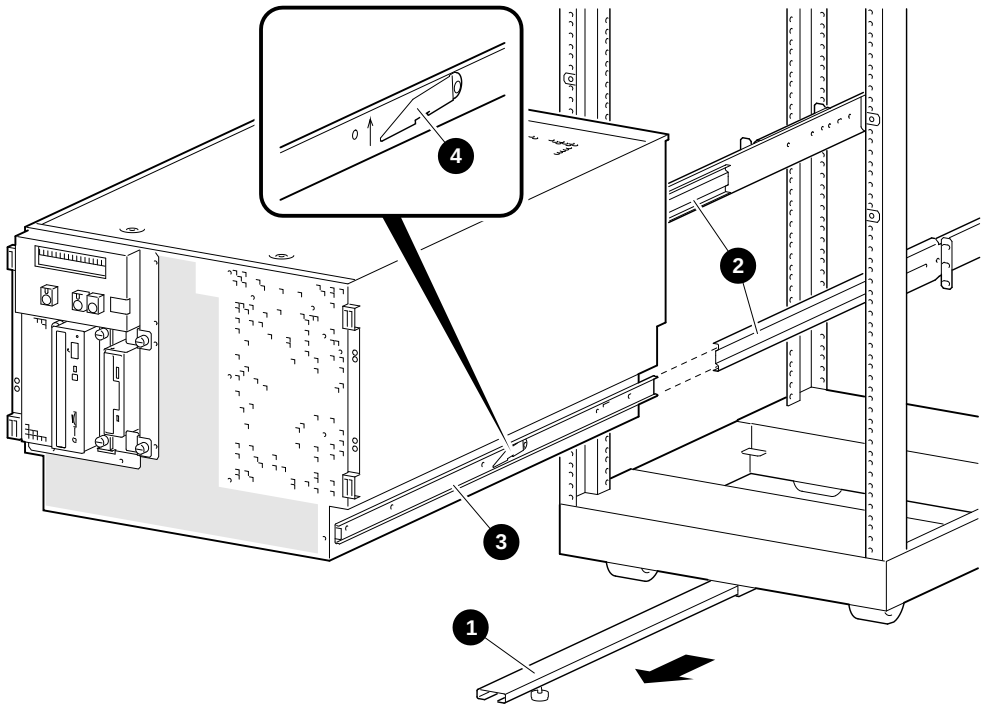
1. Pull both equipment slides ❷ out fully to their locked positions.

Note

Coil the male plug end of the power cord and place it on top of the system to keep it out of the way when performing the next step.

2. Lift the chassis ❸ and position it so that the slide races fit into the front end of the slides.
3. Push the system into the slides until it stops. Push up on the two locking levers ❹, and then push the system into the cabinet.

Figure 2–8 Drawer Mount System: Mounting the System on the Slides

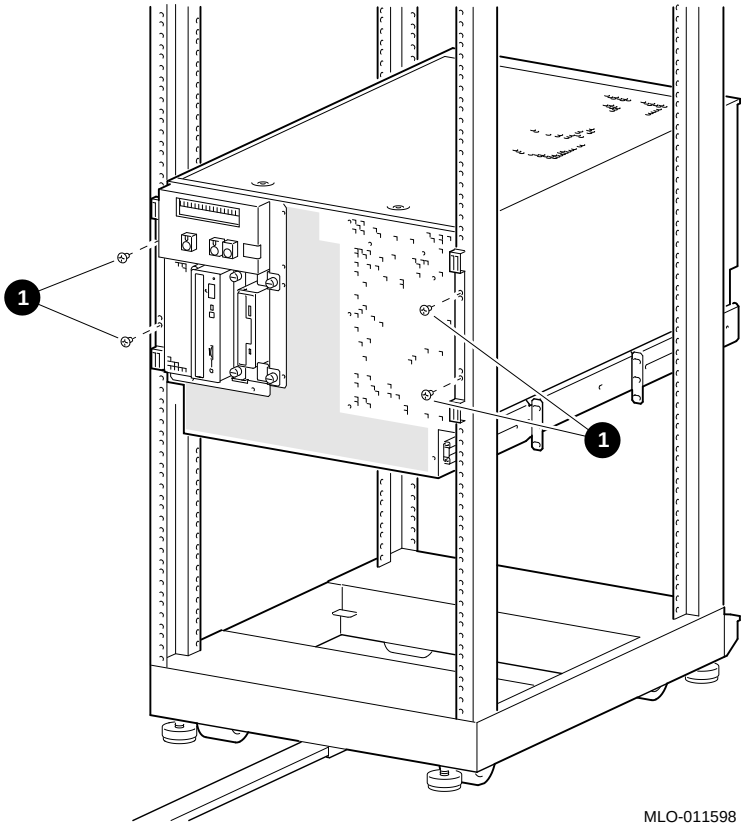


Drawer Mount System: Aligning the System Slides

To align the system slides to the cabinet rails and ensure smooth operation in and out of the cabinet, refer to Figure 2–9 and proceed as follows:

1. Pull up on the front of the system and secure the system to the front cabinet rails using four 10-32 screws ❶. The screws go through the system brackets and into the four U-nuts previously installed on the cabinet rails (refer to Figure 2–5 and Figure 2–6).

Figure 2–9 Aligning the System Slides to the Cabinet Rails



Drawer Mount System: Optional Interlock System

The optional interlock system prevents the cabinet from becoming unstable by allowing only one system at a time to be pulled out of the cabinet.

The interlock system consists of a vertical bar on which are mounted actuator latches for each product installed in the cabinet. The actuator latches engage the interlock actuator bracket on the rear of drawer mount systems. When a drawer mount system is pulled out of the cabinet, the actuator latches rotate to prevent another drawer-mount system (that has an interlock actuator bracket) from being pulled out of the cabinet.

Drawer Mount System: Interlock Actuator Bracket

The interlock actuator bracket prevents cabinet instability by allowing only one system at a time to be pulled out of the cabinet. Install the interlock actuator bracket if the system cabinet has an interlock system.

Note

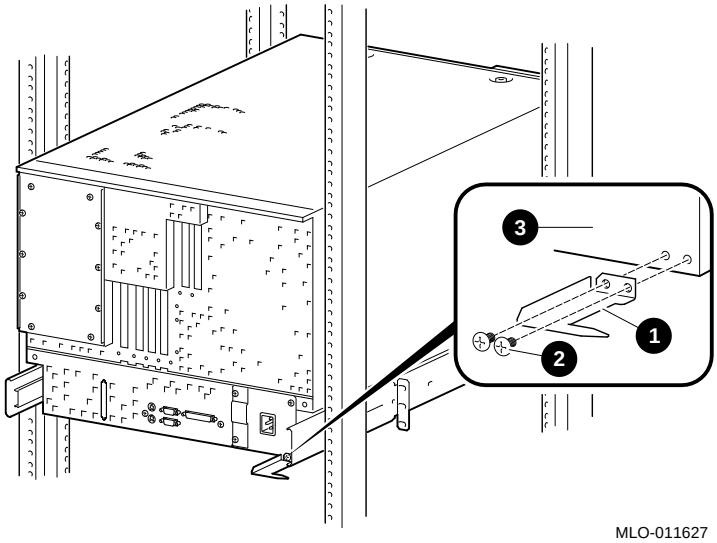
In some cabinets, the interlock bar in the cabinet may not engage the interlock actuator bracket properly. In these cases, do not install the interlock actuator bracket.

Warning

If the system is installed in a cabinet without an interlock bar or the bar is not compatible with the system interlock actuator bracket, the customer must provide a stable cabinet.

Figure 2–10 shows how to mount the interlock actuator bracket. Mount the interlock actuator bracket ❶ at the rear of the system ❸ using two 8-32 screws ❷.

Figure 2–10 Installing the Interlock Actuator Bracket



Drawer Mount System: Interlock Actuator Latches

If additional products are installed into the cabinet, actuator latches for those products should be installed. To install actuator latches, refer to Figure 2–11 and proceed as follows:

1. Remove the screws securing the bottom mounting bracket to the cabinet ❹.
2. Slide the mounting bracket off the bottom of the vertical bar ❶.
3. Slide the stabilizer bracket ❺ for the new product onto the bottom of the vertical bar.
4. Slide the actuator latch ❷ for the new product onto the bottom of the vertical bar.
5. Replace the bottom mounting bracket ❹ and install the screws removed in step 1 but *do not* tighten them.
6. Position the stabilizer bracket so that the bottom hole in the stabilizer bracket ❻ aligns with the mounting rail hole adjacent to the bottom of the installed product. This may require the loosening and sliding of other latches and stabilizer brackets to accommodate the new configuration.

7. Place the nut plate behind the mounting rail and install and tighten the two 10-32 truss-head screws provided to secure the stabilizer bracket.
8. Position the new actuator latch ❷ to properly engage the interlock actuator bracket ❸, and tighten the two 6-32 set screws to secure the latch.
9. Now tighten the screws to secure the bottom mounting bracket ❹.

The expanded view (A) (Figure 2–11) shows the position of the actuator latches when all systems are pushed into the cabinet. The expanded view (B) (Figure 2–11) shows the position of all actuator latches after one system has been pulled out.

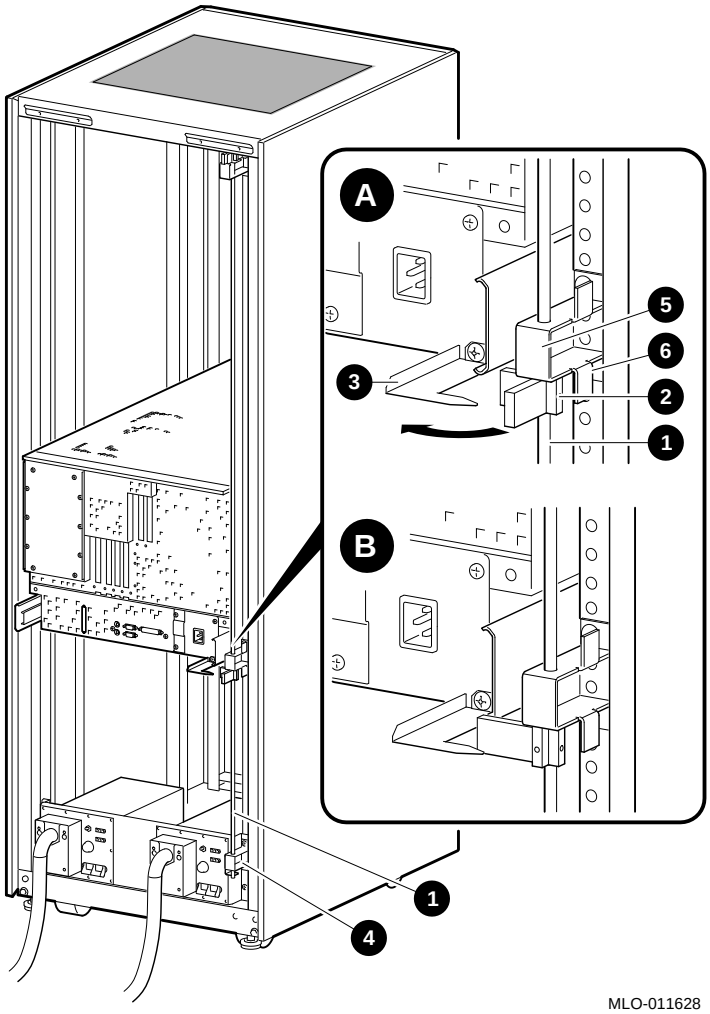
Note

The interlock system is compatible with the Digital Alpha VME 2100 systems. Other systems may not be compatible because the interlock actuator bracket may not engage properly. In these cases, do not install the interlock actuator bracket on those systems.

Warning

If a system is installed without an interlock actuator bracket or the vertical bar in the cabinet does not engage properly with the system interlock actuator bracket, the customer *must* provide a stable cabinet.

Figure 2–11 The Interlock System



Installing the Vertical Mount System

Overview

The vertical mount system is shipped with one 5 inch brace and four screws.

Reminder

A minimum of 5.25 inches of air space is required **above** and **below** the vertical mount system. Inlet air at the bottom of the vertical mount system *must* be within the operating temperature range specified in Table A–4.

For custom installations, or if you have air flow problems because of multiple devices installed in your rack, call your Digital service representation for assistance.

Tools Required

A flat-blade screwdriver is needed to install the vertical mount system.

Note

Unless noted otherwise, the following instructions apply to both English (RETMA) and metric (IEC) cabinet installations.

Vertical Mount System: Rail-Hole Pattern English (RETMA)

In a rack conforming to the English RETMA standard, the holes in the rack rails follow a pattern of 0.625 inches, 0.500 inches, and 0.625 inches. This pattern is repeated for the length of the rack rails.

Vertical Mount System: Installation Area English (RETMA)

To determine the installation area, perform the following steps at the front and rear rack rails (refer to Figure 2–12).

Step	Action
1	Check to see that there is a minimum of 5.25 inches of air space available **above** and **below** the vertical mount system.
2	Select a section of the rack rail where there is 0.50 inches of space between two holes.
3	Make a mark between the holes. This is the starting point of the installation area.
4	Count up or down three holes. This is one *set* and equals 1.75 inches.
5	Count up or down 21 sets and make a mark. The area between the marks is the *installation area*.

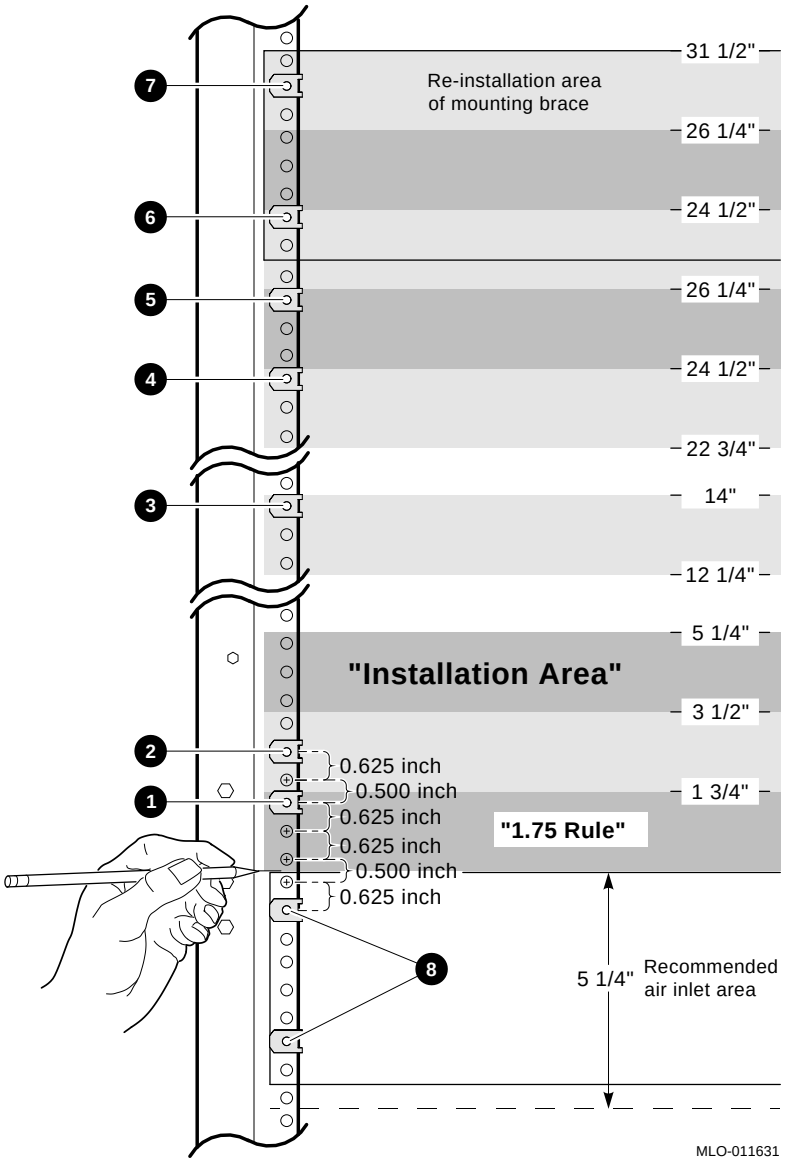
The total installation area is 36.25 inches. The equation for calculating the total installation area is:

1.75 in. $\times$ 21 sets = 36.75 in.

Note

The hole count described in this section determines the system installation location in any 36.25 inch area of the rack.

Figure 2–12 Vertical Mount System: Installation Area English (RETMA)



❶ Hole 3 for clip nut - secure system to front rails.

❷ Hole 5 for clip nut - secure system to front rails.

❸ Hole 24 for clip nut - secure system to front rails.

❹ Hole 42 for clip nut - secure system to front rails.

❺ Hole 44 for clip nut - secure system to front rails.

❻ Hole 47 - reinstall mounting brace.

❼ Hole 52 - reinstall mounting brace.

❽ Clip nuts - used to attach temporary mounting brace.

Vertical Mount System: Rail-Hole Pattern Metric (IEC)

In a rack conforming to the metric IEC standard, the holes in the rack rails are 25 mm (0.98 in.) on center throughout the length of the rack rails.

Vertical Mount System: Installation Area Metric (IEC)

To determine the installation area, perform the following steps at the front and rear rack rails (refer to Figure 2–13).

Step	Action
1	Check to see that there is a minimum of 5.25 inches of air space available **above** and **below** the vertical mount system. See the bottom holes identified as ❽ in Figure 2–13. Use these bottom holes to temporarily install the mounting bracket.
2	Select a section of the rack rail where there are 39 consecutive unoccupied holes. Begin counting with the first hole (directly above the hand shown in Figure 2–13.)
3	Make a mark between the first hole and the one below it. This is the starting point of the installation area.
4	Count up 33 holes and make a mark halfway between hole 32 and hole 33. The area between the marks is the *installation area*.

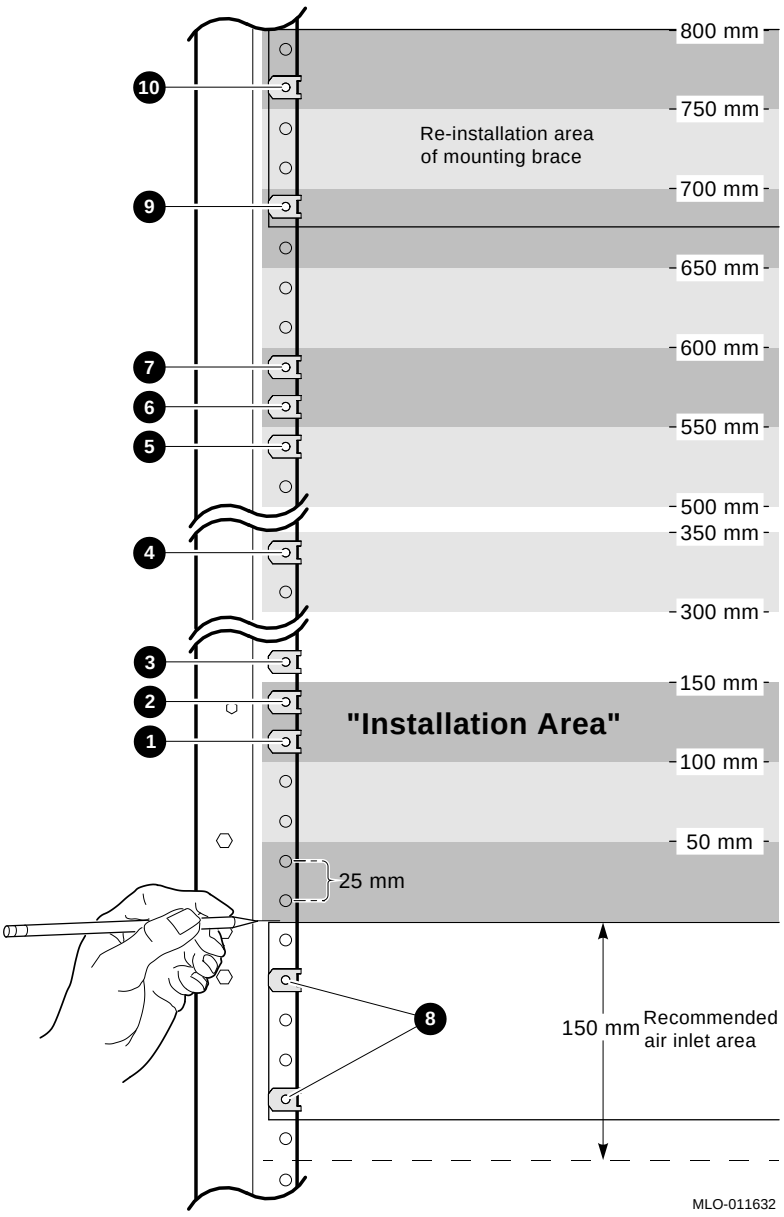
The total installation area is 950 mm (37.40 in.). The equation for calculating the total installation area is:

50 mm (1.968 in.) × 19 sets = 950 mm (37.40 in.)

Note

The hole count described in this section determines the system installation location in any 950 mm (37.40-in.) area of the rack.

Figure 2–13 Vertical Mount System: Installation Area Metric (IEC)



❶ Hole 5 for clip nut - secure system to front rails.

❷ Hole 6 for clip nut - secure system to front rails.

❸ Hole 7 for clip nut - secure system to front rails.

❹ Hole 14 for clip nut - secure system to front rails.

❺ Hole 22 for clip nut - secure system to front rails.

❻ Hole 23 for clip nut - secure system to front rails.

❼ Hole 24 for clip nut - secure system to front rails.

❽ Clip nuts - used to attach temporary mounting brace.

❾ Hole 28 - reinstall mounting brace.

❿ Hole 31 - reinstall mounting brace.

Vertical Mount System: Optional Front Bezel

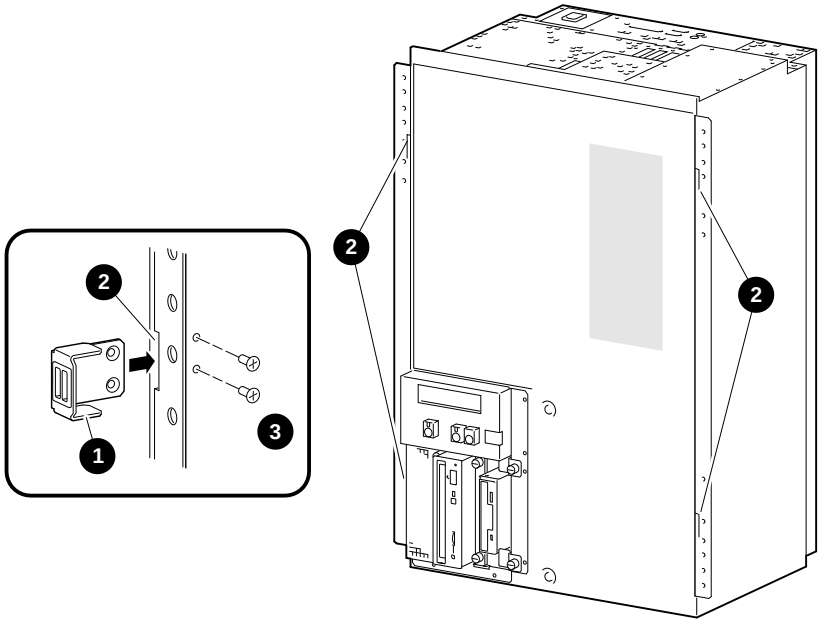
Your shipment may contain an optional parts kit with parts specific to the vertical rackmount chassis: four latch brackets and eight 4-40 flathead screws. The four latch brackets *must* be installed on the chassis before the chassis is installed in the RETMA or IEC cabinet.

Systems without the optional front bezel kit will find the four latch brackets, and eight 4-40 flathead screws in their parts kit. The four latch brackets *must* be installed on the chassis before the chassis is installed in the RETMA or IEC cabinet.

Before installing the system in your rack, refer to Figure 2–14, and perform the following pre-assembly on the system side mounting brackets:

1. Insert one latch bracket ❶ through each of the four vertical slots ❷ in the chassis frame. Ensure that the latch mechanism is toward the outside edge of the chassis frame when the bracket is inserted through the slot.

Figure 2–14 Vertical Mount System: Attaching the Four Bezel Tabs



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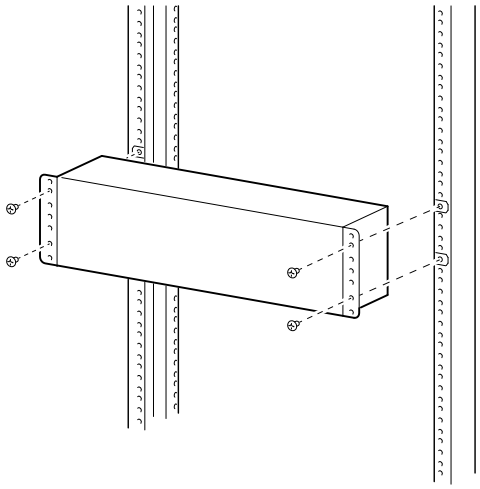
2. Secure each latch bracket to the side of the chassis with two 4-40 flathead screws ❸.
3. Set the front bezel aside until the chassis has been installed in the RETMA or IEC cabinet.

Vertical Mount System: Mounting the Support Brace

Your shipment includes a support brace designed to assist you in properly placing the system in a vertical rack. To install the brace, refer to Figure 2–15, and follow these steps:

1. Your system is 66.75 cm (26.25 in.) in height.
2. Orient the 4.50 in. support brace (found in parts kit) so that when the system is mounted, five or more inches of open space are above and below the installed system.
3. Align the holes on the brace with the four holes in the cabinet frame. Fasten the brace to the frame by using four screws provided in your hardware kit. Tighten the screws.

Figure 2–15 Vertical Mount System: Attaching the Brace



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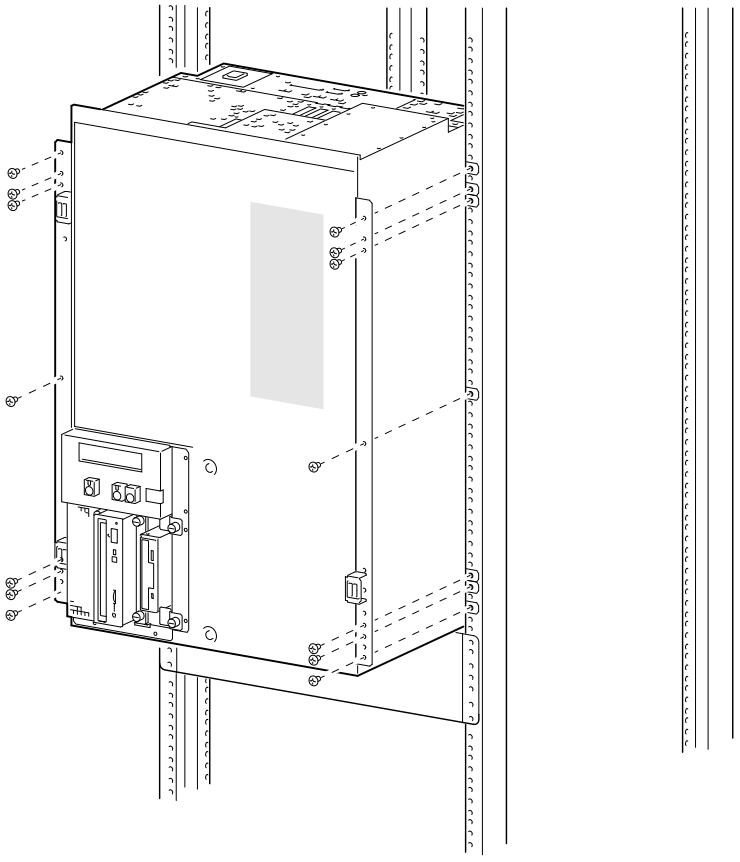
Vertical Mount System: Installing the System

To install the system, perform the following steps:

1. Slide the system onto the supporting brace, refer to Figure 2–16.

Figure 2–16 Vertical Mount System: Installing the System



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Warning

The Digital Alpha VME 2100 system weighs approximately 49.94 kg (110 lb). Use sufficient personnel and the proper equipment when lifting or moving the Digital Alpha VME 2100 system.

2. Align the 14 screw holes on the side brackets with holes in the rack rail. Fasten the system to the rack rail using the fourteen screws and nuts provided in your hardware kit. Tighten the screws, refer to Figure 2–16.
3. After installing the vertical rackmount chassis in the cabinet, grasp the front bezel by the flip-down pull tabs or by the sides.
4. Align the four strikes on the front bezel with the four latches on the chassis.
5. Press the front bezel onto the chassis until the four strikes snap into the four latches.
6. Remove the support brace. Mount brace in the space above the system unit.

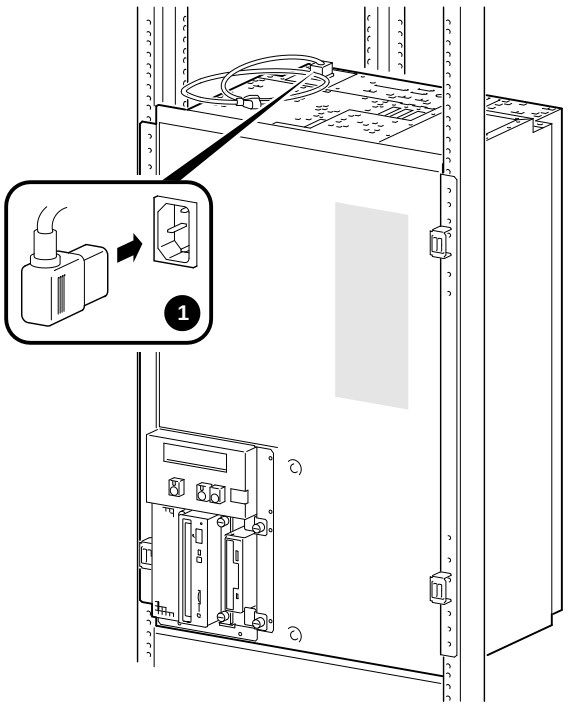
Completing the Installation of Both Systems

Attaching the Power Cord

To install the power cord, refer to ❶ in Figure 2–17 and Figure 2–18. Proceed as follows:

1. Ensure that there is slack in the power cord when you plug it into the system ac connector.

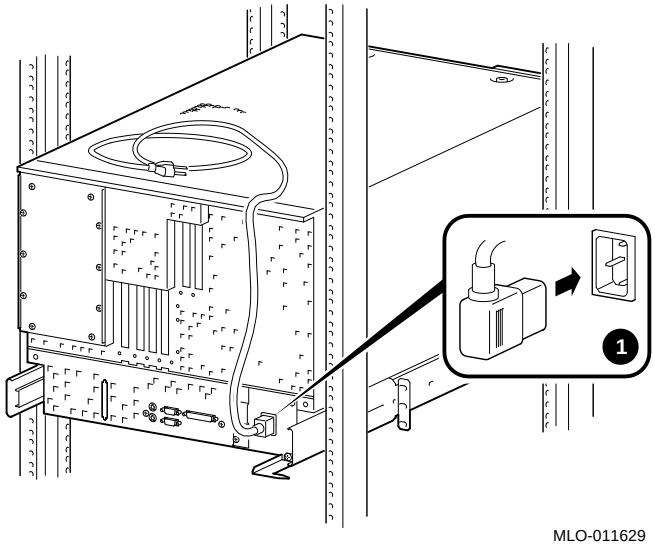
Figure 2–17 Attaching the Power Cord



Note

At this time, leave the power cord disconnected from the system ac connector. This connection serves as an ac power switch.

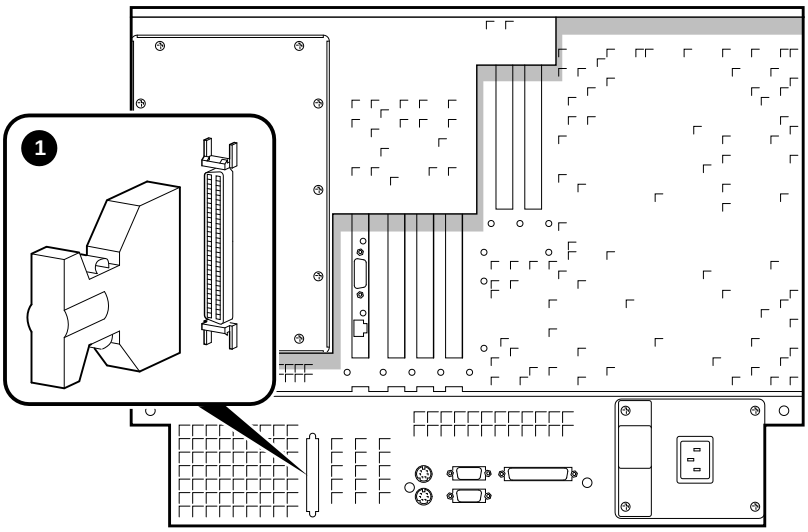
Figure 2–18 Attaching the Power Cord



Adding SCSI Devices to the System

The Digital Alpha VME 2100 system can be expanded from the SCSI port by removing the SCSI terminator ❶ and connecting the appropriate cable from a SCSI device (refer to Figure 2–19).

Figure 2–19 SCSI Port



Turning the System On

Overview

To turn on the system, follow these steps:

1. Check the system settings
2. Apply power to the system
3. Check the diagnostic indicators
4. Boot the operating system

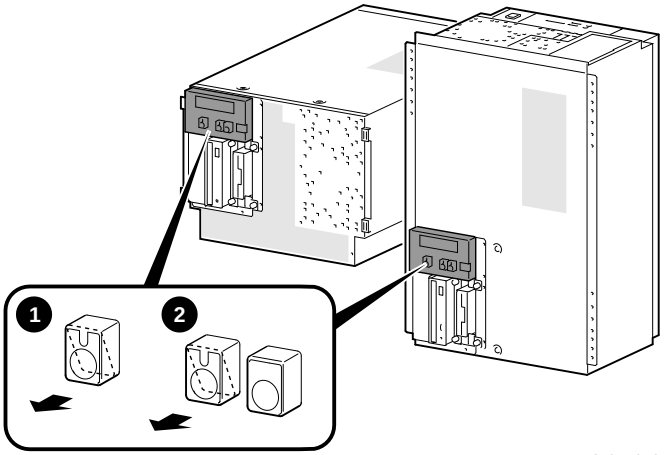
Before You Begin

To perform some of the instructions in this procedure, the OCP door needs to be opened, (bezel is already installed on system.) The key used to lock and unlock the OCP door is shipped with the optional bezel. The keylock on the front of the system is shown in Figure 1–5.

Checking the System Settings

Before turning the system on (❶), ensure that the system buttons are in the positions shown in Figure 2–20.

Figure 2–20 Powered-down System Settings



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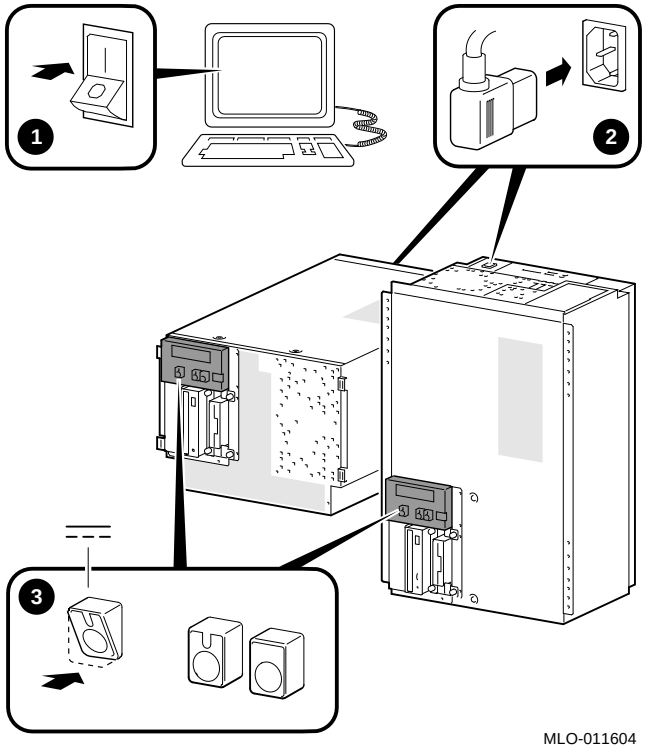
Applying Power to the System

Apply power to the system as shown in callouts ❶ through ❸ in Figure 2–21.

Note

If any external expansion boxes (for example, expansion boxes that house storage devices) are connected to the system, turn the power on to those devices first before applying power to the system.

Figure 2–21 Applying Power to the System



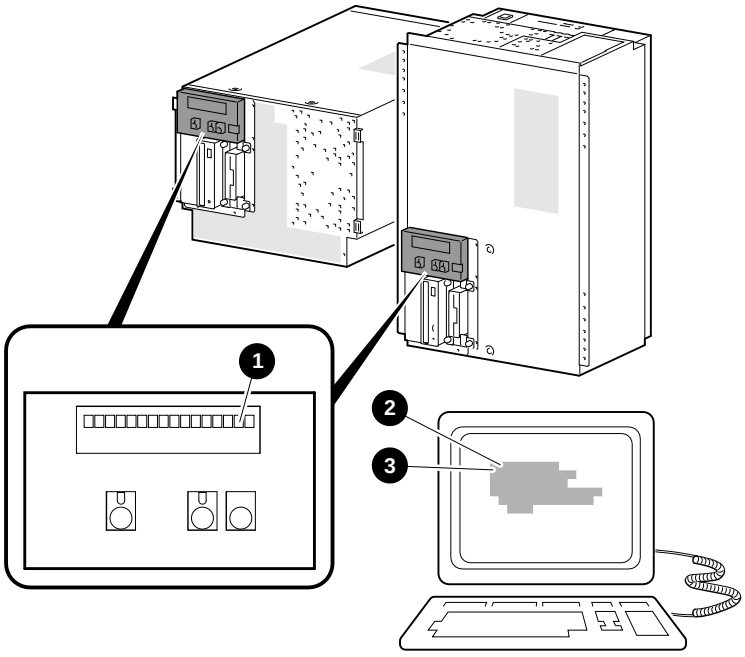
Checking the Diagnostic Indicators

After the system is turned on, check the status of three diagnostic indicators (refer to Figure 2–22):

- Power-up/diagnostic display ❶ on the operator control panel
- System startup screen ❷
- Console prompt ❸ (Digital UNIX or OpenVMS systems).

  If any of the diagnostic indicators do not appear as described, refer to Chapter 6 for help.

Figure 2–22 System Startup Diagnostic Indicators



Console Port Configurations

Power-up information is typically displayed on your console terminal. Your console terminal may be either a graphics terminal or a serial terminal (one that is connected to your system through the COM1 serial communication port). The setting of the `console` environment variable determines where the system displays power-up output. Set this environment variable according to the console terminal that you are using.

Synopsis:

set console output_device

Arguments:

serial	Displays the power-up output to a device connected to the COM1 serial communication port at the rear of the system.

Example:

```
P00>>> set console serial
P00>>>
```

Power-Up/Diagnostic Display

The power-up/diagnostic display shows the following message for several seconds:

```
starting console
```

Once the system has completed self-tests, the power-up/diagnostic display will display the value of the ocp_text environment variable (default value is a phrase similar to "Alpha AXP 190 MHz"). For information about changing the value of the ocp_text environment variable, refer to the "set ocp_text" section in Chapter 4.

System Startup Screen

The system startup screen will scroll. To stop the scrolling, enter Ctrl/S. To resume scrolling, enter Ctrl/Q. To display any error messages that may have scrolled by, enter the `cat el` command.

During power-up self-tests the test status and result are displayed on the console terminal. Information similar to the following example should be displayed on the screen.

```
starting console on CPU 0
initialized idel PCB
initializing semaphores
initializing heap
Initial heap 1c0c0
memory low limit = 100000
heap = 1c0c0 13fe0
initializing driver structures
initializing idel process PID
XDELTA not enabled
initializing file system
initializing timer data structures
lowering IPL
counted 92780731 cycles in 500 ticks
CPU 0 speed is 5.26 ns (190 MHz)
access NVRAM
entering idle loop
Starting Memory Diagnostics
Testing CSIC on Memory Module 1
Testing all memory banks in parallel
Testing Memory bank 0
Testing Memory bank 1
Configuring memory size
probing hose 0, PCI
bus 0, slot 0 -- ewa -- DECchip 21040-AA
bus 0, slot 1 -- pka -- NCR 53C810
bus 0, slot 2 --     -- Intel 82375EB
bus 0, slot 6 --     -- DECchip 21040-AA
probing PCI-to-PCI bridge, bus 1
probing hose 1, EISA
initializing keyboard
Memory Testing and Configuration Status
Module   Size    Base Addr   Intlv Mode  Intlv Unit  Status
------   -----   ---------   ----------  ----------  ------
  1       64MB   00000000      1-Way         0       Passed
Total Bad Pages 0
Testing the System
Testing the Disks (read only)
Change to Internal loopback
Testing the Network
Change to Normal Operating Mode
AlphaServer 2100 Console V3.8-49, built on Nov 7 1994 at 12:22:36
environment varialbe mopV3_boot created
P00>>>
```

Console Prompt or Main Menu

Note

If a console system prompt is not displayed, press Return several times.

Digital UNIX or OpenVMS Systems

Digital UNIX and OpenVMS systems are supported by the SRM firmware. Refer to Chapter 4 for an overview of the console subsystem.

When booting Digital UNIX or OpenVMS systems, the console prompt for the SRM firmware is displayed:

```
P00>>>
```

Preboot Tasks

You may need to perform some of the following tasks before booting your operating system:

- Check the required environment variable settings.
- Change the way your system powers up or boots.
- Verify your configuration.

The remainder of this section contains more information about each of these tasks.

Check the Required Environment Variable Settings—Digital UNIX or OpenVMS

If running Digital UNIX or OpenVMS, check that the settings for the following environment variables match your configuration. The console command to reset the variable is shown in parentheses, refer to Chapter 4 for additional information.

- Operating system (`set os_type`)
- Ethernet device type (`set ew*0_mode`)
- Speed for Fast SCSI devices (`set pk*0_fast`)
- Boot device (`set bootdef_dev`)
- Boot flags (`set boot_osflags`)

Reminder

Except for the `set bootdef_dev` and the `set boot_osflags` commands, the environment variables are set by initializing the system before booting the operating system. The system can be initialized either by entering the `init` command at the `P00>>>` prompt or by pressing the Reset button on the OCP.

Change Default Power-up or Bootstrap

To change the way the system powers up or boots the operating system, change the default values for your system's environment variables. Typical changes would be to set the system to autoboot or to change the default boot device.

- Review Chapter 4 in the this guide, particularly Tables 4-1 and 4-2. Also see the console command pages in that chapter.

Verify Your Configuration

- Digital UNIX or OpenVMS systems

  The following SRM console commands are used to verify system configuration:

  - `show config` (show_config)—Displays the buses on the system and the devices found on the buses. However, the configuration firmware will not report the configuration of I/O devices on the VME bus. This functionality occurs when the operating system boots.
  - `show device` (show_device)—Displays the devices and controllers in the system.
  - `show memory` (sho_mem)—Displays main memory configuration.
  - `set` and `show` (setting and showing environmental variables)—Sets and displays environment variable settings.

For more information about these console commands, refer to Chapter 4.

Booting the Operating System

One of two operating systems can be booted:

- Digital UNIX (formally called DEC OSF/1)
- OpenVMS

In the following instructions, the operating system has already been booted at least once.

Condition	Reference
If Factory Installed Software (FIS) has not been booted	See the Factory Installed Software document that came with your system.
If the system was not shipped with Factory Installed Software, and the operating system software has not been loaded or booted	See the installation documentation that came with your operating system.

Booting Digital UNIX or OpenVMS Software

When booting either Digital UNIX or OpenVMS systems, the console prompt `P00>>>` is displayed. Boot the operating system as follows:

Step	Action
1	Enter `boot` or `b` at the console prompt. `P00>>> b` **Note**: You may not be able to run your current operating system release on your new Digital Alpha VME 2100 system. Refer to the Software Product Description (SPD) that came with your system; it contains information on the supported operating system revisions to be used with your new system. The system boots the operating system using the default values for the boot device and boot flags. A "booting system software" screen is displayed on the console terminal. After several minutes, the operating system login banner is displayed on the console terminal.

Step	Action
2	Log in at the login prompt. Once the operating system prompt is displayed, the system is ready for normal operation.

For complete information about the `boot` command, refer to the "boot" section in Chapter 4.

Autobooting the Operating System

If the system is set to autoboot, the operating system will automatically boot after you power up the system, press the Reset button, or after recovery from a system crash.

To autoboot Digital UNIX or OpenVMS systems:

- Set the `auto_action` environment variable to either "boot" or "restart." For more information, refer to the `set auto_action` command in Chapter 4.
- Ensure that the default boot device has been set to the device from which you want the operating system to boot. (Enter `show bootdef_dev` to see whether your default boot device has already been assigned.) For information about setting the default boot device, refer to the `set bootdef_dev` command in Chapter 4.

Turning the System Off

Before You Begin

It may not be necessary to turn the system off to recover from system problems. Recovery from hangs or other minor problems are often solved by pressing the Reset button on the OCP. For maximum reliability, Digital recommends minimizing the number of times that the system is turned on or off.

Turning Off the DC Power

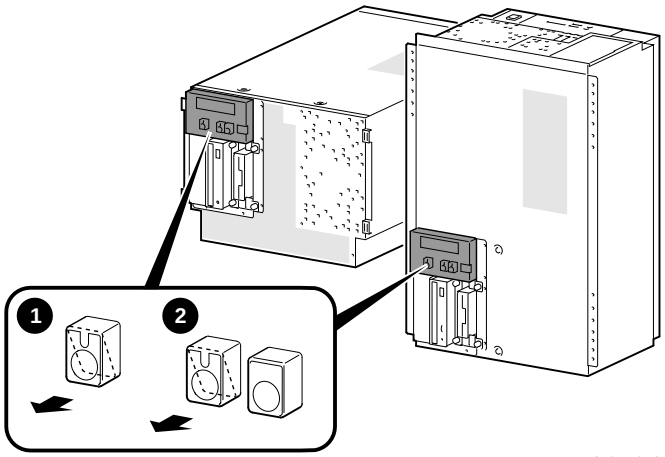
This section describes the procedure for turning off the DC power.

Warning

Before accessing enclosure components:

1. Perform an orderly shutdown of the operating system according to the shutdown procedures described in your operating system documentation.
2. Set the DC On/Off button ❶ and the Halt button ❷ to the positions shown in Figure 2–23. (If the Halt button is set to the In position, the system will not boot the next time the system is turned on.)

Figure 2–23 Turning Off the System



Extended Power-down (AC Power)

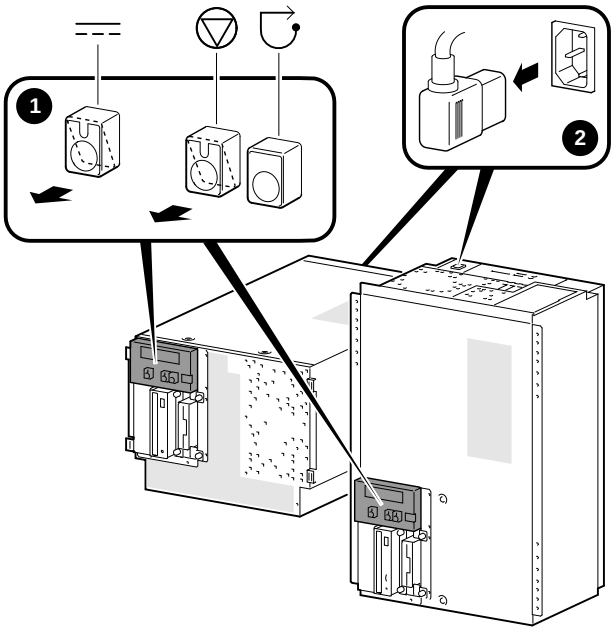
This section describes the procedure for an extended AC power-down.

Warning

Before accessing enclosure components:

1. Turn off the DC power to the system ❶ as shown in Figure 2–24 and described in previous section entitled Turning Off the DC Power.
2. Turn off the AC power to the system by disconnecting the AC power cord ❷ as shown in Figure 2–24.

Figure 2–24 Turning Off the System



Invoking Console Mode

Console Subsystem

On Alpha systems, underlying control of the system platform hardware is provided by a console subsystem. The console subsystem contains firmware code (software code embedded in the hardware) that offers service functions such as initializing and testing the hardware and bootstrapping the system software. The console firmware is explained in detail in Chapter 4 for users running Digital UNIX or OpenVMS.

Console Terminal

A console terminal is *required* for your system. The console allows you to issue commands to the system while the operating system is not running.

Console Mode

Console mode is the state in which the system and the console terminal operate under the control of the console firmware. When commands can be issued from the console terminal and firmware is executing, the system is in the console mode.

On Digital UNIX and OpenVMS systems, the console mode prompt for a system is `P00>>>`. The control characters and supported keys can be used to enter console commands at the console mode prompt.

Invoking Console Mode

Invoke console mode by shutting down the operating system according to the operating system shutdown procedure described in your operating system documentation.

Using the Halt Button

When running Digital UNIX or OpenVMS, the console mode can be invoked by pressing the Halt button on the operator control panel. However, ensure that the operating system is shut down first.

Caution

Press the Halt button only after the operating system has been shut down using the proper software shutdown procedure.

For more information about using the Halt button, refer to Figure 3–1.

Remote Access

When running Digital UNIX or OpenVMS systems, the console mode can be invoked from a remote terminal that is connected to the system through the COM1 port at the rear of the system (refer to Figure 2–26).

To invoke console mode in this way, perform the following steps:

1. Connect the remote terminal to the system.
2. Shut down the operating system.
3. When the shutdown completes, press Return.

   The console prompt (`P00>>>` is displayed.

Connecting to Networks

Overview

The standard network option for your system is Ethernet. However, your system can support other network options by using network adapters that can be connected to the VME and PCI buses.

For information about connecting your system to networks other than Ethernet, refer to the documentation that came with the network adapter.

Ethernet

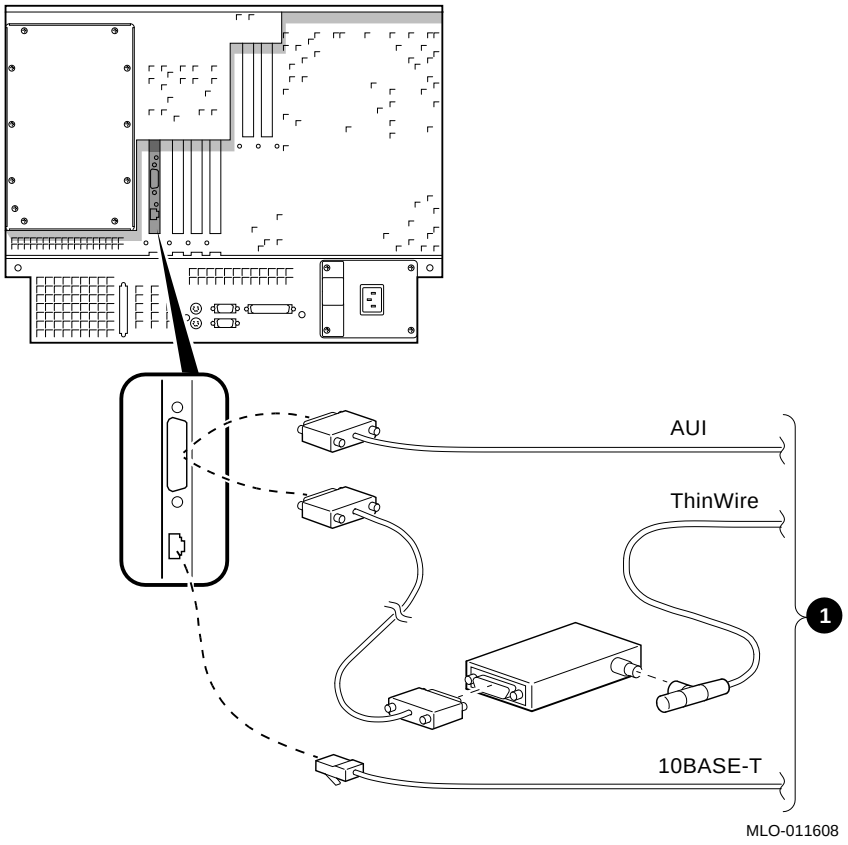
The system can be connected to a ThinWire, AUI, or 10BASE-T Ethernet network. The following explains the callouts ❶ in Figure 2–25.

- AUI indicates a Thickwire Ethernet connection
- ThinWire indicates a ThinWire Ethernet connection
- 10BASE-T indicates a Twisted-Pair Ethernet connection

Caution

Before connecting the system to an Ethernet network, turn off the dc power to the system as described in the Turning the System Off section.

Figure 2–25 Ethernet Network Connections



Connecting Peripherals

Serial/Parallel Connections

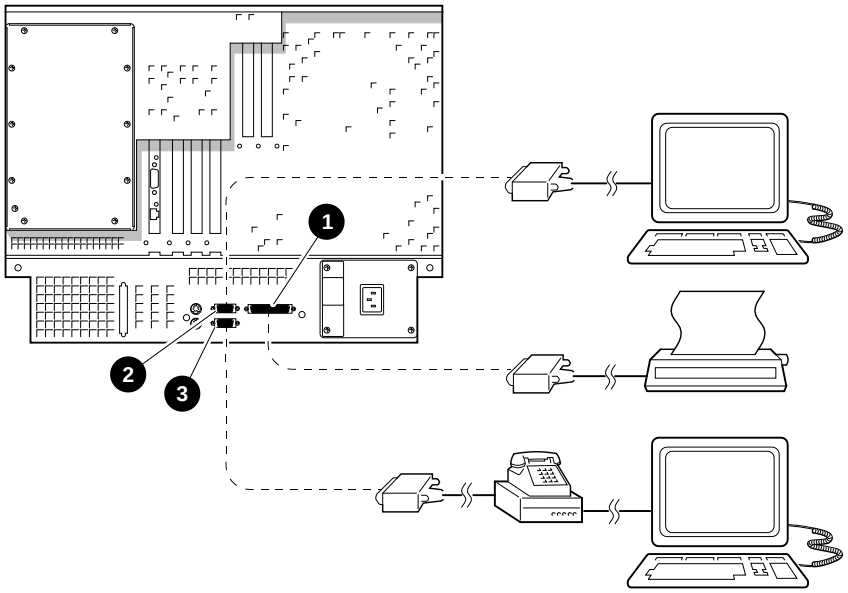
Connect a serial or parallel printer, modem, or console terminal to your system through the serial and parallel ports at the rear of the system (refer to Figure 2–26).

Caution

Before connecting serial or parallel devices to the system, turn off the dc power to the system as described in the Turning the System Off section.

For information about connecting a specific device to your system, refer to the documentation for that device.

Figure 2–26 Connecting Serial and Parallel Devices



❶ Parallel port

❷ Serial port (COM1) (console terminal)

❸ Serial port (COM2) (auxiliary console device)

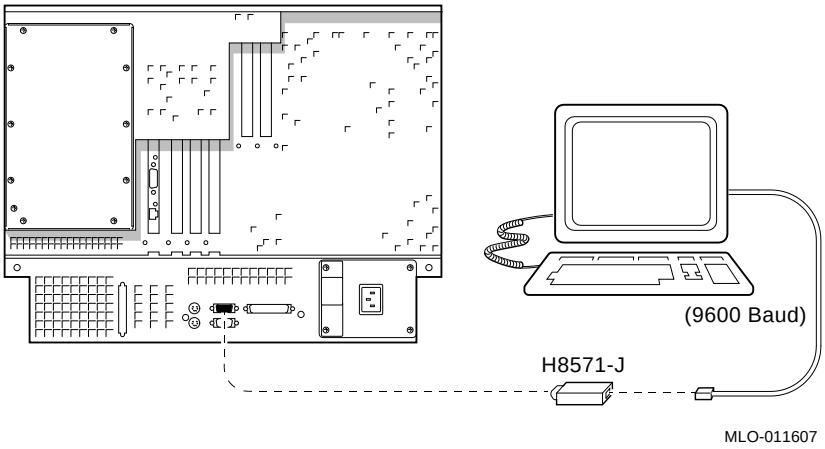
Terminal Connections

Connect a Digital VT–series terminal (VT*xxx*) to the system as shown in Figure 2–27. Refer to the documentation that is shipped with the terminal for information on how to connect the keyboard and set up the terminal. Ensure that the VT–series terminal is set to 9600 baud, 8-bits, and no parity.

Caution

Before connecting a terminal to the system, turn off the dc power to the system as described in the Turning the System Off section.

Figure 2–27 Terminal Connections



Note

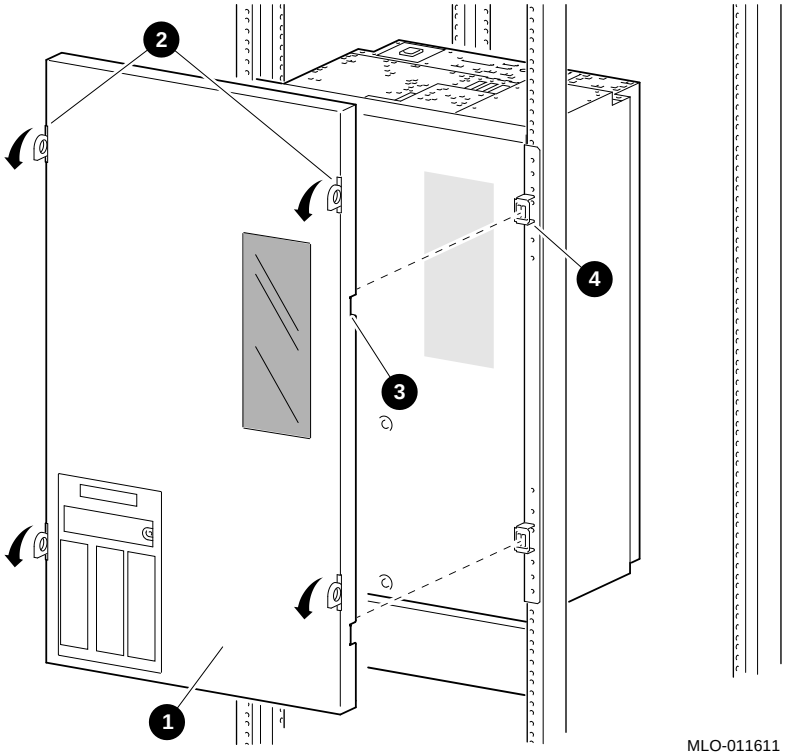
Digital VT–series terminal (VT*xxx*) requires an H8571-J serial adapter that is included with every system.

Vertical Mount System: Adding Front Bezel

To add the front bezel to the vertical mount system, following these steps:

1. If an optional removable media storage device is installed in the AlphaServer VME chassis, remove the corresponding blank insert on the front bezel before installing the front bezel on the chassis.
2. Grasp the front bezel ❶ by the flip-down pull tabs ❷ or by the sides, refer to Figure 2–28.

Figure 2–28 Installing the Front Bezel



3. Align the four strikes ❸ on the front bezel with the four latches ❹ on the chassis.
4. Press the front bezel onto the chassis until the four strikes snap into the four latches.

Drawer Mount System: Adding Front Bezel

The front bezel provides protection to the front of the system, and is installed on drawer mount chassis after the chassis has been installed in a RETMA or IEC cabinet.

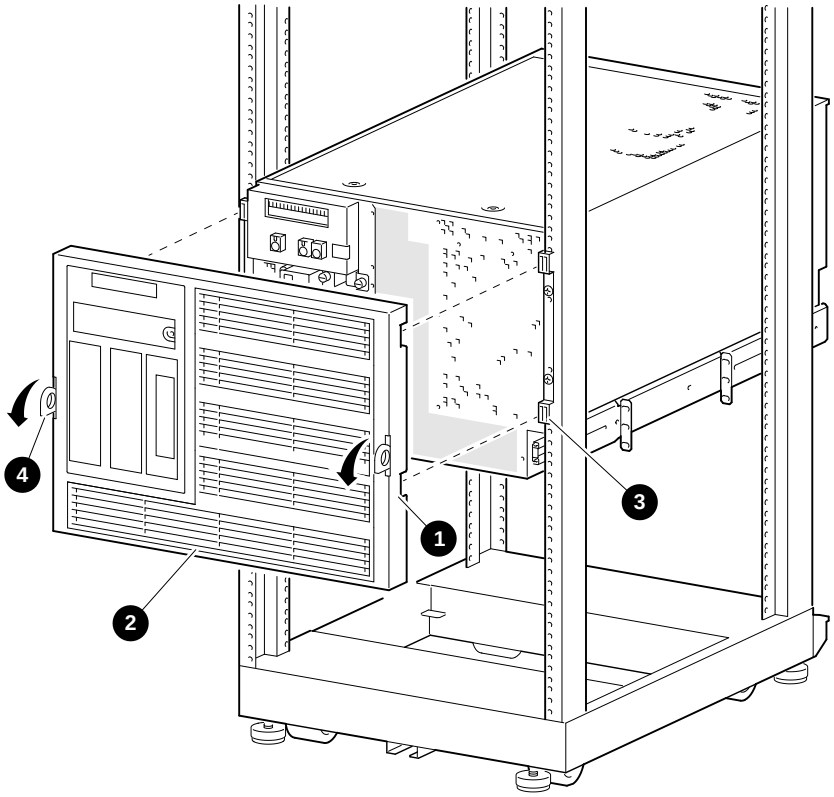
Note

If an optional removable media storage device is installed in the AlphaServer VME chassis, remove the corresponding blank insert on the front bezel before installing the front bezel on the chassis.

To install the front bezel on the drawer mount chassis, refer to Figure 2–29 and follow these steps:

1. Grasp the front bezel ❷ by the flip-down pull tabs ❹ or by the sides.

Figure 2–29 Installing the Front Bezel



2. Align the four strikes ❶ on the front bezel with the four latches ❸ on the chassis.
3. Press the front bezel onto the chassis until the four strikes snap into the four latches.

3
Operation

In This Chapter

This chapter covers the operation of the operator control panel.

Operator Control Panel

The operator control panel (OCP), shown in Figure 3–1, is located on the front of the system. The OCP contains a diagnostic display and buttons that allow the user to power, halt, and reset the system.

❶ **Power-Up/Diagnostic Display**

The power-up/diagnostic display shows system status messages during the power-up and diagnostics sequence. Use the display to check the results of system self-tests.

For information about interpreting specific messages, refer to the Interpreting the OCP Power-Up/Diagnostic Display section in Chapter 6.

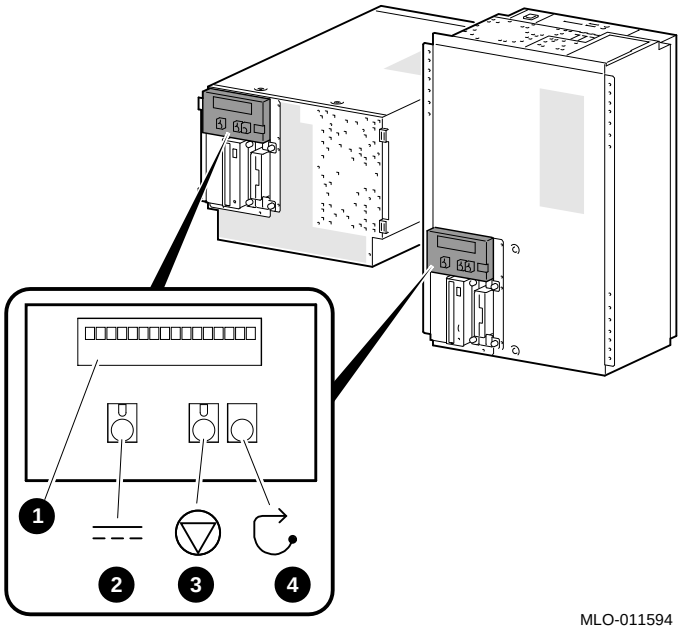
❷ **DC On/Off**

The DC On/Off button controls the flow of dc power to the system. Use the DC On/Off button and the ac power cord to apply and disconnect power to the system. The DC On/Off light, located on the DC On/Off button, is lit whenever dc power is present.

❸ **Halt (Digital UNIX and OpenVMS systems only)**

The Halt light, located on the Halt button, comes on briefly during the system self-tests. Thereafter, the Halt light comes on and remains lit whenever dc power is present and the Halt button is in the “in” position.

Figure 3–1 Operator Control Panel



Invoking Console Mode:

Pressing the Halt button invokes console mode when Digital UNIX and OpenVMS are running.

Caution

Pressing the Halt button interrupts your operating system session. Before pressing the Halt button, shut down the operating system according to the operating system shutdown procedure described in your operating system documentation.

Returning to Operating System Mode:

To return to operating system mode, press the Halt button to the "out" position and reboot the operating system.

Note

If the Halt button is pressed by mistake and few or no console commands have been entered, it may be possible to resume your operating system session by entering the `continue` command.

Before Power-Up: Pressing the Halt button before turning the system on prevents the system from booting the operating system. Instead, the system will remain in console mode. To boot the operating system and continue system operation, press the Halt button to the "out" position.

❹ **Reset**

Pressing the Reset button resets the system. The system aborts all current processes, initializes, and performs startup self-tests. Use the Reset button to reset the system if it hangs or to initialize the system if you have changed system settings.

Caution

Pressing the Reset button halts all system processes. *Do not* press the Reset button while the operating system is running unless your system is hung and all other ways of terminating the process have been exhausted.

4

Using Console Commands

Introduction

On Digital Alpha VME 2100 systems, based on the Alpha architecture, control of the system hardware is provided by a console subsystem. The console subsystem contains firmware code (software code embedded in the hardware) that facilitates interaction between the hardware and the operating system.

The Digital Alpha VME 2100 systems provide a command line interface that provides bootstrap and other services as defined in the *Alpha System Reference Manual* (SRM) specification.

In This Chapter

This chapter explains how to use the command line interface to carry out operations such as testing the hardware and bootstrapping the system software. The command line interface will be familiar to users of traditional Digital systems.

Console Task Summary

Tasks and Commands

Table 4–1 describes the tasks that you can perform from the console and the command used to perform each task.

Table 4–1 Task Summary Table

Task	Command
Invoke the console firmware	`boot`
Boot the operating system software	`boot`
Invoke the EISA Configuration Utility	`ecu`
Initialize the system	`init`
Display the default startup action	`show auto_action`
Change the default startup action	`set auto_action`
Display the current default boot device	`show bootdef_dev`
Change the default boot device	`set bootdef_dev`
Display the default boot flags	`show boot_osflags`
Change the default boot flags	`set boot_osflags`
Display the device on which power-up output is displayed	`show console`
Change the device on which power-up output is displayed	`set console`
Display the option to be run on an Ethernet controller	`show ew*0_mode`
Set an Ethernet controller to run twisted-pair, AUI, or ThinWire	`set ew*0_mode`
Display the language variant of the keyboard	`show language`
Change the language variant of the keyboard	`set language`

(continued on next page)

Table 4–1 (Cont.) Task Summary Table

Task	Command
Display the power-up/diagnostic display message	`show ocp_text`
Change the power-up/diagnostic display message	`set ocp_text`
Display the default operating system	`show os_type`
Set the default operating system	`set os_type`
Display the default speed for devices on a SCSI controller	`show pk*0_fast`
Enable fast SCSI speed for fast SCSI devices on a SCSI controller	`set pk*0_fast`
Display the ID for a SCSI controller	`show pk*0_host_id`
Set the ID for a SCSI controller	`set pk*0_host_id`
Display the system configuration	`show config`
Display the system devices	`show device`
Display the serial number and revision level of system bus options and any errors for those options	`show fru`
Display the system memory	`show mem`
Display the PALcode version	`show pal`
Display the firmware version	`show version`
Run system diagnostics	`test`

Control and Keyboard Characters

Control Characters

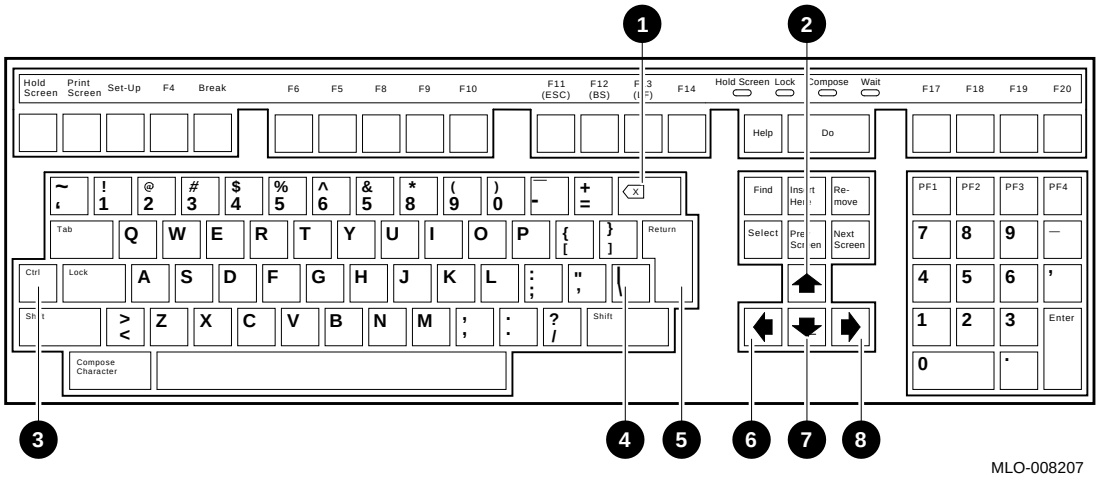
Enter control characters by holding down the key labeled Ctrl while pressing another key. You can enter the following control characters in console mode:

Character	Function
Ctrl/A	Toggles between insertion and overstrike mode so that you can edit text on the current command line. Default mode is insert.
Ctrl/C	Interrupts a command process and returns control to the console command line.
Ctrl/E	Moves the cursor to the end of the line.
Ctrl/H	Moves the cursor to the beginning of the line.
Ctrl/O	Suppresses output to console terminal until you enter Ctrl/O again. Output is also reenabled when the console prompts for a command, issues an error message, or enters operating system mode.
Ctrl/P	Acts like Ctrl/C.
Ctrl/Q	Resumes output to the console terminal that you suspended with Ctrl/S.
Ctrl/R	Redisplays the current line, omitting deleted characters.
Ctrl/S	Suspends output to the console terminal until you enter Ctrl/Q.
Ctrl/U	Deletes the entire line. Line deletion is followed with a carriage return, line feed, and a new prompt.

Keyboard Characters

Figure 4–1 shows the keyboard characters that are supported in console mode. The location of keyboard characters may vary depending on your keyboard; however, you can enter the following keyboard characters in console mode, regardless of your keyboard type.

Figure 4–1 Supported Keys on a VT420 Keyboard



Callout	Key	Function
❶	<X	Deletes the last character you entered. With a hardcopy terminal, <X is echoed with \ followed by the character being deleted. If you delete several characters consecutively, the system echoes with \, the deleted characters, followed by another \ at the end of the series.
❷	↑	Recalls up to 32 previous commands.
❸	Ctrl	Begins a control character.
❹	\ (Backslash)	Extends a command onto the next line. Must be the last character on the line to be continued.
❺	Return	Enters a command on the command line. The cursor need not be at the end of the command line.
❻	←	Moves the cursor left one position.
❼	↓	Reverses the order of recalled commands after using ↑.
❽	→	Moves the cursor right one position.

Console Commands

Levels of Commands

There two levels of console commands are:

- Basic
- Advanced

Basic Commands

Basic commands are the commands necessary to perform typical management tasks that require interaction with the console firmware. Most of the time, you will use the basic console commands. All of the basic console commands are described in alphabetical order in this chapter. Table 4–2 lists the basic console commands.

Table 4–2 Basic Console Commands

Command	Syntax	Brief Description
boot	boot [-flags [*longword*,] *longword*] [-halt] [*boot_device*]	Boots the operating system software.
continue	continue	Resumes program execution.
ecu	ecu	Invokes the EISA Configuration Utility.
help	help [*command . . .*]	Displays online help using console commands. Synonymous with man.
init	init	Initializes the system.
man	man [*command . . .*]	Displays online help using console commands. Synonymous with help.
set	set [-default] *envar val*	Sets an environment variable.
show	show [*envar*] [{config,device,memory,pal, version}]	Displays the value of an environment variable or displays configuration information.
test	test	Runs system diagnostics.

Advanced Commands

This book documents only basic console commands, that is, the commands necessary to perform typical management tasks that require interaction with the firmware. Refer to the *Digital Alpha VME 2100 Service Guide* for a list of advanced commands that are used for diagnostics and other complex tasks.

To see a list of all of the console firmware commands, enter `help` or `man` at the console prompt.

Entering Console Commands

Console Command Format

Enter a console command in the following format. To specify a flag, you must precede the flag with a space and a hyphen. For example:

`P00>>> command [-flags] [parameters. . .]`

For information about entering a specific console command, refer to the console command reference pages, in the next section of this chapter.

Online Help

Once the system is running in console mode, you can get online information about console commands by entering `help` or `man` at the console terminal.

Console Commands

Most of the console commands on your Digital UNIX or OpenVMS system are similar, but not identical to, the console commands supported on VAX systems. See Table 4–3.

Table 4–3 VAX and Digital Alpha VME 2100 Console Commands Compared

VAX Console Command	Console Command You Will Use
`show boot`	`show bootdef_dev`
`show bflags`	`show boot_osflags`
/*qualifier* (indicates optional qualifiers)	-flag (indicates optional flags)

The remainder of this chapter describes the basic console commands.

boot

Synopsis

Bootstrap the system.

`boot` [-flags [*longword*,]*longword*] [-halt] [*boot_device*]

Description

Initializes the processor, loads a program image from the specified boot device, and transfers control to that image.

If you specify a list of devices, a bootstrap is attempted from each device in order. Then control passes to the first successfully booted image. In a list, always enter network devices last, since network bootstraps only terminate if a fatal error occurs or an image is successfully loaded.

The -flags option can pass additional information to the operating system about the boot that you are requesting.

You can execute the `boot` command by entering `boot` or `b`, followed by Return. When you enter `boot` or `b`, an environment variable (shown in parenthesis) provides a default value for the following information:

- Boot device (bootdef_dev)
- Boot flags (boot_osflags)

If you specify the boot device or boot flags on the command line, the current default value is overridden for the current boot request. However, the corresponding environment variable is not changed.

Parameter

Parameter	Description
boot_device	A device path or list of devices from which the console program attempts to boot, or a saved boot specification in the form of an environment variable. Use the `set bootdef_dev` command to define the default boot device.

Flags

Flag	Description
-flags [*longword*,] *longword*	Specifies additional information to the bootstrap software. In Digital UNIX, -flags specifies boot flags. In OpenVMS, -flags specifies system root number and boot flags. Refer to the `set boot_osflags` command for a list of possible settings and their meanings. The default boot flag setting is null. Use the `set boot_osflags` command to change the default boot flag setting.
-halt	Forces the bootstrap operation to halt and invoke the console program once the bootstrap image is loaded and page tables and other data structures are set up. Console device drivers are not shut down when this qualifier is present. Transfer control to the image by entering the `continue` command.

Examples

In the following example, an OpenVMS system boots from the SCSI disk, dka0. If bootable software cannot be found on dka0, the system attempts to boot from Ethernet port ewa0. Boot flag settings are 0 and 1.

```
P00>>> boot -flags 0,1 dka0,ewa0
```

In the next example, a Digital UNIX system boots from the SCSI disk, dka0, using boot flag setting i.

```
P00>>> boot -flags i dka0
```

In the next example, the system boots from the SCSI disk, dka0, but remains in console mode. Subsequently, you can enter the `continue` command to transfer control to the operating system.

```
P00>>> boot -halt dka0
```

In the next example, the system boots from the default boot device. The console program returns an error message if a default boot device has not been set.

```
P00>>> boot
```

continue

Synopsis

Resume program execution on the specified processor.

```
continue
```

Description

Continues execution on the specified processor or the primary processor if a processor is not specified. The processor begins executing instructions at the address that is currently in the saved program counter. The processor is not initialized.

The `continue` command is only valid if you have not disturbed the system state and if you halted the system by one of two methods: either by pressing the Halt button on the operator control panel or by entering Ctrl/P on the console terminal.

Note

Some console commands, for example, `boot`, may alter the machine state so that program mode cannot be successfully resumed (unless you include "-halt" in the boot command). If program mode cannot be successfully resumed, you may need to reboot the operating system.

Examples

In the following example, a system is commanded to resume operating system mode.

```
P00>>> continue
```

In the next example, a system's second processor is commanded to resume operating system mode.

```
P00>>> continue &p1
```

help or man

Synopsis

Display information about console commands.

`help` or `man` [*command . . .*]

Description

The `help` command, interchangeable with the `man` command, displays basic information about the use of console commands when the system is in console mode.

- If you enter the `help` command with no options or arguments, the system displays the complete list of commands for which you can receive help.
- If you enter the `help` command followed by the name of a console command, the screen displays information about the console command.
- If you enter the `help` command with an argument string (such as "sh"), the system displays information about all commands that begin with that string.

Parameters

Parameter	Description
command . . .	Commands or topics for which help is requested.

Examples

In the following example, the system is commanded to display the topics for which help is available.

```
P00>>> help
```

In the next example, the system is commanded to display help on all commands that begin with "sh."

```
P00>>> help sh
```

In the next example, the system is commanded to display help on the `boot` command.

```
P00>>> help boot
```

init

Synopsis

Initialize the system.

```
init
```

Description

Initializes the system. The system resets the software and executes the power-up self-tests.

After self-tests are executed, the system will autoboot unless one of the following is true:

- The Halt button on the operator control panel is set to the "in" position.
- The auto_action environment variable is set to "halt".

If the auto_action environment variable is set to "boot" or "restart" and the Halt button is set to the "out" position, the system will autoboot; the system will stop in console mode if the Halt button is "in". If the auto_action environment variable is set to "halt," the system will stop in console mode.

Whenever you reset the following SRM environment variables, you must initialize the system with the `init` command to put the new setting into effect:

auto_action
console
language
ocp_text
os_type
pk*0_fast
pk*0_host_id

For example, to change the device on which power-up output is displayed from a serial terminal to a graphics monitor (Digital UNIX support only - requires a PCI graphics option), set the console environment variable to "graphics" and then enter the `init` command as shown in the example.

Example

```
P00>>>  show os_type
os_type             OpenVMS
P00>>> set os_type OSF
P00>>> init
 . . .
P00>>> show os_type
os_type             OSF
```

man

See help.

set

Synopsis

Set or modify the value of an environment variable.

`set` [-default] *envar val*

Description

Sets or modifies the value of an environment variable. Environment variables are used to pass configuration information between the console and the operating system. The setting of these variables determines how the system powers up, boots the operating system, and operates.

Whenever you modify the value of the following environment variables, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

auto_action
console
language
ocp_text
os_type
pk*0_fast
pk*0_host_id

Parameters

Parameter	Description
envar	The environment variable to be assigned a new value. Refer to the list of commonly used environment variables in Table 4–4.
val	The value that is assigned to the environment variable. Either a numeric value or an ASCII string.

Flag

Flag	Description
-default	Restores an environment variable to its default value.

Environment Variables

Table 4–4 provides a brief description of the environment variables. Each of these environment variables is described in the following sections.

Table 4–4 Environment Variables

Variable	Function	Factory Setting
auto_action	Specifies what action the console should take whenever the system is powered up, crashes, or the Reset button is pressed.	Halt
bootdef_dev	Specifies the default boot device to the system.	System device on which Factory Installed Software (FIS) was loaded.
boot_osflags	Sets the boot flags and in OpenVMS, a root number.	Null
console	Specifies the device on which power-up output is displayed.	Matches the system configuration.
ew*0_mode	Sets the default Ethernet device type on systems with a Digital Ethernet controller (ew*).	
language	Sets the console keyboard layout to a supported language.	Determined at factory.
ocp_text	Specifies the message that is displayed on the power-up/diagnostic display.	CPU speed
os_type	Specifies the operating system that will be run on the system. Sets the appropriate console user interface.	Matches the system configuration.
pk*0_fast	Enables fast SCSI devices to perform in fast SCSI mode.	
pk*0_host_id	Sets the default value for a controller host bus node ID.	Bus node ID 7

set auto_action

Synopsis

Set the console action at power-up and restart.

`set auto_action` [-default] *val*

Description

Sets the action the console should take any time the system is powered up, crashes, or the Reset button is pressed. When the setting involves autobooting, the system boots from the default boot device that is specified by the value of the bootdef_dev environment variable.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Qualifier	Description
halt	Causes the system to remain in console mode after the system is powered up or it crashes.
boot	Causes the system to boot automatically when it is turned on. Causes the system to halt after a system failure.
restart	Causes the system to boot automatically when it is turned on or after it fails.

Example

In the following example, the system's default console action following error, halt, or power-up is changed from halt to boot.

```
P00>>> show auto_action
auto_action     halt
P00>>> set auto_action boot
P00>>> init
 . . .
P00>>> show auto_action
auto_action     boot
```

set bootdef_dev

Synopsis

Set the default boot device.

`set bootdef_dev` *device_name*

Description

Specifies the default boot device to the system. The default boot device is the device from which the bootstrap system software is loaded. In most cases, the default boot device has already been identified on your system as the device on which Factory Installed Software (FIS) was loaded.

Setting the default boot device simplifies the process of booting the operating system as follows:

- You can enter `b` and press Return at the console prompt and the system will find and boot the operating system software.
- Assuming the default startup action is set to `boot` or `restart` (using the `set auto_action` command), the system will find and automatically boot the operating system at power-up.

Before identifying the boot device, consider the following:

- Your boot device may already be set. (Enter the command `show bootdef_dev` to display the current default boot device.)
- You can identify multiple boot devices to the system. By doing so, when you enter `b` or `boot` at the console prompt, the system searches for a bootable device from the list of devices that you specify. The system then automatically boots from the first device on which it finds software.
- Whenever you boot the operating system, you can override the default boot device by specifying an alternative device name on the `boot` command line.

Qualifiers

Qualifier	Description
boot_device	Name (or names) of your boot devices.

Examples

In the following example, the default device from which the system attempts to boot is set to dka0.

```
P00>>> set bootdef_dev dka0
```

In the next example, the default device is set to dka0.

```
P00>>> set bootdef_dev dka0.0.0.1.0
P00>>> show bootdef_dev
bootdef_dev     dka0.0.0.1.0
```

set boot_osflags

Synopsis

Set the default boot flags and, in OpenVMS, a root number.

`set boot_osflags` *root_number,bootflag*

Description

Boot flags contain information that is read and used by the operating system to determine some aspects of a system bootstrap. Under normal circumstances, the default boot flag settings will suit your environment.

To change the boot flags for the current boot only, you can pass boot flags to the operating system on the `boot` command line with the -flags option (see the `boot` command).

The interpretation of the boot flags depends on the operating system.

Digital UNIX Systems

The Digital UNIX operating system takes only one boot flag argument: the boot flag.

Possible boot flag settings and their meanings for Digital UNIX systems are:

Flag Setting	Meaning
a	Load operating system software from the specified boot device (autoboot). Boot to multiuser mode.
i	Prompt for the name of a file to load and other options (boot interactively). Boot to single user mode.
s	Stop in single-user mode. Boots /vmunix to single-user mode and stops at the # (root) prompt.
D	Full dump, implies "s" as well. By default, if Digital UNIX crashes, it completes a partial memory dump. Specifying "D" forces a full dump at system crash.

Example

In the following example on a Digital UNIX system, the boot flags are set to autoboot:

```
P00>>> set boot_osflags a
```

OpenVMS Systems

The OpenVMS operating system takes two boot flag arguments: root number and boot flags. If you specify only one argument, the argument designates the boot flag.

Root Number Settings

The root number is the directory number on the system disk on which OpenVMS files are located. For instance:

File Location	Corresponding Root Number
[SYS0.SYSEXE]	0 (default)
[SYS1.SYSEXE]	1
[SYS2.SYSEXE]	2
[SYS3.SYSEXE]	3

Boot Flags (OpenVMS)

Possible boot flag settings and their meanings for OpenVMS systems are shown in Table 4–5.

Note

Using logical ORing, you can identify multiple boot flags.

Table 4–5 OpenVMS Boot Flag Settings

Flag Setting	Bit Number	Meaning
1	0	Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).
2	1	Map XDELTA to running system.
4	2	Stop at initial system breakpoint.
8	3	Perform diagnostic bootstrap.
10	4	Stop at the bootstrap breakpoints.
20	5	Omit header from secondary bootstrap image.
80	7	Prompt for the name of the secondary bootstrap file.
100	8	Halt before secondary bootstrap.
10000	16	Display debug messages during booting.
20000	17	Display user messages during booting.

Examples

In the following OpenVMS example, the root number is set to 1 and the boot flags are set to 2:

```
P00>>> set boot_osflags 1,2
 . . .
```

In the next OpenVMS example, the boot flags are set to 1 and the root number is not changed:

```
P00>>> set boot_osflags 1
 . . .
```

set console

Synopsis

Set the device on which power-up output is displayed.

`set console` *output_device*

Description

Power-up information is typically displayed on your console terminal. Your console terminal might be either a graphics terminal or a serial terminal. The setting of this environment variable determines where the system will display power-up output. Set this environment variable according to the console terminal that you are using.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Qualifier	Description
graphics	Sets the power-up output to be displayed at an optional graphics terminal, with Digital UNIX installed.
serial	Sets the power-up output to be displayed on the device that is connected to the COM1 port at the rear of your system.

Example

In the following example, the system is set to display power-up output on the device that is connected to the COM1 port at the rear of the system.

```
P00>>> set console serial
P00>>> init
 . . .
```

set ew*0_mode

Synopsis

Set an Ethernet controller to the default Ethernet device type. This command applies to systems with a Digital Ethernet controller (ew*).

`set ew*0_mode` *qualifier*

Description

Sets an Ethernet controller to run an AUI, ThinWire, or 10BASE-T (twisted-pair) Ethernet network:

- If either an AUI or ThinWire Ethernet network is connected to the Ethernet controller, set the default Ethernet device type to "aui."
- If a 10BASE-T Ethernet network is connected to the Ethernet controller, set the default Ethernet device type to "twisted-pair."

When entering this command, replace "*" with the adapter ID for the Ethernet controller for which you are setting the default.

To get a list of the Ethernet controllers on your system, enter the `show config` command. A list of all system devices is displayed. The Ethernet controllers for which this command setting is pertinent start with the letters "ew." The third letter is the adapter ID for the Ethernet controller.

Qualifiers

Qualifier	Description
aui	Sets the default Ethernet device to AUI.
twisted-pair	Sets the default Ethernet device type to 10BASE-T (twisted-pair).
auto-sensing	Reads the device connected to the Ethernet port and sets the default to the appropriate Ethernet device type. (Currently, this option is not implemented.)

Example

In the following example, the default Ethernet device type for Ethernet controller “a” is set to a 10BASE-T (twisted-pair) controller.

```
P00>>> set ewa0_mode twisted-pair
P00>>> show ewa0_mode
ewa0_mode     twisted-pair
```

set language

Synopsis

Set the keyboard layout, which is language dependent.

`set language` *language_code*

Description

Your terminal keyboard layout depends on the language variant of the keyboard that you ordered. In order for the system to interpret the terminal keyboard layout correctly, the console language setting must match the language of the keyboard variant that you ordered.

The system ships from the factory with a default keyboard setting. Enter `show language` at the console prompt to display the current keyboard setting. If the current setting does not match your keyboard, reset this variable to match your keyboard variant.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Possible keyboard language variants and the code that you use to designate them are as follows:

Code	Language
0	none (cryptic)
30	Dansk (Danish)
32	Deutsch (German)
34	Deutsch (Schweiz) (Swiss)
36	English (American)
38	English (British/Irish)
3A	Espanol (Spanish)
3C	Francais (French)
3E	Francais (Canadian)
40	Francais (Suisse Romande)
42	Italiano (Italian)
44	Nederlands (Netherlands)
46	Norsk (Norwegian)
48	Portuguese (Portuguese)
4A	Suomi (Finnish)
4C	Svenska (Swedish)
4E	Belgisch-Nederlands (Dutch)

Example

In the following example, the system is set to be used with the Spanish variant of a terminal keyboard.

```
P00>>> set language 3A
P00>>> init
 . . .
```

set ocp_text

Synopsis

Set the message that is displayed on the power-up/diagnostic display.

`set ocp_text` *message*

Description

The power-up/diagnostic display on the front of the system is used to display important diagnostic and power-up information. When self-tests and diagnostics are completed, the CPU variant and system model number are displayed. You can use the `set ocp_text` command to display a different message of your choice, as shown in the example that follows. below.

The power-up/diagnostic display can display up to 16 characters.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Qualifier	Description
message	*your_text*

Example

In the following example, the system is set to display "Digital Alpha VME 2100" on the power-up/diagnostic display when the operating system is up and running. The text to be displayed must be entered in quotation marks.

```
P00>>> set ocp_text "Digital Alpha VME 2100"
P00>>> init
 . . .
```

set os_type

Synopsis

Set the default operating system.

`set os_type` *os_type*

Description

Before booting the operating system, you must specify the operating system that will be booted. (If the operating system is not identified correctly, you may experience problems while the operating system is running.)

You specify the operating system by setting the os_type environment variable to the desired operating system.

The os_type environment variable also controls the firmware that will be booted when the system is powered-up, halted, restarted, or shut down:

- If os_type is set to "vms" or "osf," the firmware will be booted.

If you need to temporarily run the firmware for a different operating system (to enter the `test` command or run the ECU), you must reset the os_type variable to match your operating system before booting.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Possible settings are as follows:

Qualifier	Description
osf	Sets the default operating system to Digital UNIX; boots the SRM firmware
vms	Sets the default operating system to OpenVMS; boots the SRM firmware

Example

In the following example, the default operating system is set to Digital UNIX. When the system is powered-up, halted, or restarted, the console firmware will be booted.

```
P00>>> set os_type osf
P00>>> init
 . . .
```

set pk*0_fast

Synopsis

Enable either standard or fast SCSI mode.

`set pk*0_fast` *scsi_speed*

Description

Enables fast SCSI devices on a SCSI controller to perform in standard or fast mode.

- If you have at least one fast SCSI device in your system, set the default controller speed to fast SCSI (1).

  Devices on a controller that connects to both standard and fast SCSI devices will automatically perform at the appropriate rate for the device, either fast or standard mode.

- If you have no fast SCSI devices, set the default controller speed to standard SCSI (0).

  If a controller is set to standard SCSI mode, both standard and fast SCSI devices will perform in standard mode.

When entering this command, replace "*scsi_speed*" with the adapter ID for the SCSI controller for which you are setting the default.

To get a list of the controllers on your system, enter the `show config` command. A list of all system devices is displayed. The third letter is the adapter ID for the controller.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Qualifier	Description
0	Sets the default speed for devices on the controller to standard SCSI.
1	Sets the default speed for devices on the controller to fast SCSI mode.

Example

In the following example, the default speed for devices connected to a SCSI controller with an adapter ID of "a" is set to fast SCSI mode.

```
P00>>> set pka0_fast 1
P00>>> init
 . . .
P00>>> show pka0_fast
pka0_fast     1
```

set pk*0_host_id

Synopsis

Set the controller host bus node ID to a value between 0 and 7.

`set pk*0_host_id` *scsi_controller_bus_node_id*

Description

Each SCSI bus in the system requires a controller. Buses can theoretically support up to eight devices; however, the eighth device must always be a controller. Each device on the bus, including the controller, must have a unique ID, which is a number between 0 and 7. This unique number is the bus node ID number.

On each bus, the default bus node ID for the controller is set to 7. You do not need to change the controller bus node ID unless you place two or more controllers on the same bus.

When entering this command, replace "*" with the adapter ID for the SCSI controller for which you are setting the default.

To get a list of the controllers on your system, enter the `show config` command. A list of all system devices is displayed. The third letter is the adapter ID for the controller.

Whenever you change the value of this environment variable, you must initialize the system to put the new setting into effect. To initialize the system, enter the `init` command.

Qualifiers

Qualifier	Description
0-7	Indicates the bus node ID.

Example

In the following example, the default bus node ID for a SCSI controller with an adapter ID of "b" is set to bus node ID 6.

```
P00>>> set pkb0_host_id 6
P00>>> init
 . . .
P00>>> show pkb0_host_id
pkb0_host_id     6
```

show

Synopsis

Display an environment variable value or other information.

`show` [*envar*] [{config,device,memory,pal,version}]

Description

Displays the current value (or setting) for an environment variable that you specify.

Alternatively, displays other information about the system, according to the parameters that you enter on the command line. For example, you can display the system configuration by entering `show config`.

Parameters

Parameter	Description
envar	Displays the value of the environment variable specified. Refer to the list of commonly used environment variables described in the next table.
config	Displays the current system configuration.
device	Displays devices and controllers in the system.
fru	Displays the serial number and revision level of system bus options and any errors for those options.
memory	Displays the memory module configuration.
pal	Displays the Privileged Architecture Library code (PALcode) version.
version	Displays the console program version.

Environment Variables

Variable	Description
auto_action	Displays the console action following an error, halt, or power-up: halt, boot, or restart.
bootdef_dev	Displays the device or device list from which bootstrapping is attempted.
boot_osflags	Displays the additional parameters to be passed to system software.
console	Displays the device on which power-up output is displayed.
ew*0_mode	Displays the default Ethernet device type for the Ethernet controller that you specify. This variable applies to systems with a Digital Ethernet controller (ew*).
language	Displays the language in which system software and layered products are displayed.
ocp_text	Displays the message that is displayed on the power-up/diagnostic display.
os_type	Displays the operating system to be booted.
pk*0_fast	Displays the default speed for the SCSI devices on a SCSI controller that you specify.
pk*0_host_id	Displays the default bus node ID for a SCSI controller that you specify.

Examples

In the following example, the system displays the version of the console program installed. In the following example, the console program version is V3.8-49.

```
P00>>> show version
version                V3.8-49 Nov 9 1994 12:02:20
P00>>>
```

In the next example, the default system power-up action is displayed.

```
P00>>> show auto_action
auto_action      boot
P00>>>
```

In the next example, a system's default boot device is displayed. The default boot device is ewa0.

```
P00>>> show bootdef_dev
bootdef_dev      DKA0.0.0.1.0
P00>>>
```

In the next example, a system's memory is displayed.

```
P00>>> show memory

Module   Size    Base Addr   Intlv Mode  Intlv Unit  Status
------   -----   ---------   ----------  ----------  ------
  0       64MB   00000000      1-Way         0       Passed
Total Bad Pages 0
P00>>>
```

show config

Synopsis

Display the system configuration.

`show config`

Description

Displays all devices found on the system bus, and PCI bus. You can use the information in the display to identify target devices for commands such as `boot` and `test`, as well as to verify that the system sees all the devices that are installed.

Note

The console firmware will not report the configuration of I/O options on the VME bus. This information occurs when the operating system boots.

The configuration display includes the following:

- Core system status:

  CPU, memory, standard I/O are shown with the results of power-up tests: P (pass) or F (fail)

- Hose 0, Bus 0, PCI:
  - Slot 0 = Ethernet adapter (ewa0)
  - Slot 1 = SCSI controller on standard I/O, along with storage drives on the bus.
  - Slot 2 = EISA to PCI bridge chip
  - Slots 3–5 = Reserved
  - Slot 6 = PCI to PCI bridge chip (on VME daughter board)
  - Slot 7 = Corresponds to PCI slot 7 (PCI7)
  - Slot 8 = Corresponds to PCI slot 8 (PCI8)

  For storage controllers, the devices off the controller are also displayed.

- Hose 0, Bus 1, PCI

  Slot 0 = PCI to VME chip

Slot 1 = corresponds to PCI slot 1 (PCI1)

For storage controllers, the devices off the controller are also displayed.

- Hose 1, Bus 0, EISA:

  Not applicable to Digital Alpha VME 2100 systems.

- Hose 2, Bus 0, PCI:

  Reserved for future expansion.

For more information on device names, refer to the next section, "show device."

Example

The show config display may look like the following example:

```
P00>>> show config
                      Digital Equipment Corporation
                         AlphaServer 2100 4/200

SRM Console X3.8-49      VMS PALcode X5.64, OSF PALcode X1.42

        Component       Status  Module ID
        CPU 0           P       B2020-AA DECchip (tm) 21064-3
        Memory 1        P       B2021-BA  64 MB
        I/O             P       B2110-AA
                                dva0.0.0.0.1      RX26

        Slot  Option            Hose 0, Bus 0, PCI
          0   DECchip 21040-AA  ewa0.0.0.0.0    08-00-2B-E2-16-31
          1   NCR 53C810        pka0.7.0.1.0    SCSI Bus ID 7
                                dka0.0.0.1.0    RZ26
                                dka300.3.0.1.0  RZ28
                                dka500.5.0.1.0  RRD43
          2   Intel 82375EB                     Bridge to Hose 1, EISA
          6   DECchip 21050-AA                  Bridge to Bus 1, PCI

        Slot  Option            Hose 0, Bus 1, PCI
          0   DECchip 7407

        Slot  Option            Hose 1, Bus 0, EISA

        Slot  Option            Hose 2, Bus 0, PCI
P00>>>
```

show device

Synopsis

Display system devices and controllers.

`show device` [*device_name*]

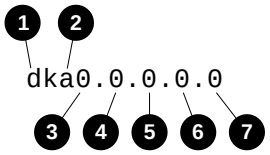
Description

Displays the devices and controllers found in the system. The device name convention is shown in Figure 4–2.

Note

The console firmware will not report the configuration of I/O options on the VME bus. This information occurs when the operating system boots.

Figure 4–2 Device Name Convention in `show device` Command



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❶ Driver ID

Two-letter port or class driver designator
DR–RAID set device
DV–Diskette drive
ER–Ethernet port
PK–SCSI port, DK–SCSI disk, MK–SCSI tape
PU–DSSI port, DU–DSSI disk, MU–DSSI tape

❷ One-letter storage adapter designator (A,B,C . . .).

❸ Device unit number: a unique number.
SCSI unit numbers are forced to 100 X node ID.

❹ Bus node number: bus node ID.

❺ Channel number: used for multi-channel devices.

❻ Slot number:

- For PCI options:
  - — slot 0 = Ethernet adapter (ewa0)
  - — Slot 1 = SCSI controller on standard I/O, along with storage drives on the bus
  - — Slot 2 = EISA to PCI bridge chip
  - — Slots 3–5 = Reserved
  - — Slot 6 = PCI to PCI bridge chip (on VME daughter board)
  - — Slot 7 = Corresponds to PCI slot 7 (PCI7)
  - — Slot 8 = Corresponds to PCI slot 8 (PCI8)

❼ Hose Number:

Hose 0, Bus 1, PCI
Hose 1, Bus 0, EISA
Hose 2, Bus 0, PCI

Argument

[*device_name*]	The device name or device abbreviation. When abbreviations or wildcards are used, all devices that match the type are displayed.

Example

```
P00>>> show device
    ❶              ❷       ❸                ❹     ❺
dka0.0.0.1.0       DKA0                     RZ26    T392
dka300.3.0.1.0     DKA300                   RZ28    D41C
dka500.5.0.1.0     DKA500                   RRD43   0064
dva0.0.0.0.1       DVA0                     RX26
ewa0.0.0.0.0       EWA0          08-00-2B-E2-16-31
pka0.7.0.1.0       PKA0              SCSI Bus ID 7
P00>>>
```

❶ Console device name

❷ Operating system device name:

- For an allocation class of zero: NODENAME$DIA*u*

  NODENAME is a unique node name and *u* is the unit number. For example, R7BUCC$DIA0.

- For a nonzero allocation class:

  $ALLCLASS$DIA*u*

  ALLCLASS is the allocation class for the system and devices, and *u* is a unique unit number. For example, 1DIA0.

❸ Node name (alphanumeric, up to 6 characters). Not shown in this example.

❹ Device type

❺ Firmware version (if known)

show fru

Synopsis

Display the serial number and revision level of system bus options and any errors for those options.

```
show fru
```

Description

Displays module and error information for the following field-replaceable units based on the serial control bus EEPROM data:

- CPU modules
- Memory modules
- I/O modules

For each of the modules, the slot position, option, part, revision, and serial numbers, as well as any reported symptom-directed diagnostics (SDD) and test-directed diagnostics (TDD) event logs are displayed.

In addition, installed PCI modules are displayed with their respective slot numbers.

Example

```
P00>>> show fru
  ❶    ❷       ❸                ❹        ❺              ❻
                                 Rev                     Events logged
 Slot   Option  Part#            Hw Sw    Serial#        SDD     TDD
   0    I/O     B2110-AA         F2 0     KA418TYC22     00      00
   2    CPU0    B2020-AA         C2 9     KA434CUBL7     00      00
   5    MEM1    B2021-BA         B0 0     AY43314429     00      00

 Slot  Option            Hose 0, Bus 0, PCI
   0   DECchip 21040-AA
   1   NCR 53C810
   2   Intel 82375EB
   6   DECchip 21050-AA

 Slot  Option            Hose 1, Bus 0, EISA

 Slot  Option            Hose 2, Bus 0, PCI

P00>>>
```

❶ System bus slot number for module (slots 1–7 top to bottom)

Slot 0: Standard I/O module (dedicated PCI card cage slot)

Slot 1–3, 5: CPU modules
Slot 4–7: Memory modules

❷ Option name (I/O, CPU#, or MEM#)

❸ Part number of option

❹ Revision numbers (hardware and firmware)

❺ Serial number

❻ Events logged:

Numbers other than "00" indicate that errors have been logged.

SDD: Number of symptom-directed diagnostic events logged by the operating system, or in the case of memory, by the operating system and firmware diagnostics.

TDD: Number of test-directed diagnostic events logged by the firmware diagnostics.

show memory

Synopsis

Display information for each memory module in the system.

```
show memory
```

Description

Displays information about each memory module.

Example

```
P00>>> show memory

  ❶      ❷      ❸          ❹          ❺          ❻
Module   Size    Base Addr   Intlv Mode  Intlv Unit  Status
------   -----   ---------   ----------  ----------  ------
  1       64MB   00000000      1-Way         0       Passed
Total Bad Pages 0 ❼
P00>>>
```

❶ Module slot number

❷ Size of memory module

❸ Base or starting address of memory module

❹ Interleave mode—number of modules interleaved (1- to 4-way interleaving)

❺ Interleave unit number

❻ Status (passed, failed, or not configured)

❼ Number of bad pages in memory (8 KB/page)

show pal

Synopsis

Display the PALcode version.

```
show pal
```

Description

Displays the PALcode version. PALcode is the Alpha Privileged Architecture Library code, written to support Alpha processors. The PALcode implements architecturally defined behavior.

Example

In the following example, the system displays the versions of the PALcode that are installed on the system. The Digital UNIX PALcode version is X1.35-42. The OpenVMS PALcode version is X5.48-64.

```
P00>>> show pal
pal      VMS PALcode X5.48-64, OSF PALcode X1.35-42
P00>>>
```

show version

Synopsis

Display the console program version.

```
show version
```

Description

Displays the version of the console program that is installed on the system.

Example

In the following example, the system displays the version of the console program that is installed on the system. The console program version is V3.8-49.

```
P00>>> show version
version                 V3.8-49 Nov 9 1994 12:02:20
P00>>>
```

test

Synopsis

Test the system.

```
test
```

Description

Runs firmware diagnostics for the entire core system. The tests are run sequentially and the status of each subsystem test is displayed to the console terminal as the tests progress. If a particular device is not available to test, a message is displayed.

The `test` script tests devices in the following order:

1. Memory tests (1 pass)
2. Read-only tests: DK* disks, DR* disks, MK* tapes, DV* diskettes
3. Console loopback tests if lb argument is specified: COM2 serial port and parallel port
4. Network external loopback tests for EWA0—This test requires that the Ethernet port be terminated or connected to a live network or the test will fail.

Note

By default, no write tests are performed on disk and tape drives. Media must be installed to test the diskette drive and tape drives.

Examples

In the following example, the system is tested, and the tests complete successfully.

```
P00>>> test
```

```
Testing the Memory
Testing the DK* Disks(read only)
dkb600.6.0.2.1 has no media present or is
  disabled via the RUN/STOP switch
file open failed for dka0.0.0.1.01
dka500.5.0.1.0 has no media present or is
  disabled via the RUN/STOP switch
file open failed for DKA500.5.0.1.0
No DU* Disks available for testing
No DR* Disks available for testing
Testing the MK* Tapes(read only)
Testing the DV* Floppy Disks(read only)
file open failed for dva0.0.0.0.1
Testing the VGA (Alphanumeric Mode only)
Testing the EW* Network
P00>>>
```

In the next example, the system is tested, and the system reports an error message. The example indicates that no network server responded to a loopback message. Ethernet connectivity on this system should be checked.

```
P00>>> test

Testing the Memory
Testing the DK* Disks(read only)
No DR* Disks available for testing
Testing the MK* Tapes(read only)
Testing the DV* Floppy Disks(read only)
Testing the VGA (Alphanumeric Mode only)
Testing the EW* Network

*** Error (ewa0), Mop loop message timed out
    from: 08-00-2b-e2-16-31

*** List index: 7 received count: 0 expected
    count 2

P00>>>
```

5

Options and Upgrades

In This Chapter

This chapter covers the following topics:

- Upgrade overview
- Supported options
- Verifying system configuration
- Configuring system bus options
  - CPU
  - Memory
- Standard I/O module
- VME bus
- PCI bus
- SCSI bus
- Power supply configuration

Upgrade Overview

Planning Your Upgrade

Plan an upgrade by performing the following tasks:

1. **Acquire an accurate list of the modules and devices in your current configuration.**

   Refer to your operating system documentation for information about acquiring VME configuration information using an operating system command.

   Also, information about SCSI and PCI devices can be acquired in console mode. (Refer to the Invoking Console Mode section in Chapter 2, and Verifying System Configuration section in this chapter, for information about invoking console mode.

2. **Decide how your system will be changed.**

   Refer to the Digital *Systems and Options Catalog* to obtain the current description of the supported options.

3. **Order the option(s).**

4. **Install and configure the option(s) using the information in this chapter.**

   - To install the option, refer to the documentation shipped with the option.
   - To configure the option, refer to the appropriate section in this chapter.

Adding Third-Party Devices

Third-party devices are devices purchased from vendors other than Digital Equipment Corporation.

Before attempting to connect third-party devices or install them inside your system unit, first check with the third-party vendor to ensure that your system and operating system support the device.

Note

Many third-party devices are checked and approved by Digital's Product Safety/EMI group, to ensure your personal protection and to prevent equipment damage.

For information about connecting third-party SCSI devices to the system, refer to the SCSI Bus section presented later in this chapter.

Supported Options

Ordering Options

For a list of the supported options, refer to the *Digital Systems and Options Catalog*.

Digital Equipment Corporation regularly publishes the catalog to assist customers in ordering and configuring systems and hardware options. Each printing of the catalog presents all of the products that are announced, actively marketed, and available for ordering. If necessary, past editions should be retained for reference.

- To obtain the latest printed catalog, call 1-800-DIGITAL or contact your Digital service representative.
- Internet participants can obtain printable PostScript® files of any section of the catalog from the Internet. To access files over the Internet, issue the following commands:

```
ftp gatekeeper.dec.com
cd /pub/digital/info/soc
```

Verifying System Configuration

Before You Begin

Several console commands or menu options allow examination of the system configuration and environment variable settings.

To use these console commands or menu options, the console mode must be invoked. For information about invoking console mode, refer to the Invoking Console Mode section in Chapter 2.

Firmware Console Commands for Digital UNIX and OpenVMS

The following SRM console commands are important for verifying your system configuration. They examine system configuration and environment variable settings.

- `show config` (described in the show config section)—Displays the buses on the system and the devices found on those buses; this command will not report devices on the VME bus.
- `show device` (described in the show device section)—Displays the devices and controllers in the system; this command will not report devices on the VME bus.
- `show memory` (described in the show memory section)– Displays main memory configuration.
- `set` and `show` (described in the Setting and Showing Environment Variables section)–Set and display environment variable settings.

  For more information about using the `set` and `show` commands to set and display environment variables, refer to Chapter 4 in this document.

show config

The `show config` command displays all devices found on the system bus and PCI bus. The information in the display can be used to identify target devices for commands such as `boot` and `test`, as well as to verify that the system sees all the devices that are installed.

The configuration display includes the following:

- Core system status:

  CPU, memory, and standard I/O are shown with the results of power-up tests: P (pass), F (fail)

- Hose 0, Bus 0, PCI:
  - Slot 0 = Ethernet adapter (ewa0)
  - Slot 1 = SCSI controller on standard I/O, along with storage drives on the bus.
  - Slot 2 = EISA to PCI bridge chip
  - Slots 3–5 = Reserved
  - Slot 6 = PCI to PCI bridge chip (on VME daughter board)
  - Slot 7 = Corresponds to PCI slot 7 (PCI 0-7)
  - Slot 8 = Corresponds to PCI slot 8 (PCI 0-8)

    For storage controllers, the devices off the controller are also displayed.
- Hose 0, Bus 1, PCI

  Slot 0 = PCI to VME chip
  Slot 1 = corresponds to PCI slot 1 (PCI1)

  For storage controllers, the devices off the controller are also displayed.
- Hose 1, Bus 0, EISA:

  Not applicable to Digital Alpha VME 2100 systems.
- Hose 2, Bus 0, PCI:

  Reserved for future expansion.

Synopsis:

show config

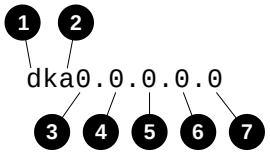
Example:

```
s>(P00>>> )show config
                       Digital Equipment Corporation
                          AlphaServer 2100 4/200

SRM Console X3.8-49      VMS PALcode X5.64, OSF PALcode X1.42

        Component       Status  Module ID
        CPU 0           P       B2020-AA DECchip (tm) 21064-3
        Memory 1        P       B2021-BA  64 MB
        I/O             P       B2110-AA
                                dva0.0.0.0.1      RX26

        Slot  Option            Hose 0, Bus 0, PCI
          0   DECchip 21040-AA  ewa0.0.0.0.0    08-00-2B-E2-16-31
          1   NCR 53C810        pka0.7.0.1.0    SCSI Bus ID 7
                                dka0.0.0.1.0    RZ26
                                dka300.3.0.1.0  RZ28
                                dka500.5.0.1.0  RRD43
          2   Intel 82375EB                     Bridge to Hose 1, EISA
          6   DECchip 21050-AA                  Bridge to Bus 1, PCI

        Slot  Option            Hose 0, Bus 1, PCI
          0   DECchip 7407

        Slot  Option            Hose 1, Bus 0, EISA

        Slot  Option            Hose 2, Bus 0, PCI
P00>>>
```

show device

The `show device` command displays the devices and controllers in the system. The device name convention is shown in Figure 5–1.

Figure 5–1 Device Name Convention



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❶ Driver ID:

Two-letter port or class driver designator
DR–RAID set device
DV–Diskette drive
ER–Ethernet port
PK–SCSI port, DK–SCSI disk, MK–SCSI tape
PU–DSSI port, DU–DSSI disk, MU–DSSI tape

❷ One-letter storage adapter designator (A,B,C . . .)

❸ Device unit number: a unique number.

❹ Bus node number: bus node ID.

❺ Channel number: used for multichannel devices.

❻ Slot number:

- For PCI options:
  - — slot 0 = Ethernet adapter (ewa0)
  - — Slot 1 = SCSI controller on standard I/O, along with storage drives on the bus
  - — Slot 2 = EISA to PCI bridge chip
  - — Slots 3–5 = Reserved
  - — Slot 6 = PCI to PCI bridge chip (on VME daughter board)
  - — Slot 7 = Corresponds to PCI slot 7 (PCI7)
  - — Slot 8 = Corresponds to PCI slot 8 (PCI8)

❼ Hose Number:

Hose 0, Bus 1, PCI
Hose 1, Bus 0, EISA
Hose 2, Bus 0, PCI

Synopsis:

show device [*device_name*]

Argument:

[*device_name*]	The device name or device abbreviation. When abbreviations or wildcards are used, all devices that match the type are displayed.

Example:

```
P00>>> show device
dka0.0.0.1.0           DKA0                 RZ26   T392
dka300.3.0.1.0         DKA300               RZ28   D41C
dka500.5.0.1.0         DKA500               RRD43  0064
dva0.0.0.0.1           DVA0                 RX26
ewa0.0.0.0.0           EWA0      08-00-2B-E2-16-31
pka0.7.0.1.0           PKA0          SCSI Bus ID 7
P00>>>
```

show memory

The show memory command displays information for each memory module in the system.

Synopsis:

show memory

Example:

```
P00>>> show memory

  ❶       ❷       ❸           ❹           ❺          ❻
Module   Size    Base Addr   Intlv Mode  Intlv Unit  Status
------   -----   ---------   ----------  ----------  ------
  1       64MB   00000000      1-Way         0       Passed
Total Bad Pages 0 ❼
P00>>>
```

❶ Module slot number

❷ Size of memory module

❸ Base or starting address of memory module

❹ Interleave mode—number of modules interleaved (1- to 4-way interleaving)

❺ Interleave unit number

❻ Status (passed, failed, or not installed)

❼ Number of bad pages in memory (8 KB/page)

Setting and Showing Environment Variables

Environment variables are typically set when you are configuring a system. Whenever you use the `set` command to reset an environment variable, you must initialize the system to put the new setting into effect. You initialize the system by entering the `init` command or pressing the Reset button.

Synopsis:

set [-default] [-integer] -[string] envar value

show envar

Arguments:

envar	The name of the environment variable to be modified.
value	The value that is assigned to the environment variable. This may be an ASCII string.

Options:

-default	Restores variable to its default value.
-integer	Creates variable as an integer.
-string	Creates variable as a string (default).

Examples:

```
P00>>> set bootdef_dev dka0
P00>>> show bootdef_dev
bootdef_dev        dka0.0.0.1.0
P00>>> show auto_action
auto_action        boot
P00>>> set boot_osflags 0,1
P00>>>
```

For more information about using the `set` and `show` commands, including the environment variables that you can set, refer to Chapter 4 in this document.

Configuring System Bus Options

The system bus interconnects the CPU modules and memory modules. The system bus is the hardware structure through which data processed by the microprocessor is transferred throughout the system.

Figure 5–2 and Figure 5–3 show the locations of the system bus and system bus options in the card cage. Your system supports options for two types of bus architectures: VME and PCI. The next sections describe the system bus options for your system. VME and PCI module should be installed by your service representative; see the *Digital Alpha VME 2100 Service Guide* for information.

Figure 5–2 Vertical Mount System: Bus Option Locations

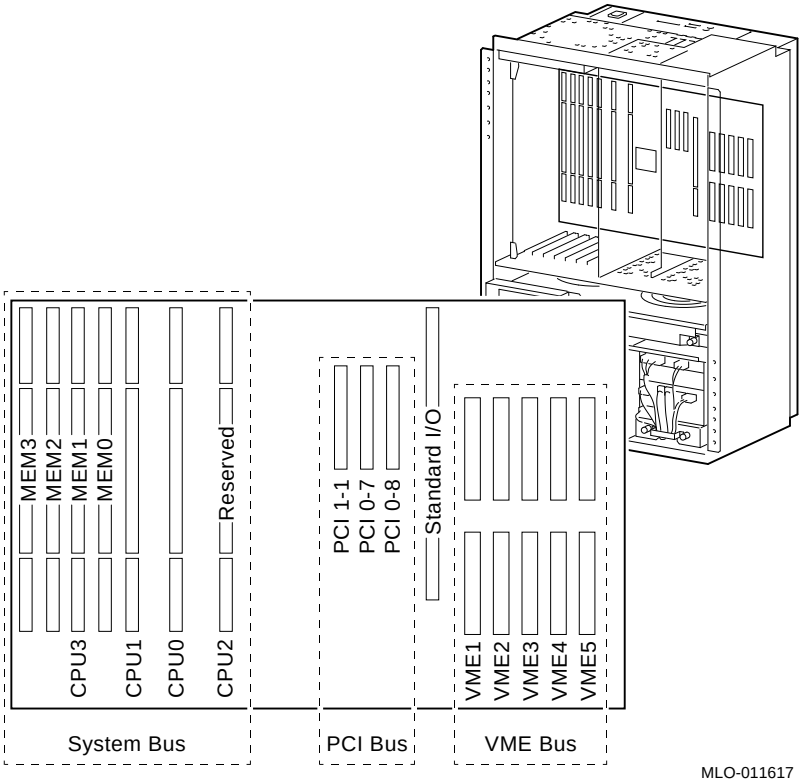
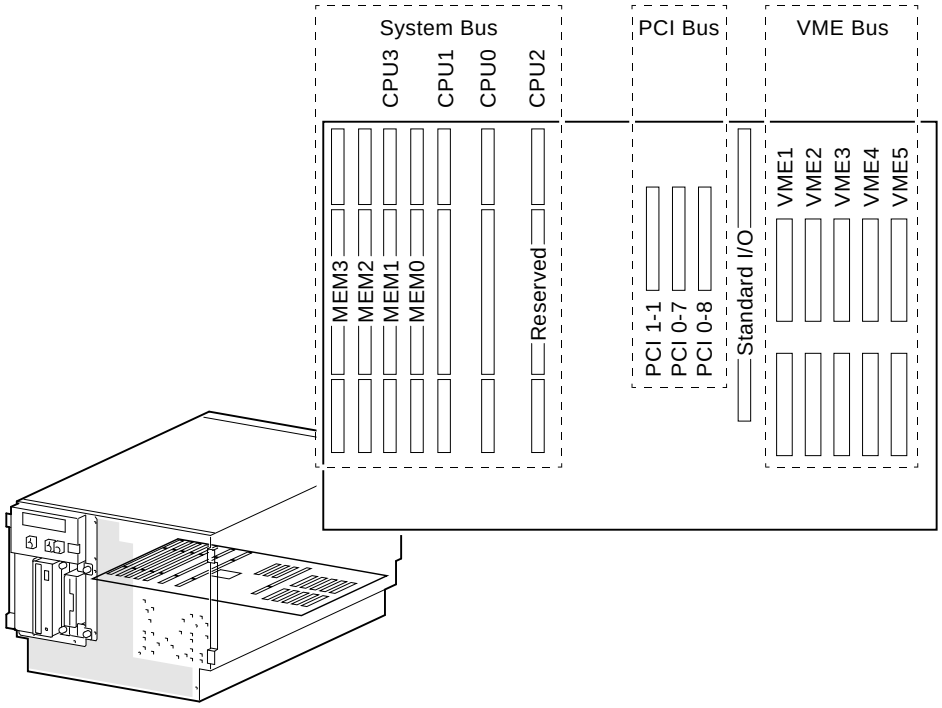


Figure 5–3 Drawer Mount System: Bus Option Locations



CPU Modules

The system can support up to four (4) CPU modules. Different CPU types cannot be used within the same system. CPU modules should be installed by your service representative; see the *Digital Alpha VME 2100 Service Guide* for information. Note the following:

- All systems must have a CPU module installed in system bus slot 2 (CPU 0).
- Systems with more than two CPUs displace the memory module capacity as shown in Figure 5–4 and Figure 5–5.

Warning

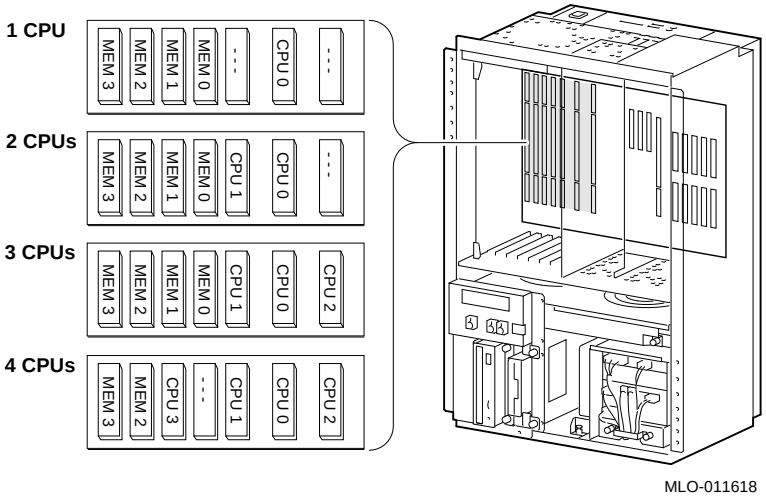
Before accessing the CPUs:

1. Perform an orderly shutdown of the operating system according to the shutdown procedures described in your operating system documentation.
2. Set the DC On/Off button ❶ and the Halt button to the positions shown in Figure 2–23, Chapter 2. (If the Halt button is set to the in position, the system will not boot the next time the system is turned on.)

CPU modules are available in two variations as follows:

- KN450-AA CPU module (B2020-AA)
- KN460-AA CPU module (B2024-AA)

Figure 5–4 Vertical Mount System: System Bus Configurations



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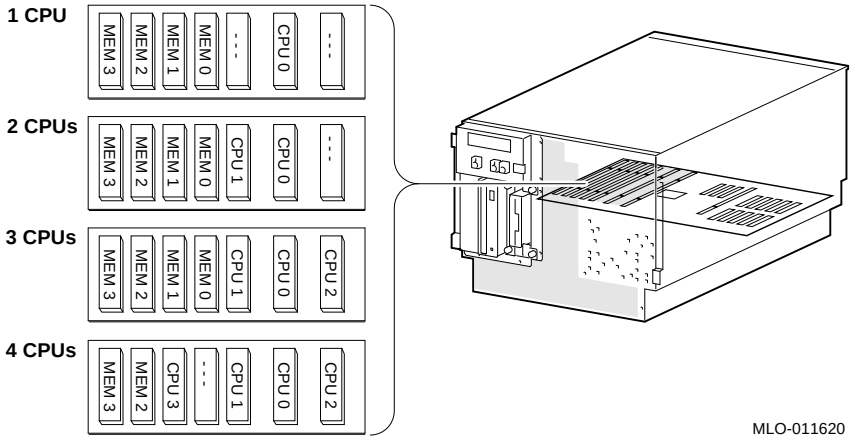
Warning: CPU and Memory modules have parts that operate at high temperatures. Wait two minutes after power is removed before handling these modules.

Figure 5–5 Drawer Mount System: System Bus Configurations



Memory Modules

The system can support up to four (4) memory modules (for a maximum memory capacity of 2 GB). A minimum of one memory module is required.

Memory modules should be installed by your service representative; see the *Digital Alpha VME 2100 Service Guide* for information.

Warning

Before installing a memory module, turn off all power to the system (both ac and dc). Refer to the Turning the System Off section in Chapter 2 for information about turning off ac and dc power.

Memory is available in three variations as follows:

- MS450–BA (B2021–BA) 64-MB
- MS450–CA (B2021–CA) 128-MB
- MS451–CA (B2022–CA) 512-MB

Standard I/O Module

Warning

Before installing the standard I/O module, turn off all power to the system (both ac and dc). Refer to the Turning the System Off section in Chapter 2 for information about turning off ac and dc power.

The standard I/O module provides the standard set of I/O functions and is required in all systems. It provides:

- A fast SCSI-2 controller chip that supports up to seven (7) drives.
- The firmware console subsystem on 512 KB of Flash ROM.
- An Ethernet controller with AUI or twisted-pair connectors.
- A floppy drive controller.
- Two serial ports with full-modem control and the parallel port.
- The keyboard and mouse interface.
- The speaker interface.
- The EISA-to-PCI bridge set.
- The TOY clock.

The I/O module should be replaced by your service representative; see the *Digital Alpha VME 2100 Service Guide* for information.

VME Bus

Overview

VME is an industry-standard expansion I/O bus. Your system supports up to five VME modules (6u VME form factor). The location of the VME bus is shown in Figure 5–2 and Figure 5–3.

Installing VME Modules

Install VME modules according to the instruction supplied with the module.

Note

Your Digital Alpha VME 2100 system always provides the VME slot 0 controller functions. However, some VME boards may also provide the same functionality as an option. These boards must be configured so that they will not perform the slot 0 controller functions.

Generally, VME boards are installed in slots from left to right. Backplane BG and JACK jumpers must be removed, as the backplane is populated with VME boards. If a VME backplane slot is skipped, the BG and JACK jumpers must remain installed.

Warning

Before installing a VME option, turn off all power to the system (both ac and dc). Refer to the Turning the System Off section in Chapter 2 for additional information.

Warning: For protection against fire, only use modules with current-limited outputs.

PCI Bus Options

PCI (Peripheral Component Interconnect) is an industry-standard expansion I/O bus that is the preferred bus for high-performance I/O options. Your system supports 32-bit PCI options.

Currently three (3) bus slots are reserved for 32-bit PCI options. The three PCI slots are labeled ❸ in Figure 1–8 and Figure 1–9. A PCI board is shown in Figure 5–6.

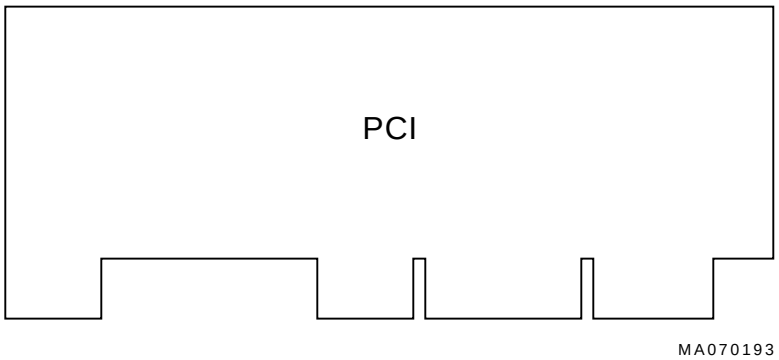
Install PCI boards according to the instructions supplied with the option. PCI boards require no additional configuration procedures; the system automatically recognizes the boards and assigns the appropriate system resources.

Warning

Before installing a PCI option, turn off all power to the system (both ac and dc). Refer to the Turning the System Off section in Chapter 2 for additional information.

For protection against fire, only use modules with current-limited outputs.

Figure 5–6 PCI Board



SCSI Bus

A SCSI bus expansion port on the rear of the system enables the ability to extend the bus that runs through the removable-media mass-storage compartment to the outside of the system. As a result, the external mass-storage devices can be connected to the buses inside the system.

A fast SCSI-2 adapter on the standard I/O module provides a single-ended SCSI bus for the system.

All tabletop or rackmount SCSI-2 devices are supported by means of PCI-based SCSI adapters. Use the following rules to determine if a device can be used on your system:

- The device must be supported by the operating system. Consult the software product description or hardware vendor.
- No more than seven (7) devices can be on any one SCSI-2 controller, and each must have a unique SCSI ID.
- The entire SCSI bus length, from terminator to terminator, must not exceed 6.0 m (19.7 ft) for single-ended SCSI-2 at 5 MB/s, or 3.0 m (9.8 ft) for single-ended SCSI-2 at 10 MB/s.

Native SCSI Bus

The fast SCSI-2 adapter on the standard I/O module supports up to four of the following internal SCSI devices:

- One or two hard-disk drives and up to two 13.3-cm (5.25-in.) half-height devices.
- One CD–ROM drive.
- One optional removeable-media device.

For Digital Alpha VME 2100 systems, the internal cabling for the removable-media bus is 2.0 m (6.6 ft); therefore, the maximum length for external expansion is 4.0 m (13.1 ft).

This bus can be extended to a rackmount StorageWorks shelf or to an external expander to support up to seven (7) drives.

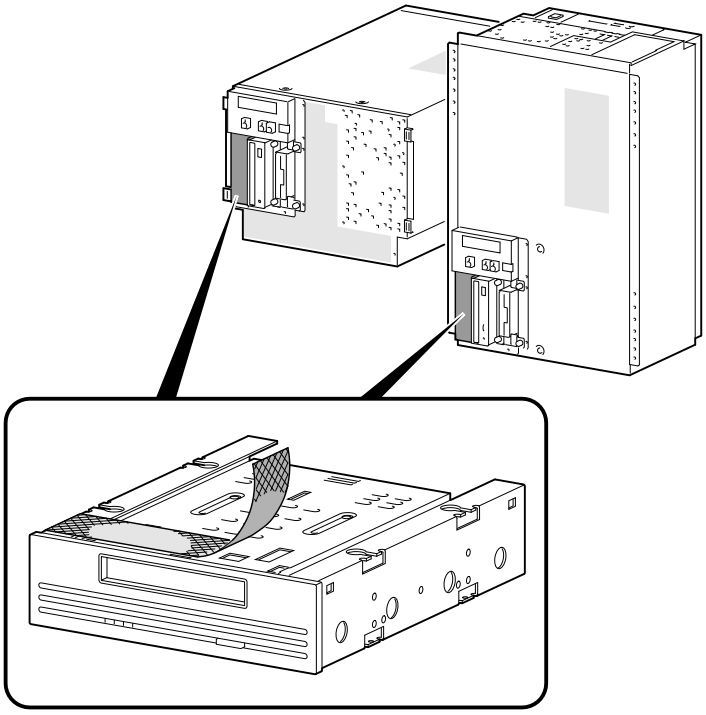
Installing Removable Media Storage Devices

Set the device's node ID so that there are no duplicate node IDs on your system, as each device must have a unique node ID. For information on device switch settings, refer the the documentation supplied with the device.

Note

If you are installing a TLZ0*n* drive as the leftmost drive, and you do not have a front bezel, attach the tape drive insulator assembly, part number 70-32518-01, provided in your accessory kit. See Figure 5–7. For additional information, refer to the *Tape Drive Insulator Strip* instructions provided with the insulator strip.

Figure 5–7 Attaching the Tape Drive Insulator Strip



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To install a removable media device, refer to Figure 5–8 and follow these steps:

1. Remove the optional front bezel. See Chapter 2 for step-by-step instructions.

Note

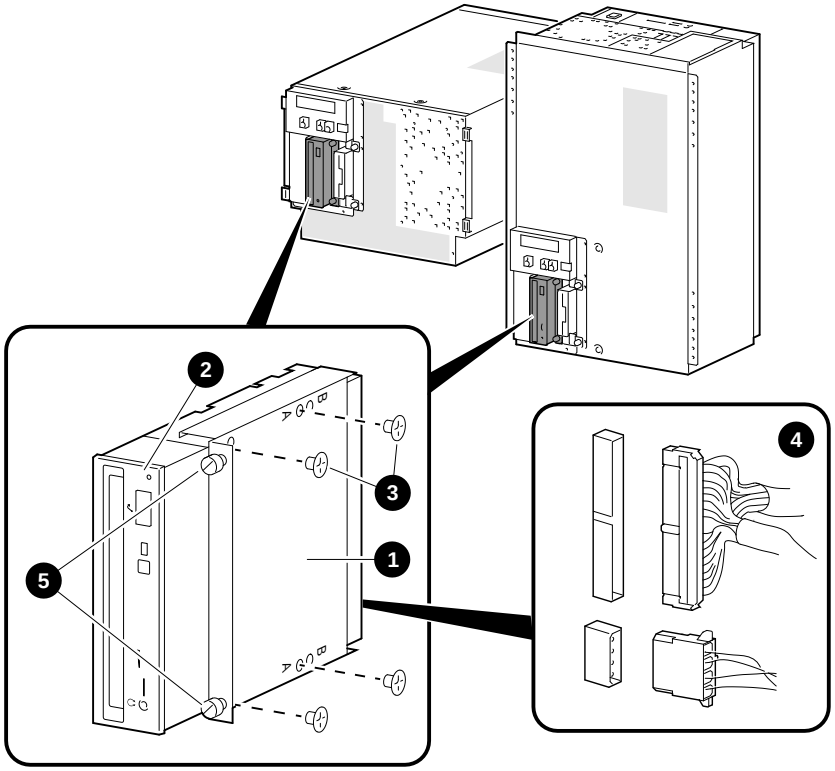
RRD*nn* and TLZ0*n* drives use the set of bracket holes marked "A" in Figure 5–8, whereas the TZK11 drive uses the set of bracket holes marked "B" in Figure 5–8.

Warning

Before installing a storage device, turn off all power to the system (both ac and dc). Refer to the Turning the System Off section in Chapter 2 for information about turning off ac and dc power.

2. Attach the bracket ❶ to the new drive ❷ using four M3 x 6 mm flat-head screws ❸ and the appropriate bracket holes (A or B). Bracket and appropriate screws are shipped with the device.

Figure 5–8 Installing Removable Media



3. Set the device's node ID so that there are no duplicate node IDs, as each device must have a unique node ID. Nodes 0–6 are available for drives, and node 7 is reserved for the host adapter. Refer to the device documentation on how to set the node ID on the device.
4. Insert the drive ❷ with the attached bracket into the appropriate slot and connect the drive cables ❹.
5. Secure the drive to the front of the system using two captive screws ❺.
6. If you added a device in the optional slot for removable-media devices, punch out the corresponding panel in the front bezel.
7. Replace the front bezel. See Chapter 2 for instructions.

Installing Fixed Disk Storage Devices

Important

Only qualified service personnel should remove or install a fixed disk drive. The *Digital Alpha VME 2100 Service Guide* contains information on troubleshooting, removing, and installing fixed disk drives.

Power Supply Configuration

Important

Only qualified service personnel should remove or install a power supply. The *Digital Alpha VME 2100 Service Guide* contains information on troubleshooting, removing, and installing a power supply.

6

Troubleshooting the System

In This Chapter

This chapter provides troubleshooting information and covers the following topics:.

- Determining the service provider
- Task overview
- Determining the type of problem
- Reporting problems
- Power problems
- Problems getting to console mode
- Interpreting the OCP power-up/diagnostic display
- Console reported problems
- Mass-storage problems indicated at power-up
- PCI bus problems indicated at power-up
- Boot problems
- Operating system reported problems
- Fail-safe loader

Determining the Service Provider

Before servicing the system, be aware of any service agreement that exists for your system. The agreement helps determine the level of maintenance for self-maintenance customers.

- For self-maintenance customers, use the information in this chapter to help identify and resolve the problem. Refer to the *Digital Alpha VME 2100 Service Guide* for more comprehensive troubleshooting information.
- If there is a service agreement with Digital, contact your Digital service representative for assistance.

Considerations Before Troubleshooting

Before troubleshooting any system problem, check the site maintenance log for the system's service history. Be sure to ask the system manager the following questions:

- Has the system been used before and did it work correctly?
- Have changes to hardware or updates to firmware or software been made to the system recently?
- What is the state of the system—is the operating system running?

  If the operating system is down and you are not able to bring it up, use the console environment diagnostic tools, such as the power-up/diagnostic displays and ROM-based diagnostics (RBDs).

  If the operating system is running, use the operating system environment diagnostic tools, such as error logs, crash dumps, and exercisers (DEC VET).

Identifying Problems

Table 6–1 lists ways to identify problems and indicates where each method is described.

Table 6–1 How to Identify a Problem

Method	Reference
Use the troubleshooting tables	This chapter
Run diagnostic tests	`test` command in the test section or `show fru` command in the Console Reported Problems section.

Task Overview

Identifying and Resolving Problems

Table 6–2 describes the steps required to identify and resolve system problems.

Table 6–2 Identifying and Resolving Problems

Step	Description
1	Determine the type of problem.
2	Locate the problem in the troubleshooting tables.
3	Follow the suggested actions to resolve the problem.
4	If necessary, run the diagnostic tests.
5	Contact your Digital service representative or other maintenance provider.

The next sections describe these steps in detail.

Determining the Type of Problem

Types of System Problems

Determine the type of problem that your system is experiencing from the list in Table 6–3.

Table 6–3 Problem Reference

Problem	Section
The system powers down unexpectedly or does not power up.	Power Problems
The power-up screens are not displayed on the console terminal.	Problems Getting to Console Mode
The power-up screens report an error or do not complete.	Console Reported Problems
The system cannot find the boot device or the device does not boot.	Boot Problems
The operating system startup screen does not appear, software applications do not run, or the operating system reports an error.	Operating System Reported Problems

If the system has a problem that is not listed in Table 6–3 or the corrective actions in the troubleshooting tables do not resolve the problem, refer to the Reporting Problems section in this chapter.

Reporting Problems

Precall Checklist

If you are unable to locate the system problem as outlined in Table 6–3, or the corrective actions suggested in the troubleshooting tables in this chapter do not resolve the problem, contact the nearest Digital support center. Before calling to report a problem, complete the following steps:

1. Locate the part and serial numbers printed on the label at the rear of your system. Record these numbers on a copy of the Digital Alpha VME 2100 Problem Worksheet in this chapter.

   The Digital support center will need this information when you call.

2. Fill in the Status of the System information on the worksheet.

3. Note the problem, any known possible causes, and the corrective actions suggested in the troubleshooting tables. Also indicate what corrective actions (if any) have already been taken to try to resolve the problem.

4. Be prepared to read information from the screen and to enter commands at the keyboard while you talk to the Digital support center representative.

Digital Support Center Contact Numbers

Table 6–4 lists the telephone numbers for contacting your Digital support center.

If your Digital support center number is not listed in Table 6–4, contact your local Digital office for assistance.

Table 6–4 Digital Support Centers

Country	Telephone Number
UNITED STATES	1-800-354-9000
Colorado Springs, CO	
From U.S./Canada/Mexico	719-592-7000
Shrewsbury, MA	
From U.S./Canada/Mexico	508-841-3700
Alpharetta, GA	
From U.S./Canada/Mexico	404-343-0000
AUSTRALIA	31-2-5615252
AUSTRIA	0222-86630-555
BELGIUM	02-7297744
CANADA	
English	1-800-267-5251
French	1-800-267-2603
DENMARK	80301005
FINLAND	90 9800 2878
FRANCE	1-69874123
GERMANY	01307702
HONG KONG	852-4149779
ISRAEL	052-592-300
ITALY	2-1678 20062
JAPAN (Tokyo)	
Trouble	0120-113035 (toll-free)

(continued on next page)

Table 6–4 (Cont.) Digital Support Centers

Country	Telephone Number
SPS Telephone Support	0120-113036 (toll-free)
Commodity Products Phone	0120-206042 (toll-free)
Special Account Customers	0120-113334 (toll-free)
KOREA	82-2-7991114
MALAYSIA	60-3-2300111
MEXICO	520140810017
NETHERLANDS	030-832888
NORTHERN IRELAND	0232 381381
NORWAY	02-256300
PHILIPPINES	623-810-5156
PORTUGAL	
Lisbon	01-3877051
Oporto	02-6068805
PUERTO RICO	800-981-4764
REPUBLIC OF IRELAND	01-381216
SINGAPORE	330-6225
SPAIN	
Madrid	34-(9)1-5834257
Barcelona	34-(9)3-4012222
SWEDEN	08-988835
THAILAND	66-254-8191
UNITED KINGDOM	025 6-59200

Digital Alpha VME 2100
Problem Worksheet

DEC service representative telephone number: _____

Serial Number: _____

Status of the System (check all that apply):

_____ DC power light is not on

_____ OCP power/diagnostic display failure message

_____ Operating system fails to boot

_____ Console program fails to boot

_____ Console error message

_____ Diagnostic test error message

OCP powerup/diagnostic display:

_____

_____

Screen error message:

_____

_____

_____

_____

Troubleshooting notes:

_____

_____

_____

_____

_____

_____

_____

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Power Problems

This section describes how to troubleshoot the system when there is no power at the system enclosure or the power supply subsystem lights indicate power trouble.

Table 6–5 describes possible power problems and their corrective actions.

Table 6–5 Diagnostic Flow for Power Problems

Symptom	Corrective Action
The power supply fans do not spin up when the ac power cable is plugged into the system.	Check the power source and the power cord.
AC power is present, as indicated by the sound of spinning fans, but the system does not start.	Check the DC On/Off button setting on the OCP.
	Check that the ambient room temperature is within the environmental specifications (10°C–40°C, 50°F–104°F.)
The power supply shuts down after approximately ten (10) seconds.	Check to see if the fan is operating. A failure causes the system to shut down after approximately ten (10) seconds.
Power out.	A failing open will not be deconfigured on reboot. It is necessary to press the Reset button, or cycle the power.

Problems Getting to Console Mode

This section describes how to troubleshoot the system when powering up the system, but the console terminal does not display the power-up screen.

Table 6–6 describes possible problems getting to console mode and their corrective actions.

Table 6–6 Diagnostic Flow for Problems Getting to Console Mode

Symptom	Corrective Action
The power-up screen is not displayed.	Check the power-up/diagnostic display on the OCP (refer to Table 6–7) for a failure during self-tests. Check that the keyboard and monitor are properly connected and powered on (refer to the Terminal Connections section in Chapter 2). If the power-up screen is not displayed, yet the system enters console mode, check that the console environment variable is set correctly. If a VGA console terminal is used, set the variable to graphics. If a serial terminal is used, set the variable to serial. If `console` is set to serial, the power-up screen is routed to the COM1 serial communication port (refer to the `set console` command in Chapter 4.) Try connecting a console terminal to the COM1 serial communication port (refer to the Terminal Connections section in Chapter 2). If necessary use a 9-pin connector. Check the baud rate setting for the console terminal and system. The system baud rate setting is 9600. When using the COM1 port, set the `console` environment variable to "serial."

Interpreting the OCP Power-Up/Diagnostic Display

Table 6–7 describes how to interpret messages that may be displayed on the power-up/diagnostic display located on the operator control panel on the front of the system (shown in Figure 3–1).

Table 6–7 Interpreting the OCP Power-Up/Diagnostic Display

Message	Meaning
TEST	This is displayed while the system performs diagnostic tests and exercisers. The type of module under test, its slot number, and the currently executing test number are also displayed.
NO MEM INSTALLED	This message is displayed if you power up with no memory installed.
FAIL	If an error is detected, a failure message is displayed (and the Halt button LED lights) for a few seconds. The error is logged to the appropriate module through the serial control bus. In nearly all cases, the power-up tests continue. The module type and the slot number for the field replaceable unit (FRU) that failed, along with the test number that detected the error, are also displayed. The module types and slot numbers are as follows: CPU*nn* — CPU modules (0–3) MEM*nn* — Memory modules (0–3) I/O_0 — Standard I/O module

(continued on next page)

Table 6–7 (Cont.) Interpreting the OCP Power-Up/Diagnostic Display

Message	Meaning
CPU STATUS	Summary of CPU testing—The status of each CPU from right to left, starting with CPU0 is displayed: "P" — CPU passed "F" — CPU failed "–" — CPU not present
STARTING CPU #	The console is starting the primary CPU.
TEST MEM BANK #	The console is testing memory.
PROBE I/O SUBSYS	The console is checking the PCI bridge.
SYSTEM RESET	The Reset button has been pressed.
Alpha *nnn*MHz	When the system is under operating system control, the CPU speed is displayed unless your own text is supplied using the ocp_text environment variable.

Console Reported Problems

This section describes how to troubleshoot the system when self-tests do not complete or when error messages are displayed on your console terminal in console mode.

Table 6–8 describes possible problems reported by the console program and their corrective actions.

Table 6–8 Diagnostic Flow for Problems Reported by the Console Program

Symptom	Corrective Action
The power-up tests do not complete.	Use the power-up/diagnostic display on the OCP (refer to Table 6–7).
The system powers up to the `ash>` prompt.	Reinstall the firmware. Refer to the firmware update documentation for firmware installation instructions. Contact your Digital support center if there is no backup copy of the firmware.
The console program reports an error. • The OCP displays failure message at power-up • The Halt button LED lights during power-up • The power-up screen includes error messages	Use the power-up/diagnostic display on the OCP (refer to Table 6–7) to determine the error. Use the `show fru` command described in the next section to see if errors have been logged. Examine the console event log (enter the `cat el` command) or power-up screens to check for embedded error messages recorded during power-up.

(continued on next page)

Table 6–8 (Cont.) Diagnostic Flow for Problems Reported by the Console Program

Symptom	Corrective Action
	If the power-up screens or the console event log indicate problems with the PCI devices, or if the PCI devices are missing from the `show config` display, use the troubleshooting flowchart (refer to Table 6–11) to determine the problem.
	Run the `test` command (refer to the test section in this chapter) to verify the problem.

show fru

The `show fru` command reports module and error information for the following field replaceable units based on the serial control bus EEPROM data:

- CPU modules
- Memory modules
- I/O modules

For each of the modules, the slot position, option, part, revision, and serial numbers, as well as any reported symptom-directed diagnostics (SDD) and test-directed diagnostics (TDD) event logs are displayed.

In addition, installed PCI modules are displayed with their respective slot numbers.

Synopsis:

show fru

Examples:

```
P00>>> show fru
  ❶    ❷       ❸                ❹         ❺
                                 Rev                          Events logged
 Slot   Option  Part#            Hw Sw   Serial#              SDD     TDD
   0    I/O     B2110-AA         F2 0    KA418TYC22           00      00
   2    CPU0    B2020-AA         C2 9    KA434CUBL7           00      00
   5    MEM1    B2021-BA         B0 0    AY43314429           00      00

 Slot  Option            Hose 0, Bus 0, PCI
   0   DECchip 21040-AA
   1   NCR 53C810
   2   Intel 82375EB
   6   DECchip 21050-AA

 Slot  Option            Hose 1, Bus 0, EISA

 Slot  Option            Hose 2, Bus 0, PCI

P00>>>
```

❶ System bus slot number for module (slots 1–7 top to bottom)

- Slot 0: Standard I/O module (dedicated PCI card-cage slot)
- Slot 1–3, 5: CPU modules
- Slot 4–7: Memory modules

❷ Option name (I/O, CPU#, or MEM#)

❸ Part number of option

❹ Revision numbers (hardware and firmware)

❺ Serial number

❻ Events logged:

Numbers other than “00” indicate that errors have been logged.

- SDD: Number of symptom-directed diagnostic events logged by the operating system, or in the case of memory, by the operating system and firmware diagnostics.
- TDD: Number of test-directed diagnostic events logged by the firmware diagnostics.

test

The `test` command runs firmware diagnostics for the entire "core" system. The tests are run sequentially and the status of each subsystem test is displayed on the console terminal as the tests progress. If a particular device is not available to test, a message is displayed.

Note

By default, no write tests are performed on disk and tape drives. Media must be installed to test the floppy drive and tape drives.

The `test` script tests devices in the following order:

1. Memory tests (one pass)
2. Read-only tests: DK* disks, DR* disks, DU* disks, MK* tapes, DV* floppy
3. Console loopback tests if lb argument is specified: COM2 serial port and parallel port
4. VGA console tests—These tests are run only if the VGA terminal is not used as the console terminal; that is, the console environment variable is set to "serial."
5. Network external loopback tests for EWA0—This test requires that the Ethernet port be terminated or connected to a live network, otherwise, the test will fail.

Synopsis:

test [lb]

Argument:

[lb]	The loopback option includes console loopback tests for the COM2 serial port and the parallel port during the test sequence.

Example:

```
P00>>> test
 2:32:12  January 4, 1995
Testing the Memory
Testing the DK* Disks(read only)
dkb600.6.0.2.1 has no media present or is
  disabled via the RUN/STOP switch
file open failed for dka0.0.0.1.01
dka500.5.0.1.0 has no media present or is
  disabled via the RUN/STOP switch
file open failed for DKA500.5.0.1.0
No DU* Disks available for testing
No DR* Disks available for testing
Testing the MK* Tapes(read only)
Testing the DV* Floppy Disks(read only)
file open failed for dva0.0.0.0.1
Testing the VGA(Alphanumeric Mode only)
Testing the EW* Network
P00>>>
```

Mass-Storage Problems Indicated at Power-Up

Mass-storage failures at power-up are usually indicated by read fail messages. Other problems can result in storage devices missing from the `show config` display.

Table 6–9 provides information for troubleshooting fixed-media mass-storage problems indicated at power-up.

Table 6–10 provides information for troubleshooting removable-media mass-storage problems indicated at power-up.

Use these tables to diagnose the likely cause of the problem.

Table 6–9 Fixed-Media Mass-Storage Problems

Problem	Symptom	Corrective Action
A drive failed.	The fault LED for the drive is on (steady).	Replace the drive.
There are duplicate SCSI ID(s).	The drives with duplicate SCSI IDs are missing from the `show config` display.	Correct the removable-media SCSI IDs.
The SCSI ID(s) is set to 7. 7 is reserved for the host ID.	The valid drives are missing from the `show config` display. One drive may appear seven (7) times on the `show config` display.	Correct the SCSI IDs.
There are duplicate host ID(s) on a shared bus.	The valid drives are missing from the `show config` display. One drive may appear seven (7) times on the `show config` display.	Change the host ID(s) using the `set pk*0_host_id` command described in Chapter 4.
An I/O module failed.	Problems persist after eliminating the previous problem sources.	Replace the standard I/O module.

Table 6–10 Removable-Media Mass-Storage Problems

Problem	Symptom	Corrective Action
A drive failed.	The fault LED for the drive is on (steady).	Replace the drive.
There are duplicate SCSI ID(s).	The drives with duplicate SCSI IDs are missing from the `show config` display.	Correct the SCSI IDs.
The SCSI ID(s) is set to 7. 7 is reserved for the host ID.	The valid drives are missing from the `show config` display. One drive may appear seven (7) times on the `show config` display.	Correct the SCSI IDs.
There are duplicate host ID(s) on a shared bus.	The valid drives are missing from the `show config` display. One drive may appear seven (7) times on the `show config` display.	Change the host ID(s) using the `set pk*0_host_id` command described in Chapter 4.
There are missing or loose cables.	The activity LEDs do not come on. The drive is missing from the `show config` display.	Remove the device and inspect the cable connections.
A terminator(s) is missing.	There are read/write errors in the console event log; the storage adapter port may fail.	Attach terminators as needed: internal SCSI terminator (12-41296-01) or external SCSI terminator (12-37004-04).
There is an extra terminator(s).	Devices produce errors or device IDs are dropped.	Check that only the beginning and the end of the SCSI bus is terminated. Remove the unnecessary terminators.
The I/O module failed.	Problems persist after eliminating the previous problem sources.	Replace the standard I/O module.

PCI Bus Problems Indicated at Power-Up

PCI bus failures at power-up are usually indicated by the inability of the system to see the device. Use Table 6–11 to diagnose the likely cause of the problem.

Table 6–11 PCI Troubleshooting

Step	Corrective Action
1	Confirm that the PCI module and any cabling are properly seated.
2	Check for a bad slot by moving the last installed controller to a different slot.
3	Call the option manufacturer or the Digital support center for help.

Boot Problems

This section describes how to troubleshoot problems that occur while the system is booting the operating system software.

Table 6–12 describes possible problems during booting and their corrective actions.

Table 6–12 Diagnostic Flow for Boot Problems

Symptom	Corrective Action
The system cannot find the boot device.	Check the node ID and device name parameters. Refer to the Verifying System Configuration section in Chapter 5 for the correct device parameters. Also, check the environment variable settings (such as `bootdef_dev`, `boot_file`, and `boot_osflags`) for Digital UNIX and OpenVMS. Refer to the `boot` section in Chapter 4
The device does not boot.	Run the `test` command to check that the boot device is operating. A failing open is not deconfigured on a reboot. Press the Reset button or cycle power.

Operating System Reported Problems

This section describes how to troubleshoot system problems that occur while the operating system software is up and running.

Table 6–13 describes possible operating system problems and their corrective actions.

Table 6–13 Diagnostic Flow for Errors Reported by the Operating System

Symptom	Corrective Action
The system is hung or has crashed.	Examine the crash dump file. Refer to the *OpenVMS AXP Alpha System Dump Analyzer Utility Manual* for information on how to interpret OpenVMS crash dump files. Refer to the *Guide to Kernel Debugging* for information on using the DEC OSF/1 Krash Utility.
The operating system is up.	Have the Digital support center examine the operating system error log files to isolate the problem. Self-maintenance customers can refer to the *Digital Alpha VME 2100 Service Guide*. If the problem occurs intermittently, have the Digital support center run an operating system exerciser, such as the DEC VET, to stress the system. Refer to the *DEC Verifier and Exerciser Tool User's Guide* for instructions on running DEC VET.

Fail-Safe Loader

The fail-safe loader (FSL) allows you to power-up without initializing drivers running power-up diagnostics.

Note

The fail-safe loader should be used only when a failure at power-up prohibits you from getting to the console program. You cannot boot an operating system from the fail-safe loader.

If a checksum error is detected when loading the SRM console at power-up, the fail-safe loader is automatically loaded into memory and the system displays the FSL prompt `ash>`. If the system automatically powers up to the `ash>` prompt, reinstall the firmware according to the instructions provided with the firmware.

Whenever the fail-safe loader console is activated, the power-up/diagnostic display on the OCP displays a `FAIL I/O_00` message.

The FSL permits you to get to a console, with limited functionality, when one of the following is the cause of a problem getting to the console program under normal power-up:

- A power failure or accidental power-down during a firmware upgrade
- An error in the nonvolatile nvram file
- An incorrect environment variable setting
- A driver error

Note

The FSL program, indicated by the `ash>` prompt, has limited functionality (a simple shell is indicated by the letters “ash” contained in the console prompt).

Fail-Safe Loader Functions

From the FSL program, you can:

- Edit the nvram file (using the `edit` command).
- Assign a correct value to an environment variable (using the `show` and `set` commands).
- Start individual drivers using the `init -driver ew` command to start the Maintenance Operations Protocol (MOP) driver or `init -driver dv` to start the floppy driver. The `init -driver 6` command in FSL mode starts all available drivers.

Note

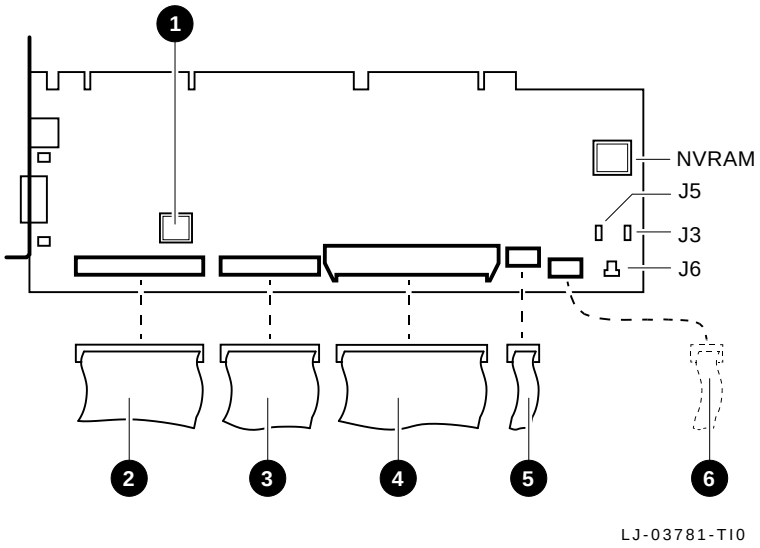
The nonvolatile file, nvram, is shipped from the factory with no contents. The customer can use the `edit` command to create a customized script or command file that is executed as the last step of every power-up.

Activating the Fail-Safe Loader

To activate the FSL, perform the following steps:

1. Install jumper J6 on the standard I/O module (refer to Figure 6–1). The jumper is stored on one of the pins of the J6 jumper.
2. Turn on the system.
3. Use the FSL program (indicated by the `ash>` prompt) to make corrections, edit the nvram file, set environment variables, or initialize phase 6 drivers.
4. When you have finished, power-down and remove the FSL jumper.

Figure 6–1 Fail-Safe Loader Jumper (J6) on the Standard I/O Module



❶ Ethernet Address ROM (E72)

❷ SCSI (50-pin)

❸ Floppy (34-pin)

❹ Remote I/O (60-pin)

❺ OCP (10-pin)

❻ DSM Remote Option (16-pin)

Note

J3–Power supply mode: Disabled, not used.

J5–Program voltage: Internal use only.

J6–Fail-Safe: When installed, selects the fail-safe loader firmware.

NVRAM–Nonvolatile random-access memory.

A

Hardware Specifications

In This Appendix

This appendix lists the hardware specifications for the Digital Alpha VME 2100 system.

This appendix covers the following topics:

- System Dimensions
- Electrical Specifications
- Environmental Conditions

System Specifications

System Dimensions

Table A–1 provides information about the drawer mount system dimensions. The dimensions depend on if the system has the bezel for mounting into a cabinet with the English RETMA rail-hole pattern or the bezel for mounting into a cabinet with the metric IEC rail-hole pattern.

Table A–1 Drawer Mount System: Dimensions

Weight	Height	Width	Depth
System for Installation Into Cabinets with English RETMA Hole Pattern			
110 lb	14.0 in.	19.0 in.	27.75 in.
System for Installation Into Cabinets with Metric IEC Hole Pattern			
49.94 kg	35.0 cm	45.0 cm	70.0 cm

Table A–2 provides information about the vertical mount system dimensions.

Table A–2 Vertical Mount System: Dimensions

Weight	Height	Width	Depth
System for Installation Into Racks with English RETMA Hole Pattern			
110 lb	26.25 in.	17.50 in.	15.25 in.
System for Installation Into Racks with Metric IEC Hole Pattern			
49.94 kg	66.75 cm	44.45 cm	38.735 cm

Note

The overall height of the vertical mount system, with the optional front bezel attached, is 80.0 cm (31.50 inches).

Electrical Specifications

Table A–3 provides information about the various electrical system specifications.

Table A–3 System Electrical Specifications

Input voltage	100-120 Vac/220-240 Vac with automatic voltage sensing
Input current (maximum)	12 A at 100-120 Vac 6 A at 220-240 Vac
Phasing	Single-phase
Frequency	50/60 Hz
Power (maximum)	1200 W input maximum, system only, power factor .98 minimum
U.S.A. power cord plug	NEMA 5-15P (Mates with receptacle NEMA 5-15R) for 120 V applications or NEMA 6-15P (Mates with receptacle NEMA 6-15R) for 240 V applications.

Environmental Conditions

Table A–4 provides information about the environmental conditions in which the system can operate.

Table A–4 System Environmental Conditions

Operating/Storage Conditions	
Temperature range	10°C to 40°C (50°F to 104°F)
Temperature change rate	11°C/hr (20°F/hr) maximum
Relative humidity	10% to 90% (noncondensing)
Maximum altitude	2,438 m (8,000 ft)
Note: The maximum allowable operating temperature above 2,438 m (8,000 ft) is reduced 1.8°C/1,000 m (1.0°F/1,000 ft)	
Maximum wet bulb temperature	28°C (82°F)
Minimum dew point	2°C (36°F)

Nonoperating Conditions	
Temperature range	-40°C to 66°C (40°F to 151°F)
Relative humidity	10% to 95% (noncondensing)
Maximum altitude	4,877 m (16,000 ft)

Glossary

10BASE-T Ethernet network

IEEE standard 802.3-compliant Ethernet products used for local distribution of data. These networking products characteristically use twisted-pair cable.

AUI Ethernet network

Attachment unit interface. An IEEE standard 802.3-compliant Ethernet network made of standard Ethernet cable.

autoboot

A system boot initiated automatically by software when the system is powered up or reset.

availability

The amount of scheduled time that a computing system provides application service during the year. Availability is typically measured as either a percentage of "uptime" per year or as system "unavailability," the number of hours or minutes of downtime per year.

BA472 enclosure

The enclosure that houses the Digital Alpha VME 2100 drawer or vertical mount system.

backplane

The main board or panel that connects all of the modules in a computer system.

backup cache

A second, very fast cache memory that is closely coupled with the processor.

bandwidth

The rate of data transfer in a bus or I/O channel. The rate is expressed as the amount of data that can be transferred in a given time, for example megabytes per second.

battery backup unit

A battery unit that provides power to the entire system enclosure (or to an expander enclosure) in the event of a power failure. Another term for uninterruptible power supply (UPS).

boot

Short for bootstrap. To load an operating system into memory.

boot device

The device from which the system bootstrap software is acquired.

boot flags

A flag is a system parameter set by the user. Boot flags contain information that is read and used by the bootstrap software during a system bootstrap procedure.

boot server

A computer system that provides boot services to remote devices such as network routers.

bootstrap

The process of loading an operating system into memory.

bugcheck

A software condition, usually the response to software's detection of an "internal inconsistency," which results in the execution of the system bugcheck code.

bus

A collection of many transmission lines or wires. The bus interconnects computer system components, providing a communications path for addresses, data, and control information.

bystander

A system bus node (CPU, standard I/O, or memory) that is not addressed by a current system bus commander.

byte

Eight contiguous bits starting on an addressable byte boundary. The bits are numbered right to left, 0 through 7.

cache memory

A small, high-speed memory placed between slower main memory and the processor. A cache increases effective memory transfer rates and processor speed. Cache memory contains copies of data recently used by the processor and fetches several bytes of data from memory in anticipation that the processor will access the next sequential series of bytes.

card cage

A mechanical assembly in the shape of a frame that holds modules against the system and storage backplanes.

carrier

The individual container for all StorageWorks devices, power supplies, and so forth. In some cases because of small form factors, more than one device can be mounted in a carrier. Carriers can be inserted in modular shelves. Modular shelves can be mounted in modular enclosures.

CD–ROM

A read-only compact disc. The optical removable media used in a compact disc reader.

central processing unit (CPU)

The unit of the computer that is responsible for interpreting and executing instructions.

client-server computing

An approach to computing whereby a computer—the "server"—provides a set of services across a network to a group of computers requesting those services—the "clients."

cluster

A group of systems and hardware that communicate over a common interface. The systems in the cluster share resources, and software programs work in close cooperation.

cold bootstrap

A bootstrap operation following a power-up or system initialization (restart). On Alpha systems, the console loads PALcode, sizes memory, and initializes environment variables.

commander

In a particular bus transaction, a CPU or standard I/O that initiates the transaction.

command line interface

One of two modes of operation in the Digital Alpha VME 2100 operator interface. The command line interface supports the OpenVMS and Digital UNIX operating systems. The interface allows you to configure and test the system, examine and alter the system state, and boot the operating system.

console mode

The state in which the system and the console terminal operate under the control of the console program.

console program

The code that processor executes during console mode.

console subsystem

The subsystem that provides the user interface for a computer system when the operating system is not running.

console terminal

The terminal connected to the console subsystem. The terminal is used to start the system and direct activities between the computer operator and the computer system.

data bus

A bus used to carry data between two or more components of the system.

data cache

A high-speed cache memory reserved for the storage of data. Abbreviated as D-cache.

DECchip 21064 processor

The CMOS, Alpha architecture, single-chip processor used on many Alpha-based computers.

DEC VET

Digital Verifier and Exerciser Tool. A multipurpose system diagnostic tool that performs exerciser-oriented maintenance testing.

diagnostic program

A program that is used to find and correct problems with a computer system.

Digital UNIX operating system

A general-purpose operating system based on the Open Software Foundation OSF/1 technology. Digital UNIX was formerly called DEC OSF/1. V3.0B of the product runs on a range of Alpha systems, from workstations to servers.

direct-mapping cache

A cache organization in which only one address comparison is needed to locate any data in the cache, because any block of main memory data can be placed in only one possible position in the cache.

direct memory access (DMA)

Access to memory by an I/O device that does not require processor intervention.

DRAM

Dynamic random-access memory. Read/write memory that must be refreshed (read from or written to) periodically to maintain the storage of information.

ECC

Error correction code. Code and algorithms used by logic to facilitate error detection and correction.

EEPROM

Electrically erasable programmable read-only memory. A memory device that can be byte-erased, written to, and read from.

EISA bus

Extended Industry Standard Architecture bus.

EISA Configuration Utility (ECU)

A feature of the EISA/PCI bus that helps you perform system services. The ECU must be run whenever you replace the Standard I/O board.

environment variables

Global data structures that can be accessed from console mode. The setting of these data structures determines how a system powers up, boots the operating system, and operates.

ERF/UERF

Error Report Formatter. ERF is used to present error log information for OpenVMS. UERF is used to present error log information for the Digital UNIX operating system.

Ethernet

IEEE 802.3 standard local area network.

Factory Installed Software (FIS)

Operating system software that is loaded into a system disk during manufacture. On site, the FIS is bootstrapped in the system.

fail-safe loader (FSL)

A program that allows you to power up without initiating drivers or running power-up diagnostics. From the fail-safe loader you can perform limited console functions.

Fast SCSI

An optional mode of SCSI-2 that allows transmission rates of up to 10 megabytes per second.

FDDI

Fiber Distributed Data Interface. A high-speed networking technology that uses fiber optics as the transmissions medium.

field-replaceable unit

Any system component that a qualified service person is able to replace on site.

firmware

Software code stored in hardware.

fixed-media compartments

Compartments that house nonremovable storage media.

Flash ROM

Flash-erasable programmable read-only memory. Flash ROMs can be bank- or bulk-erased.

FRU

Field-replaceable unit. Any system component that a qualified service person is able to replace on site.

full-height device

Standard form factor for 5 1/4-inch storage devices.

half-height device

Standard form factor for storage devices that are not the height of full-height devices.

halt

The action of transferring control of the computer system to the console program.

hose

The interface between the card cage and the I/O subsystem on the Digital Alpha VME 2100 system.

initialization

The sequence of steps that prepare the computer system to start. Occurs after a system has been powered up.

instruction cache

A high-speed cache memory reserved for the storage of instructions. Abbreviated as I-cache.

Interrupt request lines (IRQs)

Bus signals that connect a module (for example, a disk controller) to the system so that the module can get the system's attention through an interrupt.

LAN

Local area network. A network that supports computers that are connected over limited distances.

latency

The amount of time it takes the system to respond to an event.

LED

Light-emitting diode. A semiconductor device that glows when supplied with voltage. A LED is used as an indicator light.

loopback test

Internal and external tests that are used to isolate a failure by testing segments of a particular control or data path. A subset of ROM-based diagnostics.

machine check/interrupts

An operating system action triggered by certain system hardware-detected errors that can be fatal to system operation. Once triggered, machine-check handler software analyzes the error.

mass storage device

An input/output device on which data is stored. Typical mass storage devices include disks, magnetic tapes, and CD–ROMs.

MAU

Medium attachment unit. On an Ethernet LAN, a device that converts the encoded data signals from various cabling media (for example, fiber optic, coaxial, or ThinWire) to permit connection to a networking station.

memory interleaving

The process of assigning consecutive physical memory addresses across multiple memory controllers. Improves total memory bandwidth by overlapping system bus command execution across two or four memory modules.

modular shelves

In the StorageWorks modular subsystem, a shelf contains one or more modular carriers, generally up to a limit of seven. Modular shelves can be mounted in system enclosures, in I/O expansion enclosures, and in various StorageWorks modular enclosures.

MOP

Maintenance Operations Protocol. A transport protocol for network bootstraps and other network operations.

multiprocessing system

A system that executes multiple tasks simultaneously.

node

A device that has an address on, is connected to, and is able to communicate with other devices on a bus. Also, an individual computer system connected to the network that can communicate with other systems on the network.

NVRAM

Nonvolatile random-access memory. Memory that retains its information in the absence of power.

OCP

Operator control panel.

open system

A system that implements sufficient open specifications for interfaces, services, and supporting formats to enable applications software to:

- Be ported across a wide range of systems with minimal changes
- Interoperate with other applications on local and remote systems

- Interact with users in a style that facilitates user portability

OpenVMS operating system

A general-purpose multiuser operating system that supports Alpha computers in both production and development environments. OpenVMS AXP software supports industry standards, facilitating application portability and interoperability. OpenVMS AXP provides symmetric multiprocessing (SMP) support for AXP multiprocessing systems.

operating system mode

The state in which the system console terminal is under the control of the operating system. Also called program mode.

operator control panel

The panel located behind the front door of the system, which contains the power-up/diagnostic display, DC On/Off button, Halt button, and Reset button.

OSF/1 operating system

A general-purpose operating system based on the Open Software Foundation OSF/1 2.0 technology.

PALcode

Alpha Privileged Architecture Library code, written to support Alpha processors. PALcode implements architecturally defined behavior.

PCI

Peripheral Component Interconnect. An industry-standard expansion I/O bus that is the preferred bus for high-performance I/O options. Available in a 32-bit and a 64-bit version.

porting

Adapting a given body of code so that it will provide equivalent functions in a computing environment that differs from the original implementation environment.

power-down

The sequence of steps that stops the flow of electricity to a system or its components.

power-up

The sequence of events that starts the flow of electrical current to a system or its components.

processor module

Module that contains the CPU chip.

program mode

The state in which the system console terminal is under the control of a program other than the console program.

reliability

The probability a device or system will not fail to perform its intended functions during a specified time.

ROM-based diagnostics

Diagnostic programs resident in read-only memory.

script

A data structure that defines a group of commands to be executed. Similar to a VMS command file.

SCSI

Small Computer System Interface. An ANSI-standard interface for connecting disks and other peripheral devices to computer systems. Some devices are supported under the SCSI-1 specification; others are supported under the SCSI-2 specification.

self-test

A test that is invoked automatically when the system powers up.

serial control bus

A two-conductor serial interconnect that is independent of the system bus. This bus links the processor modules, the I/O, the memory, the power subsystem, and the operator control panel.

serial ROM

In the context of the CPU module, ROMs read by the DECchip 21064 microprocessor after reset that contain low-level diagnostic and initialization routines.

SMP

Symmetric multiprocessing. A processing configuration in which multiple processors in a system operate as equals, dividing and sharing the workload.

SRM

User interface to console firmware for operating systems that expect firmware compliance with the *Alpha System Reference Manual (SRM).*

standard I/O module

Module that provides a standard set of I/O functions. It resides in a dedicated slot in the backplane.

storage array

A group of mass storage devices, frequently configured as one logical disk.

StorageWorks

Digital's modular storage subsystem (MSS), which is the core technology of the Alpha SCSI-2 mass storage solution. Consists of a family of low-cost mass storage products that can be configured to meet current and future storage needs.

superpipelined

Describes a pipelined processor that has a larger number of pipe stages and more complex scheduling and control.

superscalar

Describes a processor that issues multiple independent instructions per clock cycle.

symmetric multiprocessing (SMP)

A processing configuration in which multiple processors in a system operate as equals, dividing and sharing the workload.

symptom-directed diagnostics (SDDs)

An approach to diagnosing computer system problems whereby error data logged by the operating system is analyzed to capture information about the problem.

system bus

The hardware structure that interconnects the CPUs and memory modules. Data processed by the CPU is transferred throughout the system through the system bus.

system disk

The device on which the operating system resides.

test-directed diagnostics (TDDs)

An approach to diagnosing computer system problems whereby error data logged by diagnostic programs resident in read-only memory (RBDs) is analyzed to capture information about the problem.

thickwire

One-half inch, 50-Ohm coaxial cable that interconnects the components in many IEEE standard 802.3-compliant Ethernet networks.

ThinWire

Ethernet cabling and technology used for local distribution of data communications. ThinWire cabling is thinner than thickwire cabling.

twisted pair

A cable made by twisting together two insulated conductors that have no common covering.

wide area network (WAN)

A network that connects a server to a distant host computer, PC, or other server, or that connects numerous computers in numerous distant locations.

write back

A cache management technique in which data from a write operation to cache is written into main memory only when the data in cache must be overwritten.

write-enabled

Indicates a device onto which data can be written.

write-protected

Indicates a device onto which data cannot be written.

write through

A cache management technique in which data from a write operation is copied to both cache and main memory.

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