DECsystem 5900

Enclosure Maintenance Manual

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Preface

Product Description

The DECsystem 5900 system is designed for server applications, including file servers, compute servers, and network servers. It is a midrange system that uses a modular approach, based on industry standard 47.5 cm (19 in) rackmounted components.

The original model, the DECsystem 5900 system, utilizes a high-performance single-card computer based on the MIPS R3000A processor. A more recent version, the DECsystem 5900/260 system is based on the MIPS R4400 processor. Both systems are housed in a single-cabinet configuration that contains a power controller, a CPU drawer, and up to four additional mass storage drawers.

Document Description

Since versions of the system are identical except for the actual processor (CPU/daughter card), for clarity and simplicity this manual refers to both the DECsystem 5900 system and the DECsystem 5900/260 system as simply the DECsystem 5900 system. Where unique information for a particular processor is required, pertinent differences are pointed out.

This manual describes the DECsystem 5900 system server configurations, explains installation procedures, and provides step-by-step instructions for Field Replaceable Unit (FRU) removal and replacement by Digital service representatives.

Any service or upgrades needed inside the DECsystem 5900 cabinet must be done by a Digital service representative.

Audience

The *DECsystem 5900 Enclosure Maintenance Manual* is for use by Digital service representatives only.

Document Structure

The *DECsystem 5900 Enclosure Maintenance Manual* contains four chapters and one appendix, as follows:

Chapter 1	DECsystem 5900 Enclosure This chapter provides a physical description of the DECsystem 5900 system, and an overview of the system's cables and power switches.
Chapter 2	DECsystem 5900 System Installation This chapter explains how to install the DECsystem 5900 system.
Chapter 3	Enclosure and CPU Drawer FRU Removal and Replacement This chapter describes removal and installation of field-replaceable units (FRUs) in the enclosure and the CPU drawer, as well as replacement of the drawer itself.
Chapter 4	Mass Storage FRU Removal and Replacement This chapter describes removal and installation of field-replaceable units (FRUs) in the mass storage drawers, as external devices, and as rackmounted devices, as well as replacement of the drawers themselves.
Appendix A	Field-Replaceable Units (FRUs) and Part Numbers Appendix A lists the major FRUs, devices and options in the DECsystem 5900 system.

Conventions Used in This Document

The *DECsystem 5900 Enclosure Maintenance Manual* uses the following conventions:

Convention	Indicates
boldface type	User input.
italic type	Important information, variables, and complete titles of manuals.
Note	General information about the current topic.
Caution	Information to prevent damage to equipment or software. Read these carefully.
WARNING	Information to prevent personal injury. Read these carefully.

1

DECsystem 5900 Enclosure

1.1 DECsystem 5900 System Overview

The DECsystem 5900 system is a RISC/ULTRIX system for server applications, including file servers, compute servers, and network servers. It is a highly modular system that has many configuration capabilities. The basic configuration is a single-cabinet uniprocessor. The original DECsystem 5900 system is based on a high-performance single-module computer that utilizes the MIPS R3000A processor. The DECsystem 5900/260 system utilizes a MIPS R4400 processor.

All versions of the system are referred to in this manual as the DECsystem 5900 system. Where unique information for a particular processor is required, pertinent differences are pointed out.

The DECsystem 5900 system uses the following devices:

- Up to fourteen 32-Mbyte memory modules
- 1-Mbyte NVRAM memory for Prestoserve(TM) support
- Internal storage for up to 28 SCSI devices
- Support for all TURBOchannel devices that conform to the TURBOchannel specification

This chapter describes the following parts of the DECsystem 5900 system:

- Enclosure contents and options
- CPU drawer contents and options
- Mass storage drawer contents and options
- Power controllers and power supplies
- External storage options
- Power requirements
- Cables and buses

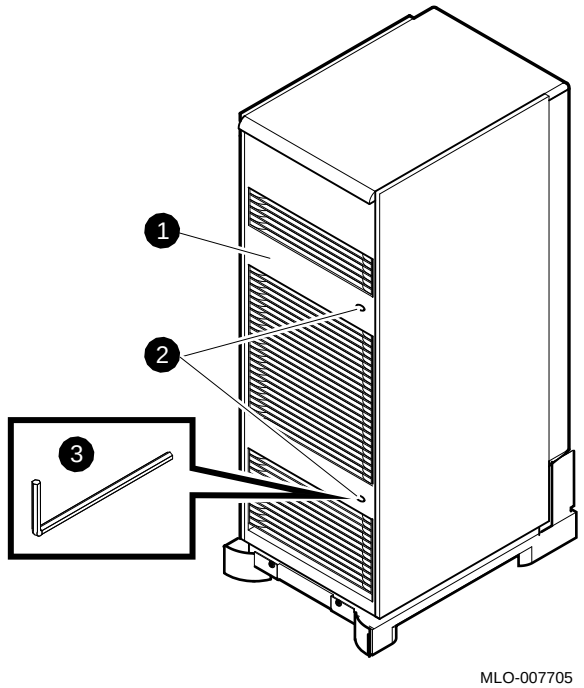
1.1.1 Enclosure Description

The DECsystem 5900 system uses a free-standing H9A00 enclosure with rackmounted drawers, shown in Figure 1–1, and is designed to be used in a computer room environment. It normally rests upon four levelers, but comes equipped with wheels for easy installation and placement.

The cabinet may be accessed by both the front and rear doors. Use the front door to turn on and turn off the system, and to access removable media or the drawers. Use the rear door to access cable connections, ports, and the power controller.

The front doors have magnetic latches to keep the doors closed; both front and rear doors can be locked and unlocked with a key (12–26339–01) or with a 1/4-inch hex wrench.

Figure 1–1 DECsystem 5900 Enclosure



❶ Front door
❷ Front door latches
❸ Hex wrench

The DECsystem 5900 system consists of:

- H9A00 cabinet
- Drawers:

  CPU drawer
  One mass storage drawer for devices
  Optional second CPU drawer
  Up to 3 additional mass storage drawers (optional)

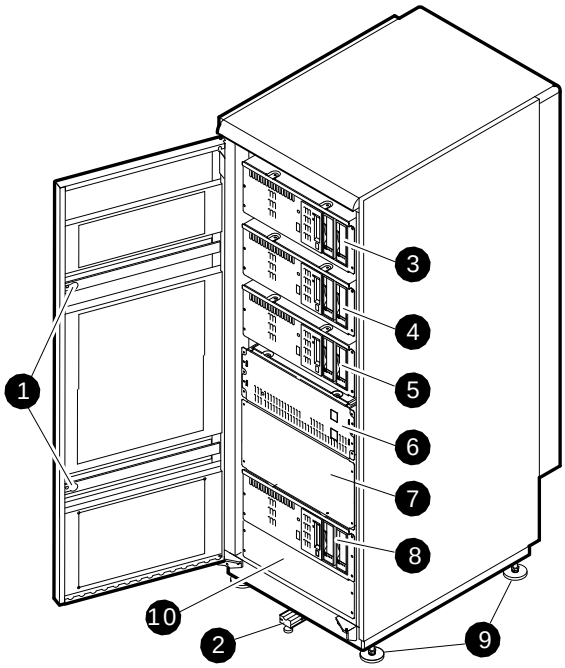
- Power controller
- Network, data, power cables and SCSI bus(es)

The DECsystem 5900 cabinet includes trim panels, called skirts, which are attached to the bottom during installation.

The location of the CPU drawer in relation to mass storage drawers varies according to the options ordered when the system was shipped. See Figure 1–2 and Figure 1–3 for examples of how drawers or filler panels might be positioned.

Filler panels cover unused enclosure slots, as well as slot 0, which contains the power controller.

Figure 1–2 The DECsystem 5900 System—Front Open-Door View



MLO-007649

❶ Door latches

❷ Stabilizer bar (use when extending any drawer)

❸ Mass storage drawer (slot 6)

❹ Mass storage drawer (slot 5)

❺ Mass storage drawer (slot 4)

❻ CPU drawer (slot 3)

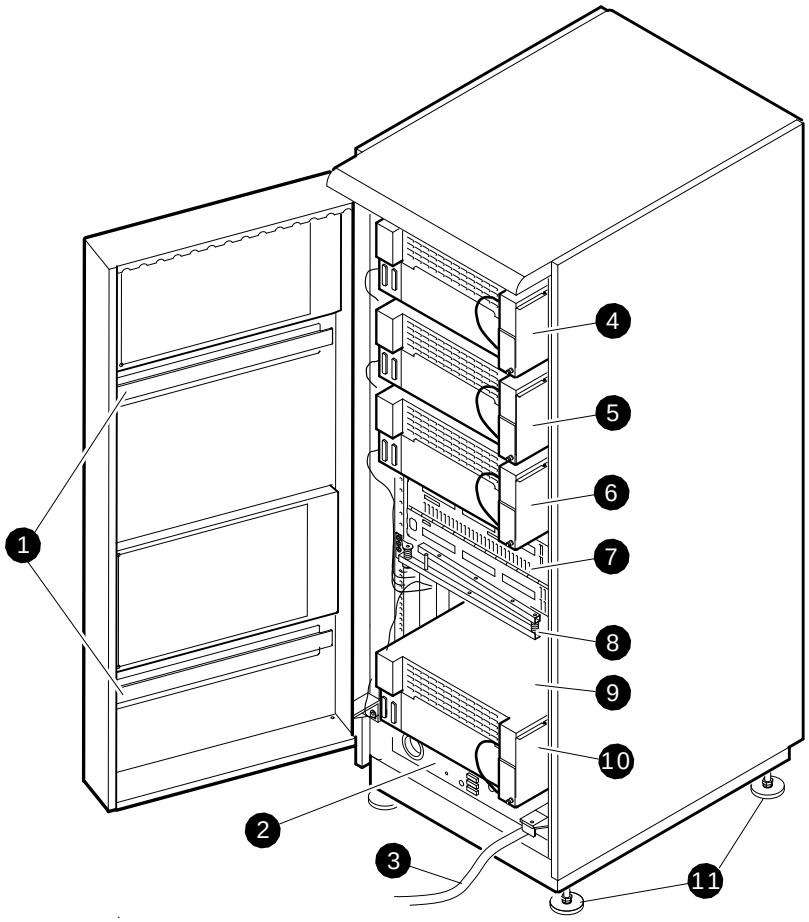
❼ Filler panel covering empty slot (slot 2) or optional second CPU drawer.

❽ Mass storage drawer (slot 1)

❾ Screw-down leveling feet

❿ Filler panel (slot 0) covering power controller (in rear)

Figure 1–3 The DECsystem 5900 System—Rear Open-Door View



❶ Door latches
❷ Power controller (slot 0)
❸ Power cable
❹ Mass storage drawer (slot 6)
❺ Mass storage drawer (slot 5)
❻ Mass storage drawer (slot 4)
❼ CPU drawer (slot 3)
❽ Cable arm
❾ Empty drawer slot (slot 2)
❿ Mass storage drawer (slot 1)
⓫ Screw-down leveling feet

1.1.1.1 Cooling Scheme

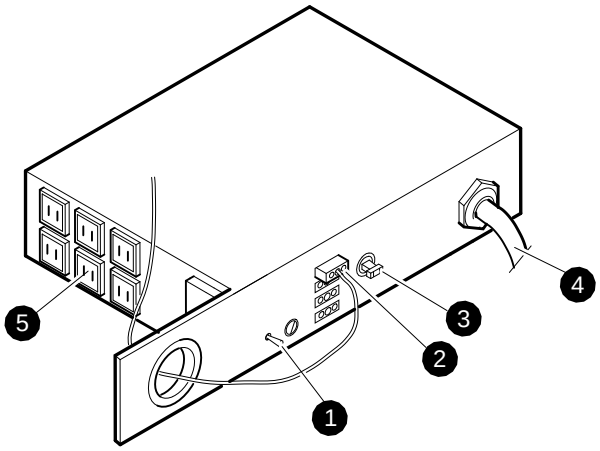
Air enters the front of the cabinet, and exits from the rear. Each drawer has its own specific cooling arrangements, including blowers or fans; the cabinet itself has no cooling fans or blower.

1.1.1.2 Enclosure Power Controller

The DECsystem 5900 enclosure uses a single-phase ac power controller to supply power to the cabinet, located in the bottom rear of the H9A00 enclosure. Switches, shown in Figure 1–4 and defined in Table 1–1, all face toward the rear of the enclosure, and are accessed through the rear enclosure door.

There are two models of power controllers, a 120 V version (used in the US), and a 220 V version for international use. The 120 V US model has an attached ac power cord; the international model has a removable cord for the country in which it is used.

Figure 1–4 Power Controller Switches and Outlets



MLO-007654

❶ Remote/local toggle switch. This switch should be set to the remote position (up) to turn on the system using the upper switch on the front of the CPU drawer.

❷ Power controller cable from remote sensors to the CPU drawer upper front switch

❸ Circuit breaker (up is on)

❹ System power cable (see Table 2–3)

❺ Outlets for drawer power cables

Table 1–1 Power Controller Switch and Outlet Functions

Switch/Outlet	Function
Remote/local toggle switch	On the remote setting, the CPU drawer can be used to turn the system on/off
Circuit breaker	Emergency power cutoff
Outlets	Power source for CPU and mass storage drawer(s)
Power cable	System power
Remote power sensors	Automatic shutdown of external devices

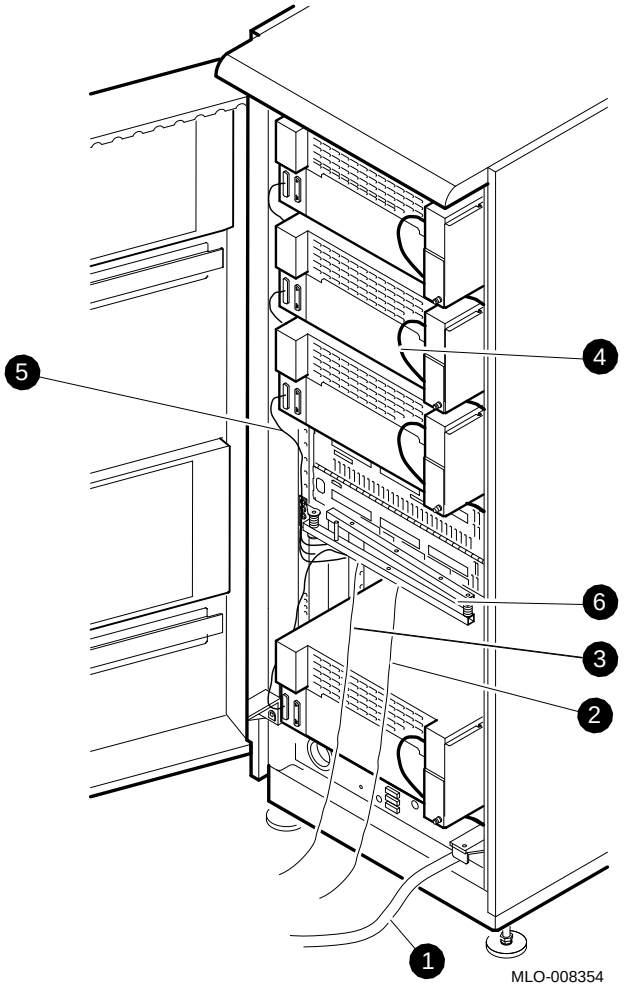
1.1.1.2.1 Power Distribution Power is distributed from the power controller throughout the enclosure to both CPU and mass storage drawers via standard IEC 320 power cables, which are of uniform length and tie-wrapped to the enclosure frame. The power controller distributes power at the same voltage at which it enters the cabinet, that is, 120 V nominal or 220 V nominal, 50/60 Hz.

A three-pin connector cable from the power controller to the CPU drawer allows for a single point of system power control: the upper front switch of the CPU drawer. (The remote/local switch must be set to remote to allow for this.)

To organize and protect the many cables and buses attached to the CPU drawer, they are routed through a cable arm which extends and retracts as the drawer is pulled out and pushed in.

Figure 1–5 depicts a sample power cable/bus configuration for the DECsystem 5900 system.

Figure 1–5 Sample Power Cable/Bus Configuration



❶ AC power cable

❷ Console cable

❸ Ethernet cable

❹ Power cables to drawers

❺ SCSI bus cables (mass storage drawers to CPU drawer)

❻ CPU drawer cable arm

See Section 4.6 for details on the configuration of devices in a mass storage drawer.

1.1.1.2.2 Uninterruptible Power Supply An optional external uninterruptible power supply (UPS) can be added to provide reliable power to the DECsystem 5900 cabinet.

1.1.1.2.3 Power Sequencing The ac power controller is connected to the upper switch on the front of the CPU drawer. When the power controller remote/local switch is in the remote position (up), the upper switch on the front of the CPU drawer controls power to the entire system.

When the Remote/Local switch is in local mode (down), the individual drawers must be turned on or off manually.

Each individual drawer contains its own ac power switch. Power within a particular drawer is available if all of the following conditions are met:

- AC power is available into the cabinet.
- 1/8-A fuse in power controller is intact.
- The power controller breaker switch is on.
- The drawer's power sequence cable is plugged in at the power controller.
- The CPU drawer's main power switch is in the on position (this assumes that the power controller is switched to remote mode).
- The drawer's power switch is on.

1.1.1.3 CPU and Mass Storage Drawers

The DECsystem 5900 system is shipped complete with all drawers ordered by the customer, and filler panels over unused drawer slots. The minimum configuration is one CPU drawer and one mass storage drawer. Each drawer contains one or more components of the DECsystem 5900 system. These components may include the following:

- In the CPU drawer:

  System module
  CPU/daughter card
  Two or more memory modules
  NVRAM module
  TURBOchannel option slots
  TURBOchannel options (if any)
  TURBOchannel Extender Adapter module (in option slot 0)
  TURBOchannel Extender module
  Power supply
  Blower
  Power cabling
  Connectors for Enet, SCSI, and communication ports

- In the mass storage drawer:

  Fixed media disks
  Removable media tape drives, floppy drives, and CD–ROM drives
  Power supply
  SCSI cabling
  Power cabling

Other storage devices may be attached *externally* to the DECsystem 5900 system.

1.1.1.3.1 Drawer Design The drawers have been designed for efficiency and serviceability, and include the following features:

- Slide-out access
- Latches to prevent accidental removal
- Individual power control
- Completely installable as an upgrade

Each drawer has six 5/16-inch hex screws to hold it in place in the cabinet for shipping. Power to an individual mass storage or CPU drawer may be turned off independent of other mass storage drawers or CPU drawers.

Note

ULTRIX does not support turning off devices or drawers while it is running. Run the **shutdown** procedures before turning off the system or individual drawers.

1.1.1.3.2 Electromagnetic Interference (EMI) The drawer enclosures and covers form an electrical noise seal that complies with requirements for EMI by:

- Containing radio frequency interference generated by the system
- Keeping external radio frequencies from entering the enclosure

Caution

Drawer enclosures and covers are required to meet international regulatory standards and to maintain proper cooling.

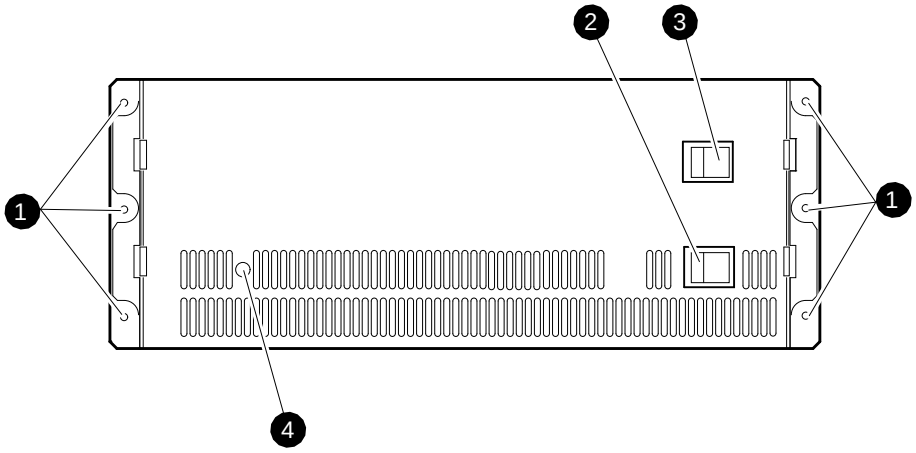
1.1.2 CPU Drawer

This section describes the CPU drawer.

1.1.2.1 CPU Drawer Front Panel

Figure 1–6 shows the front panel of a CPU drawer, and identifies each component.

Figure 1–6 CPU Drawer Front Panel



❶ 5/16-inch hex screws that secure the drawer to the cabinet for shipping

❷ CPU drawer power switch (should normally be left on)

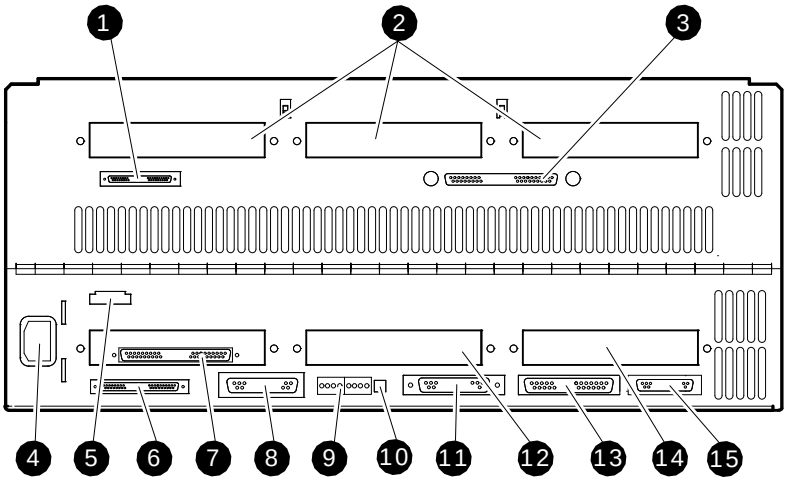
❸ System power switch (should normally be left on)

❹ DC power LED on indicator

1.1.2.2 CPU Drawer Rear Panel

Figure 1–7 shows the rear panel of a CPU drawer.

Figure 1–7 CPU Drawer Rear Panel



❶ Not used

❷ TURBOchannel Extender module slots

❸ TURBOchannel Extender I/O (connected to ❼)

❹ AC power receptacle

❺ Remote power sequence connector

❻ System module SCSI port

❼ TURBOchannel Extender Adapter module (in option slot 0, connected to ❸)

❽ Standard Ethernet

❾ Diagnostic LEDs

❿ Halt switch

⓫ System console port

⓬ TURBOchannel option slot 1

⓭ Communications port

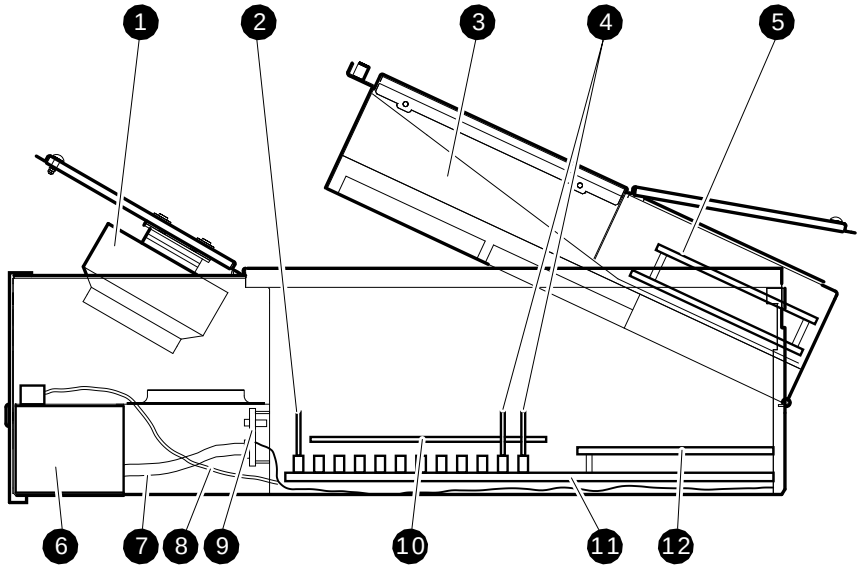
⓮ TURBOchannel option slot 2

⓯ Not used

1.1.2.3 CPU Drawer Components

Figure 1–8 shows the interior side view of a CPU drawer with the three covers slightly raised to provide a perspective on the relative location of CPU drawer components.

Figure 1–8 CPU Drawer



❶ Blower for temperature control

❷ 1-Mbyte NVRAM memory SAM (slot 14 of the memory array is for NVRAM only)

❸ Air plenum

❹ 32-Mbyte memory modules (2 shown)

❺ Option module mounted on TURBOchannel Extender module

❻ 244 W drawer power supply

❼ Power supply cable

❽ Remote system switch power cable

❾ Power distribution module

❿ CPU/daughter card

⓫ System module

⓬ TURBOchannel Extender Adapter module (slot 0 only)

1.1.2.4 CPU Daughter Card and System Module Features

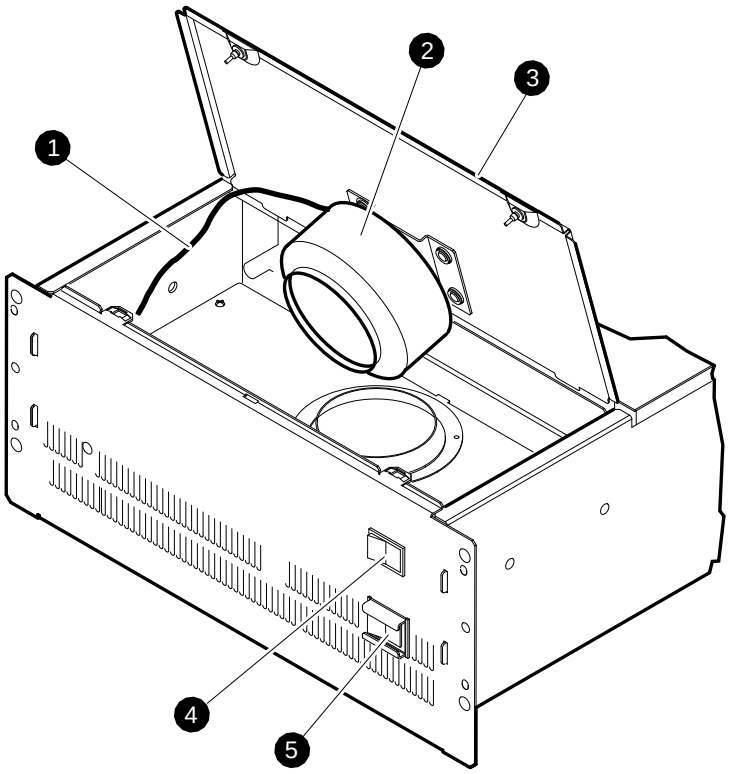
A DECsystem 5900 CPU drawer contains the following:

- R3000A or an R4400
- 64 to 448 Mbyte main memory
- Ethernet controller with DMA (standard connector)
- SCSI controller with DMA
- Four serial lines
  - Keyboard (15-pin connector, reserved for future use)
  - Two synch/asynch (25-pin RS232)
- Three TURBOchannel slots
- 1 Mbyte Prestoserve nonvolatile RAM
- TURBOchannel Extender Adapter module (in TURBOchannel slot 0)
- TURBOchannel Extender module

1.1.2.5 Blower

The CPU drawer contains a temperature controlled 12-volt dc blower attached to the top front cover (see Figure 1–9).

Figure 1–9 CPU Drawer Blower



❶ Blower power cable
❷ CPU drawer blower
❸ Front top cover
❹ System power switch
❺ CPU drawer switch

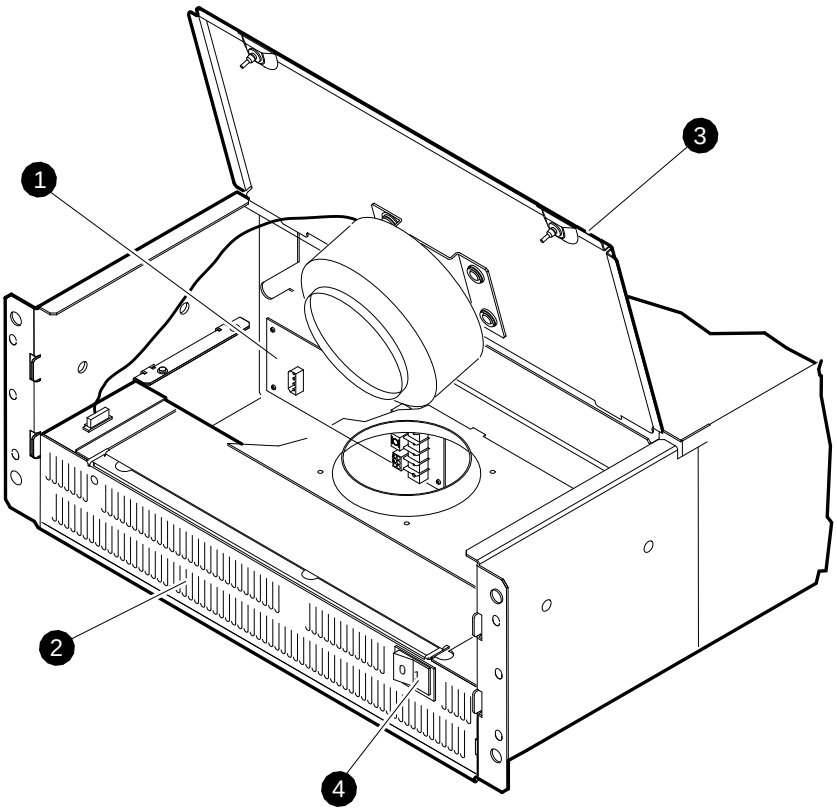
1.1.2.6 Power Supply

The CPU drawer power supply is located in the lower front compartment of the drawer (see Figure 1–10). Power is distributed from the power supply to the system module via a power cable which runs inside the isolator along the CPU drawer wall. A power distribution module is attached to the rear wall of the power supply compartment.

Power to the blower from the power controller is regulated according to the temperature.

For clarity, Figure 1–10 has been illustrated with the front plate of the CPU drawer removed.

Figure 1–10 CPU Drawer Power Supply



❶ Power distribution module

❷ CPU drawer power supply

❸ Front top cover

❹ CPU drawer switch

1.1.2.7 CPU Drawer Options

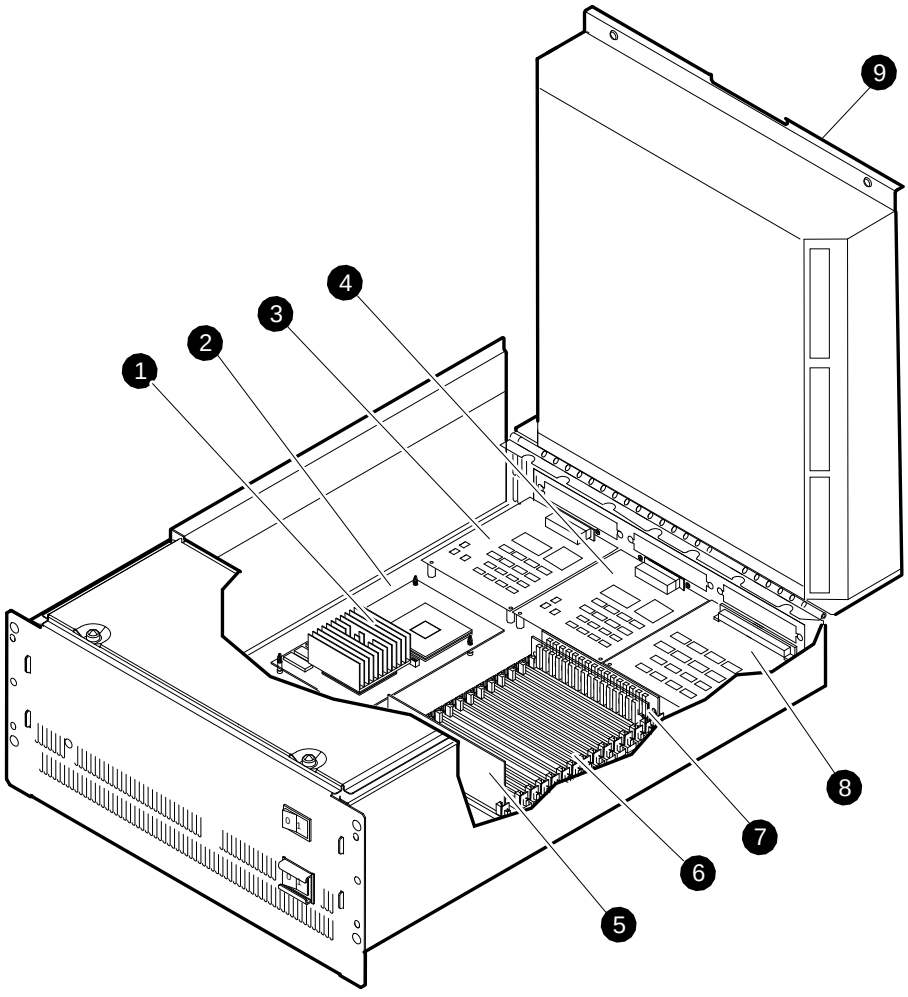
The options in Table 1–2 are available for a CPU drawer. (Appendix A contains a listing of all DECsystem 5900 FRUs.)

Table 1–2 Options in the CPU Drawer

Type	FRU	Description
Memory options	MS02–CA	Memory 32-MB SAM (up to 14 per system)
NVRAM for Prestoserve	MS02–NV	1 MB (one only per system)
TURBOchannel options	PMAD–AA	Standard Ethernet
	PMAZ–AA	SCSI
	DEFZA–CA	FDDI
	CITCA–AA	TURBOchannel to CI adapter, three slots wide
	DEC WANcontroller 720	TURBOsync two-port synchronous comm interface
	VME	Module/enclosure, single slot

Figure 1–11 shows the system module, CPU/daughter card, and the location of options and slots on the system module in a CPU drawer.

Figure 1–11 System Module, CPU/Daughter Card, Memory Options and TURBOchannel Slots



❶ CPU/daughter card

❷ System module

❸ TURBOchannel slot (slot 2) with sample option module

❹ TURBOchannel slot (slot 1) with sample option module

❺ MS02–NV NVRAM module

❻ MS02–CA memory slots

❼ MS02–CA memory (two modules shown)

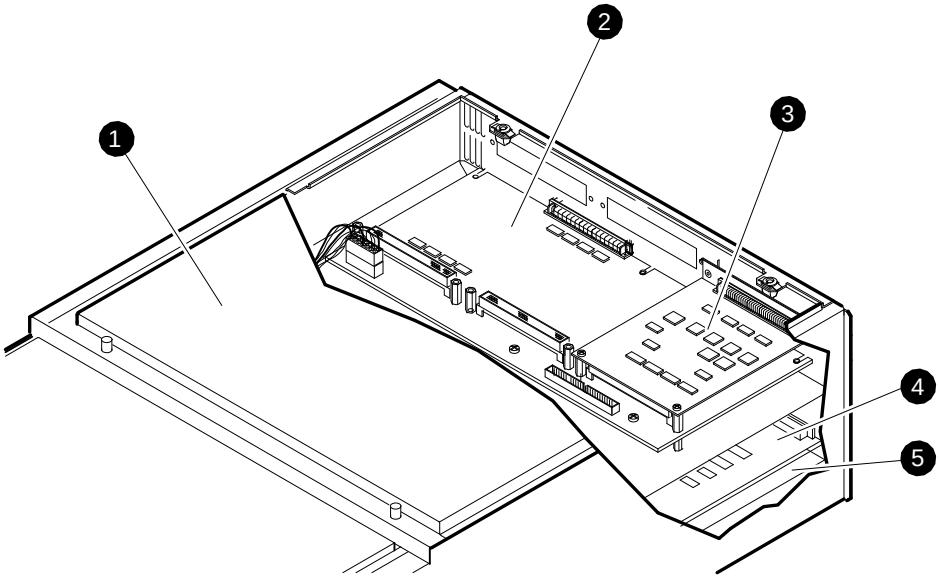
❽ TURBOchannel Extender Adapter module (slot 0)

❾ Middle top cover (includes rear top cover and TURBOchannel Extender compartment)

1.1.2.8 TURBOchannel Extender Module

Figure 1–12 shows the location of the TURBOchannel Extender module with sample option modules. The rear top cover of the CPU drawer has been removed for purposes of illustration.

Figure 1–12 CPU Drawer TURBOchannel Extender Module



❶ Middle top cover

❷ TURBOchannel Extender module

❸ Sample TURBOchannel option in extender

❹ TURBOchannel Extender adapter module

❺ System module

1.1.3 Mass Storage Drawer Description

The DECsystem 5900 cabinet has at least one drawer (and possibly up to four drawers, depending upon the configuration chosen by the customer) devoted to storage devices. These are called *mass storage drawers*.

There are two different mass storage drawer designs. You may encounter either or both versions in a particular DECsystem 5900 system, depending on when it was manufactured and whether or not a mass storage upgrade has been added.

1.1.3.1 Mass Storage Drawer Information

Before beginning a service procedure or upgrade, you must identify which type of drawer you will be working on, and refer to the appropriate section of this chapter for guidance. Use Table 1–3 to determine where the information you need is located.

Table 1–3 Where to Find Mass Storage Drawer Information

Distinguishing Features	Mass Storage Drawer 1	Mass Storage Drawer 2
Power switch on drawer front	Yes	No
Top cover	Two sections with screws	One piece
Exposed fans on rear of drawer	No	Yes
For detailed information see:	Section 1.1.4	Section 1.1.6

The options available in mass storage drawers are the same regardless of the design of the drawer. For a list of available options, see Section 1.1.8.

1.1.3.2 Removable and Nonremovable Media Devices

Two types of storage options are available for mass storage drawers:

- Removable media devices, which are physically changed by the customer, such as tapes and CDs. Removable media devices are always located in one of the removable media slots at the right front of the mass storage drawer, and can accommodate either one full-height, or two half-height devices with a divider in the middle.
- Nonremovable media devices such as hard disk drives, in which the media is not changed.

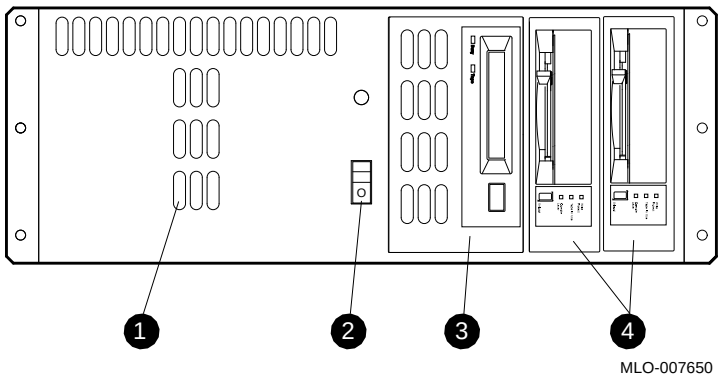
1.1.4 Mass Storage Drawer 1

This section decribes the mass storage drawer 1.

1.1.4.1 Mass Storage Drawer 1 Front Panel

Figure 1–13 shows the front panel of a mass storage drawer 1, and identifies each component.

Figure 1–13 Mass Storage Drawer 1 Front Panel



❶ Air inlet

❷ Power switch—green LED illuminates to indicate power is on

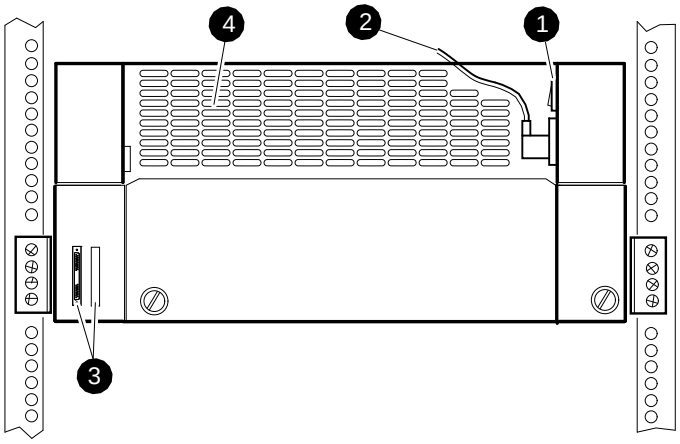
❸ Optional full-height removable media device (TLZ04 shown)

❹ Optional half-height removable media devices (TZ30s shown)

1.1.4.2 Mass Storage Drawer 1 Rear Panel

Figure 1–14 shows the rear panel of a mass storage drawer 1.

Figure 1–14 Mass Storage Drawer 1 Rear Panel



❶ Power switch (should normally be left on)

❷ Power cable that connects to main power controller

❸ Ports for SCSI bus cable that connects to a SCSI controller, tabletop device, and a terminator

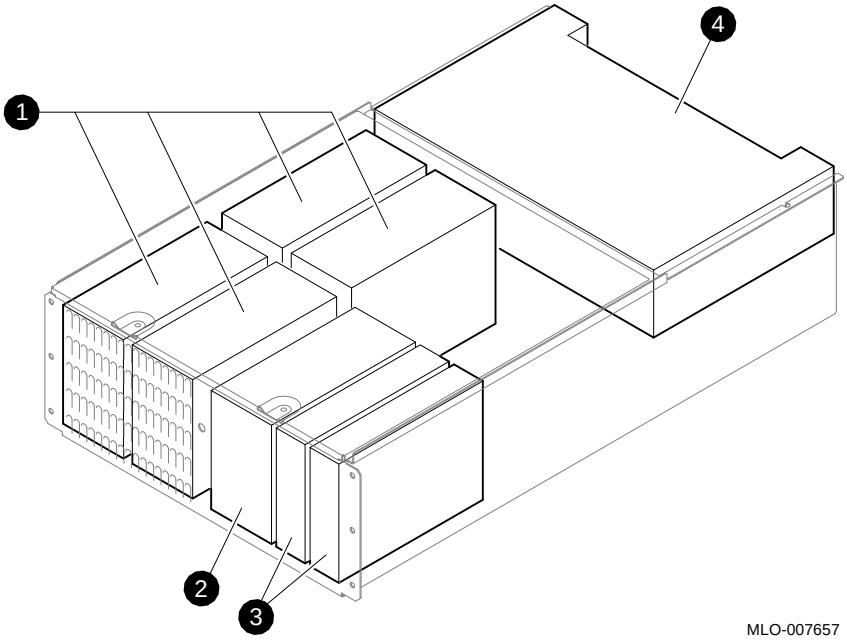
❹ Air outlet

1.1.4.3 Mass Storage Drawer 1 Interior Compartments

Each mass storage drawer provides mounting, power, and cooling for up to seven 13-cm (5.25-in) SCSI devices. The two right front device positions are designed to mount either fixed or removable media devices. The far right-hand position can mount either one full-height device or two half-height devices, as shown in Figure 1–15. The drawers contain both SCSI-IN and SCSI-OUT ports, and can be configured for either one or two (split) SCSI buses.

Power is distributed from the mass storage drawer power supply by means of an internal power harness with 4-pin power connectors for up to seven mass storage devices.

Figure 1–15 Internal View of Mass Storage Drawer Devices



❶ Full-height nonremovable storage options

❷ Full-height removable or nonremovable storage option

❸ Half-height removable storage options

❹ Drawer power supply

1.1.4.4 Mass Storage Drawer 1 SCSI Signal Buses

There are two SCSI signal buses in each mass storage drawer which may be configured as a single bus cable or in a split bus cable configuration. For details and illustrations of signal bus configurations, see Section 4.6.

1.1.4.5 Mass Storage Drawer 1 Device Brackets

Each device is held in place within the mass storage drawer with a particular bracket, depending upon the size and function of the device.

The drive bracket is used for full-height devices; the removable media device bracket can accommodate either full- or half-height devices. See Figure 4–6 and Figure 4–7 for an example of each type of bracket.

Note

Different brackets are used for the same device, depending upon the mass storage drawer version.

1.1.5 Mass Storage Drawer 1 Power Supply

The mass storage drawer 1 power supply is described below.

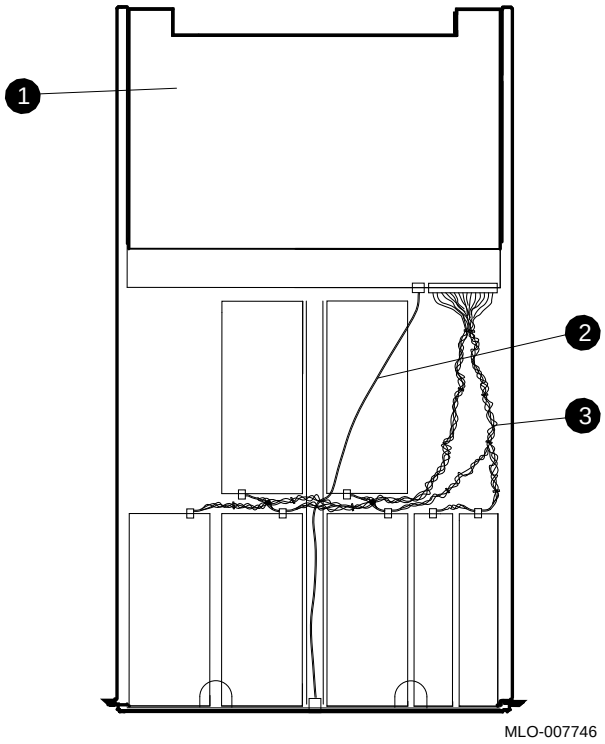
1.1.5.1 Power Supply and Power Harness

Each mass storage drawer has a 400 W power supply (with integral fans), shown in Figure 1–16. Power to each mass storage device is provided by means of the power bus (harness), which includes seven 4-pin keyed connectors, one for each mass storage device. The bus is connected to the power supply in the drawer by means of a 16-pin keyed connector (see Figure 1–16).

1.1.5.2 Mass Storage Drawer 1 Power Switch Cable

A 4-pin keyed connector conducts power from the power supply to the switch in the front of the drawer. The switch features a built-in power-on LED indicator which lights when the drawer is turned on. The 4-pin connector plugs in to the left of the SCSI device power harness (see Figure 1–16).

Figure 1–16 Mass Storage Drawer 1 Power Supply and Harness



❶ Mass storage drawer power supply

❷ Mass storage drawer power switch cable

❸ Mass storage drawer power harness (bus)

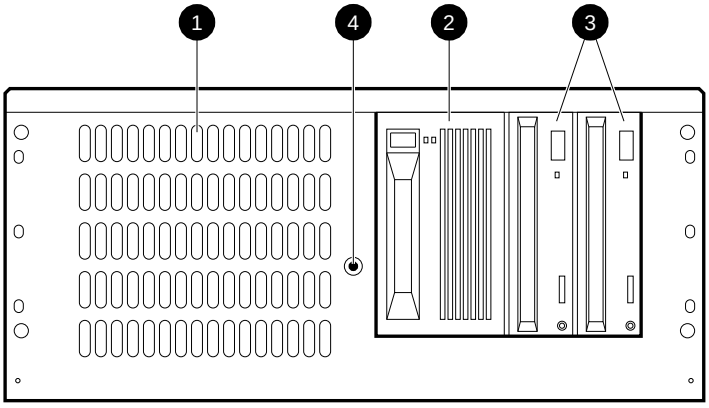
1.1.6 Mass Storage Drawer 2

The following section describes the mass storage drawer 2.

1.1.6.1 Mass Storage Drawer 2 Front Panel

Figure 1–17 shows the front panel of a mass storage drawer 2, and identifies each component.

Figure 1–17 Mass Storage Drawer 2 Front Panel



❶ Air inlet

❷ Optional full-height removable media device (TLZ04 shown)

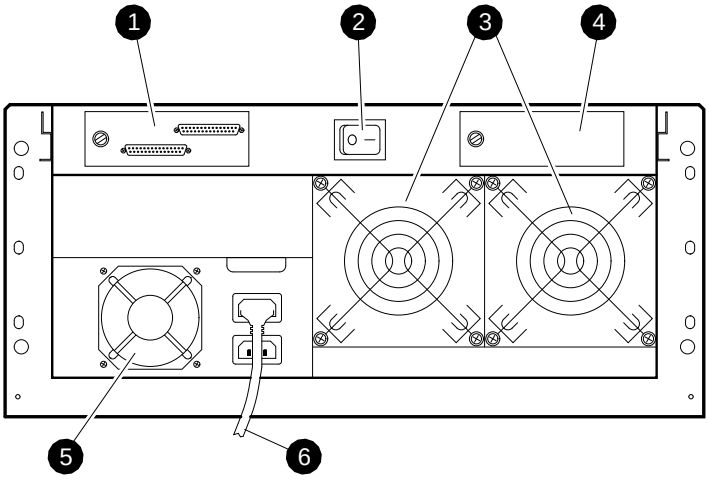
❸ Optional half-height removable media devices (RRD42s shown)

❹ LED

1.1.6.2 Mass Storage Drawer 2 Rear Panel

Figure 1–18 shows the rear panel of a mass storage drawer 2.

Figure 1–18 Mass Storage Drawer 2 Rear Panel



❶ Port for SCSI bus cable that connects to the CPU drawer

❷ Power switch (should normally be left on)

❸ Fans

❹ Optional connector panel

❺ Power supply

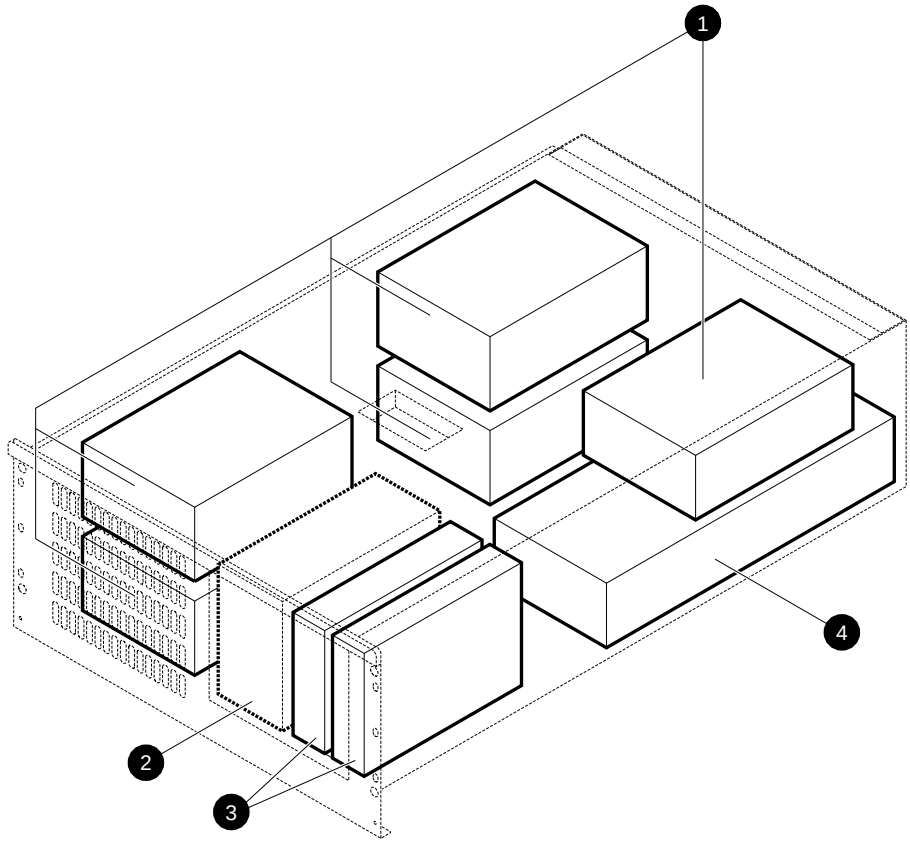
❻ Power cable that connects to main power controller

1.1.6.3 Mass Storage Drawer 2 Interior Compartments

Each mass storage drawer provides mounting, power, and cooling for up to seven 13-cm (5.25-in) SCSI devices. The two right-front device positions are designed to mount either fixed or removable media devices. The far right-hand position can mount either one full-height device or two half-height devices, as shown in Figure 1–19. The drawers contain both SCSI-IN and SCSI-OUT ports, and can be configured for either one or two (split) SCSI buses.

Power is distributed from the mass storage drawer power supply by means of an internal power harness with 4-pin connectors for seven mass storage devices.

Figure 1–19 Internal View of Mass Storage Drawer 2 Devices



❶ Full-height nonremovable storage options

❷ Full-height removable storage option

❸ Half-height removable storage options

❹ Drawer power supply

1.1.6.4 Mass Storage Drawer 2 SCSI Signal Buses

There are two SCSI signal buses in each mass storage drawer which may be configured as a single bus cable or in a split bus cable configuration. For details and illustrations of signal bus configurations, see Section 4.6.

1.1.6.5 Mass Storage Drawer 2 Device Brackets

Each device is attached to a particular bracket, depending upon the size and function of the device. The bracket and device slide into slots in the appropriate positions in the mass storage drawer 2.

The drive bracket is used for full-height devices; the removable media device bracket can accommodate either full- or half-height devices. See Figure 4–17 and Figure 4–18 for an example of each type of bracket.

Note

Different brackets are used for the same device, depending upon the mass storage drawer version.

1.1.7 Mass Storage Drawer 2 Power Supply

The following section describes the power supply for the mass storage drawer 2.

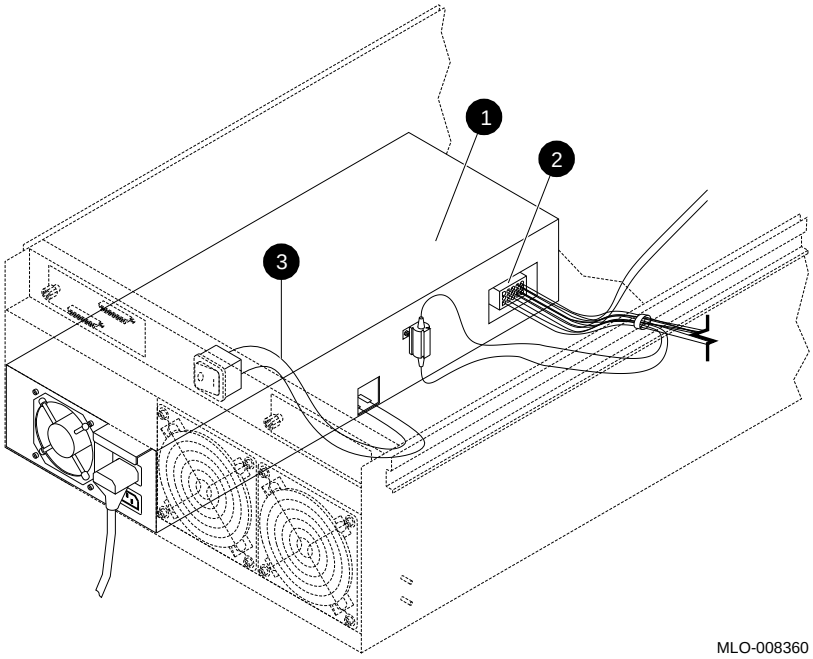
1.1.7.1 Power Supply and Power Harness

Each mass storage drawer has a 400 W power supply (with integral fans), shown in Figure 1–20. Power to each mass storage device is provided by means of the power bus (harness), which includes seven 4-pin keyed connectors, one for each mass storage device. The bus is connected to the power supply in the drawer by means of a 15-pin keyed connector (see Figure 1–20).

1.1.7.2 Mass Storage Drawer 2 Power Switch Cable and LED

Two separate wires run from the 15-pin keyed connector to a power-on LED indicator on the front of the drawer which lights when the drawer is turned on. A 2-pin connector conducts power from the power supply to the switch on the rear of the drawer (see Figure 1–20).

Figure 1–20 Mass Storage Drawer 2 Power Supply and Harness



❶ Mass storage drawer power supply

❷ Mass storage drawer power harness (bus)

❸ Mass storage drawer power switch cable

1.1.8 Mass Storage Drawer Options

The options in Table 1–4 are available for mass storage drawers. (Appendix A contains a listing of DECsystem 5900 FRUs.)

Table 1–4 Options in the Mass Storage Drawer

Type	Device Name	Description
Mass storage options	RZ57	1-Gbyte hard disk
	RZ58	1.3-Gbyte hard disk
Removable media options	RX26	2.8-MB 3.5-inch internal floppy disk
	RRD42–DA	600-MB CD reader, 5.25-inch device
	TLZ04	1.2-Gbyte DAT (4 mm)
	TLZ06	4.0-Gbyte tape (4 mm)
	TKZ09	5.0-Gbyte tape (8 mm)
	TZ30	95-MB 1/2-inch tape, 5.25-inch drive
	TZK10	320-MB QIC tape drive
	TZ85	2.6-Gbyte 1/2-inch tape drive

1.1.9 Rackmounted Enclosure Options

The rackmounted options in Table 1–5 are available for the DECsystem 5900. These options occupy at least one drawer slot in the DECsystem 5900 cabinet.

Table 1–5 Rackmounted Options

Type	Device Name	Description
One slot	Dual CPU	Second CPU drawer
One slot	Mass storage drawer	Complete mass storage drawer upgrade
Two slot	StorageServer 100	Optical disk (juke box)

1.1.10 External Options

The external options in Table 1–6 are available for the DECsystem 5900 system.

Table 1–6 External Options

Type	Device name	Description
External options	TSZ07	6400-bpi 9-track tape drive, external tabletop
	TKZ08–DA	8-mm EXABYTE(TM) tape, external tabletop
	TKZ09	5.0-Gbyte tape (8-mm)
	TZ85	2.6-Gbyte 1/2-inch tape drive
	TZ857	18.2-Gbyte 1/2-inch tape drive, 7 cartridges
	StorageServer 100	Optical disk (juke box)

1.1.11 Power Requirements

Power requirements for the DECsystem 5900 system are shown in Table 1–7.

Table 1–7 Power Requirements

Category	120 Vac	240 Vac
AC plug type	NEMA L5–30P	Not applicable
CPU drawer	240 watts	240 watts
Frequency range	47 to 63 Hz	47 to 63 Hz
Mass storage drawer	270 watts	270 watts
Maximum configuration	1560 watts	1560 watts
Nominal voltage	120 volts	220 volts
Power cable type	Attached	Country specific (see Table 2–3)
Start-up current	30 rms A	16 rms A

1.2 DECsystem 5900 System Processing Capabilities

This section describes the processing capabilities of the DECsystem 5900 system.

1.2.1 System Module Components

The system module includes:

- 256-Kbyte power-up self-test and bootstrap ROM
- System control and status registers and diagnostic LED indicators
- RTC-based system clock and 50-byte (5-year) battery backed-up RAM
- SCC-based serial lines
- Two RS232 asynchronous serial comm ports with full modem control
- Error address status register
- ECC error check/syndrome status register
- LANCE-based network interface for ThickWire Ethernet
- Disk/tape interface for SCSI peripherals
- Three TURBOchannel I/O option connectors
- TURBOchannel Extender
- DMA for SCSI Ethernet, and two comm ports
- Halt switch

1.2.2 CPU/Daughter Card Components

The CPU/daughter card has the following:

- R3000A MIPS processor CPU/FPU or an R4400 MIPS processor CPU/FPU
- R/W buffer
- Processor interface
- Memory and TURBOchannel interface
- Clock and configuration logic

1.2.3 Memory

Up to fourteen 32-Mbyte MS02–CA single inline memory modules (SAMs) may be connected to the processor module, for a maximum total of 448 Mbytes. The DECsystem 5900 system will be shipped with a minimum of two 32-Mbyte SAMs.

1.2.4 Prestoserve

A 1-Mbyte MS02–NV memory module is installed in the last memory slot, slot 14. It supports the Prestoserve NFS accelerator. Slot 14 is only used for the MS02–NV.

1.2.5 TURBOchannel

The system module contains three TURBOchannel option slots. One of these slots is preconfigured with an adapter module, the TURBOchannel Extender Adapter module, that is used to connect a TURBOchannel Extender module. The remaining two slots may be used for one dual or two single TURBOchannel option modules.

TURBOchannel is an I/O interface which enables 100 Mbyte per second connection to optional devices such as:

PMAZ (single-ended SCSI)
PMAD (Ethernet)
DEFZA (FDDI)

As shown in Table 1–8 and Figure 1–7, there are three TURBOchannel option slots on the rear panel of the CPU drawer. TURBOchannel slot 0 contains a TURBOchannel Extender Adapter module connected to the TURBOchannel Extender module (TCE), located in the upper rear compartment of the CPU drawer. TCE is a standard feature of the DECsystem 5900 system, and provides space for the use of one single, dual, or triple TURBOchannel slot option in the DECsystem 5900 system without occupying all of the system module TURBOchannel slots. (Only one option may be used in the TCE whether it is a single, dual, or triple slot option.)

Table 1–8 TURBOchannel Slots

Slot	Module
0	TURBOchannel SCSI controller (contains Extender Adapter module), ❼ in Figure 1–7
1	TURBOchannel SCSI controller, ⓬ in Figure 1–7; for example, PMAZ
2	TURBOchannel SCSI controller, ⓮ in Figure 1–7; for example, DEFZA
3	System module, ❻ in Figure 1–7; CPU, system, and memory

The purpose of the TURBOchannel Extender module is to allow a two- or three-slot TURBOchannel option module to be connected to the DECsystem 5900 system and physically take up only one TURBOchannel slot. This leaves two slots available for other TURBOchannel options. Without the TURBOchannel Extender module, certain TURBOchannel options could use up all three slots.

1.2.6 SCSI Interface

The system module contains a 53C94-based DMA SCSI interface similar to previous Digital RISC systems which will interface with up to seven SCSI devices. In order to control additional (optional) mass storage drawer devices or drivers, one or more TURBOchannel SCSI controllers (PMAZ) are required (each SCSI controller controls 7 SCSI devices).

A fully populated DECsystem 5900 system would have 28 SCSI devices: seven on the system module port, seven each on two PMAZ modules (slots 1 and 2), and seven more on a PMAZ located on the TCE (which is connected to slot 0 via the TURBOchannel Extender Adapter module; see Figure 1–7).

In each mass storage drawer there are two separate SCSI buses. Each bus has five SCSI connectors. The two SCSI buses can be connected to contain seven SCSI devices (single bus configuration) for a total of seven SCSI devices allowed. The SCSI buses may be left unconnected, and terminated separately (split bus configuration) if so desired. For more information on single and split configurations, see Section 4.6. A terminator *must* be located at the end of each SCSI bus.

On each separate SCSI bus (one or two per mass storage drawer) the individual devices are tagged with identity (ID) numbers. No two SCSI devices on the same bus may have the same ID number. If SCSI devices are added, they must be marked with an appropriate ID sticker.

The factory-set configuration is depicted in Table 1–9.

Table 1–9 SCSI ID Factory Configuration

Device	ID
CPU SCSI adapter	7
First removable media device	5
Boot disk or first disk	0
Remaining disks, in order	1, 2, 3, 4, 6, 5
Remaining removable media devices	6, 4

Ethernet Interface

The Ethernet hardware is the LANCE-based design used in previous products.

Communications Interface

Two RS–232 ports are provided on the system module. Although these ports provide full modem support in the hardware, the firmware does not support full modem control.

1.3 DECsystem 5900 Cables and Buses

This section lists the network and power cables and SCSI buses used by the DECsystem 5900 system which are not in a drawer (either CPU or mass storage).

1.3.1 Drawer Cables and Buses

A set of power cables and SCSI buses for each of the four possible mass storage drawers is present in the DECsystem 5900 enclosure when it is shipped, whether or not a full complement of four mass storage drawers is ordered. Table 1–10 lists the cables and buses that are external to the drawers, and internal to the enclosure.

Table 1–10 Mass Storage Drawer Cables

Cable or Bus	Function
Power cable	Connects each drawer to the main power controller
SCSI buses	Connects each mass storage drawer to the CPU drawer (SCSI controller(s))

1.3.2 System Cables

Table 1–11 describes the cables that extend outside the system enclosure.

Table 1–11 System Cables and Buses

Cable or Bus	Function
Console interface	Connects the system console terminal to an H8571–A (MMJ 25-pin connector) on the back of the CPU drawer
Ethernet cable	Connects the system to the local network
FDDI	Connects the system to the local FDDI network
Power cable	Connects the system to a power outlet (see Table 2–3)
External SCSI bus	Connects to tabletop or external devices

Both CPU and mass storage drawers contain various internal power cables and/or signal buses. See Figure 1–8 for the CPU power supply cable.

Mass storage drawer versions 1 and 2 internal power cables are shown in Figure 1–16 and Figure 1–20, respectively.

Details of internal signal cable configurations may be found in Figure 4–28 and Figure 4–30 for mass storage drawer 1, and Figure 4–29 and Figure 4–31 for mass storage drawer 2.

1.4 LED Power Indicators and Switches

LEDs

- CPU drawer—A "dc ok" LED indicator on the front of the CPU drawer lights when it is turned on (Figure 1–6).

- Mass storage drawer— A green light on the power switch on the front panel of the mass storage drawer 1 lights when the storage drawer power is turned on (Figure 1–13).

Note

Both front and rear power switches must be pressed to the “on” position for the green LED indicator on the front switch to illuminate.

Switches

Table 1–12 explains the location and function of each DECsystem 5900 switch.

Table 1–12 DECsystem 5900 Switches

Switch	Location	Function
Circuit breaker	Rear of the system on the power controller	Limits the current into the cabinet; can be used as a main power switch.
System power	Upper switch on the front of the CPU drawer	Turns the system on and off via the power controller.
CPU drawer power	Lower switch on the front of the CPU drawer	Turns the CPU drawer on and off.
Mass storage drawer power	Rear panel of each drawer (also front panel of mass storage drawer 1)	Turns the mass storage drawer on and off.
Halt	Rear panel of the CPU drawer	Halts the CPU; the system enters console mode.
Remote/local toggle	Rear of the system on the power controller	Sets the power control mode.

Note

Mass storage drawer 1 only: both front and rear power switches must be pressed to the “on” position for the green LED indicator on the front switch to illuminate.

See Section 2.3.2 for the DECsystem 5900 system power-up sequence.

2

DECsystem 5900 System Installation

This chapter contains the procedure for installing the DECsystem 5900 enclosure.

2.1 Site Preparation

The site should be prepared in advance of receipt of the shipment. The following are general site preparation guidelines.

2.1.1 DECsystem 5900 Physical Dimensions

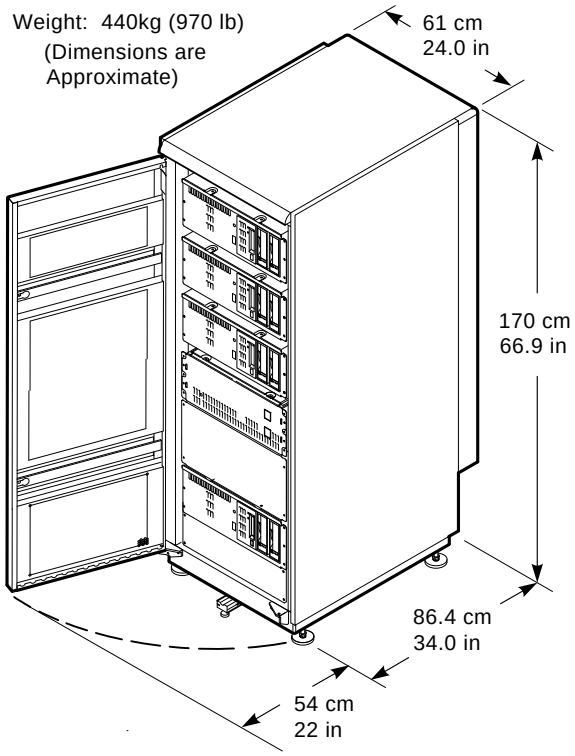
Figure 2–1 shows the dimensions of the DECsystem 5900 enclosure.

You must leave at least 92 cm (36 inches) of clearance in the front and 56 cm (22 inches) in the rear of the DECsystem 5900 system for service and ventilation. No space is required on the sides of the enclosure, though you must be sure there is some way to access the rear on a regular basis.

WARNING

Due to the weight of the equipment, Digital recommends that at least two people move system and terminal boxes.

Figure 2–1 DECsystem 5900 Enclosure Dimensions



2.1.2 Additional Equipment

Make sure there is enough space for terminals and other peripheral equipment.

When you plan the cable routing for multiterminal systems, consider factors such as safety, convenience, future expansion, and cost. Cabling should be in place and labeled before you install the system.

2.1.3 Static Electricity

Static electricity can cause system failure and loss of data. To minimize static buildup, follow these guidelines:

- Maintain relative humidity of at least 20%.
- Provide a separately fed electrical circuit for each enclosure ordered (whether an expander or a system).

- Provide as many electrical outlets as required for each additional device, including any tabletop device and console terminal.

2.1.4 Acoustics

The DECsystem 5900 enclosure is designed for use in computer rooms. Data is measured in accordance with ANSI S12.10–1985 (American National Standards Institute) and ISO/DIS 7779 (International Standards Organization).

- LNPE (B) is the noise power emission level (A-weighted sound power level) measured in bels per 1 pw (reference 1 picowatt). LNPE for the DECsystem 5900 enclosure is 7.2 bels while operating, and 7.0 on standby.
- LPA is the sound pressure measured in decibels at 1.0 m from the front edge of the unit and 1.5 m above the floor. LPA for the DECsystem 5900 enclosure is 57 decibels while operating, and 55 on standby.

Note

The actual noise level is dependent on the type and number of storage devices and may vary according to your configuration.

2.1.5 Heat Dissipation

Heat dissipation is measured in British thermal units (Btu). Maximum heat dissipation in the DECsystem 5900 enclosure is 5325 Btu/h.

2.1.6 Temperature and Humidity Values

Table 2–1 lists temperature and relative humidity values for the DECsystem 5900 enclosure.

Table 2–1 Temperature and Relative Humidity Values

Parameter	Operating	Nonoperating
Temperature[1]	0°C to 32°C 32°F to 90°F	–40°C to 66°C –40°F to 151°F
Temperature rate of change	11°C per hour maximum 20°F per hour maximum	N/A
Relative humidity	20% to 80% (noncondensing)	10% to 95%
Maximum altitude	3000 m (10,000 ft)	15,000 m (50,000 ft)

[1]For operation above sea level, decrease the operation temperature by 1.8°C per 1000 m (or 1°F per 1000 ft).

2.1.7 Electrical Requirements

The power source should be adequate to handle the original system and allow for system expansion. Digital recommends a dedicated circuit from the power source to each system. Additional power equipment may be required to avoid power disturbances.

Table 2–2 lists the electrical requirements for the DECsystem 5900 enclosure in both the 120 Vac and 230 Vac configurations. Table 2–3 lists the power cables required.

Table 2–2 DECsystem 5900 Enclosure Electrical Requirements

Nominal AC Voltage⟹	120 Vac	230 Vac
Voltage range	88 to 144 Vac	176 to 228 Vac
Power source phase	Single	Single
Nominal frequency	60 Hz	50 Hz
Frequency range	47 to 63 Hz	47 to 63 Hz
Maximum steady state current at nominal voltage	24 A	12 A
Startup current (20 seconds)	30 A	16 A
Maximum inrush current	200 A	200 A
Maximum power consumption	1560 W	1560 W

Table 2–3 Required Power Cables by Country

Country	Cable Number	Plug Number
Australia	BN18D–4E (17–00198–05)	AS 3112–1981
Central Europe	BN18C–4E (17–00199–10)	CEE7/7
Denmark	BN18P–4E (17–01255–01)	IEC 309
Europe	BN18P–4E (17–01255–01)	IEC 309

(continued on next page)

Table 2–3 (Cont.) Required Power Cables by Country

Country	Cable Number	Plug Number
India	BN18H–4E (17–00456–06)	BS546
Ireland	BN18P–4E (17–01255–01)	IEC 309
Israel	BN18F–4E (17–00457–06)	S.I.32
Italy	BN18E–4E (17–00364–06)	CEI 23–16
Japan	BN18R–4E (17–01256–01)	IEC 309
South Africa	BN18H–4E (17–00456–06)	BS546
Switzerland	BN18P–4E (17–01255–01)	IEC 309
United Kingdom	BN18P–4E (17–01255–01)	IEC 309
United States	BN18R–4E (17–01256–01)	IEC 309

2.2 Unpacking the Shipment

The shipment can include several cartons containing:

- The system unit
- Cables for connecting additional devices to the system
- Console terminal(s)
- Kit of customer documentation
- The container marked "Software" that contains software documentation, system software, diagnostic software, and a software license.

Note

Save all packing materials if you plan to reship the system.

Depending on the order, the shipment can also include additional terminals, printers, or modems.

When delivered, the system is packed in a cardboard container attached to a shipping skid or pallet.

Before unpacking the equipment, check for external shipping damage. Report any damage to the customer's sales representative and contact the customer's delivery agent. Keep all packing material and receipts when filing a damage claim.

Unpack the system according to the instructions on the system shipping carton. When you unpack the cartons, check the contents against the shipping list to ensure the order is complete.

2.2.1 Removing the Skid

Remove the plastic wrap, the corner pads, and any cardboard packaging.

WARNING

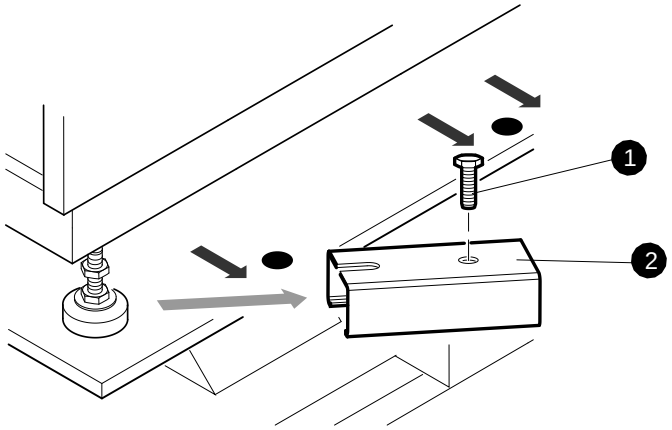
Use two people to move the system; the system weighs between 265 and 485 kg (480 and 1070 lb), depending on the options installed.

To remove the system from the skid, follow these steps:

1. Leave a 7-ft clearance in front of the skid.

2. Insert the skid ramps into the holes in the front of the skid with the arrows on the skid lined up with the arrows on the ramp.
3. With a 9/16-inch wrench, loosen and remove the wheel lock bolts ❶ on the system's feet (see Figure 2–2).
4. Remove the wheel locks and save them for use if the system ever needs to be shipped.
5. Roll the system down the ramps into the proper position. The front two wheels are casters, the rear wheels are fixed.
6. Slide the system into the desired location.

Figure 2–2 Wheel Lock Removal



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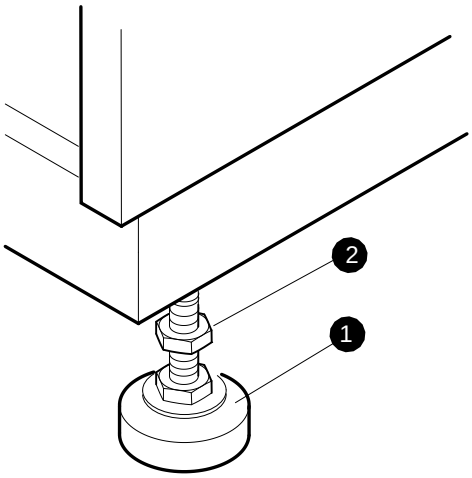
❶ Wheel lock bolt(s)

❷ Wheel lock

2.2.2 Leveling the System

After the system is in place, use an adjustable wrench to lower the leveler feet (one at each of the four corners) to assume the weight of the system, and lock the feet by tightening the lock nut up to the system (see Figure 2–3).

Figure 2–3 Leveling the System



❶ Leveler foot

❷ Lock nut

2.2.3 Assembling the System Skirts

The skirts are installed after the system has been set in place and leveled as explained in Section 2.2.2. The skirt kit is in a separate box from the accessory kit.

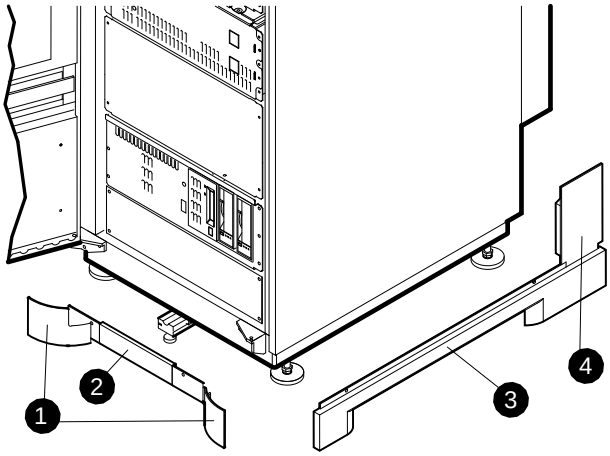
2.2.3.1 Front Skirt

The front skirt consists of three pieces which must be assembled and then attached to the front of the system; a center skirt and a left and right corner skirt, part numbers 74–41733–01, 74–41659–01, and 74–41659–02, respectively (see Figure 2–4).

2.2.3.2 Side Skirts

The side skirts each have two parts—a long skirt (74–1653–01) and an "ear" (74–41655–01) which is attached to the long skirt with three self-tapping Phillips screws. Each of these assemblies is then attached to the system with two quarter-turn Phillips captive screws.

Figure 2–4 Front and Side Skirts

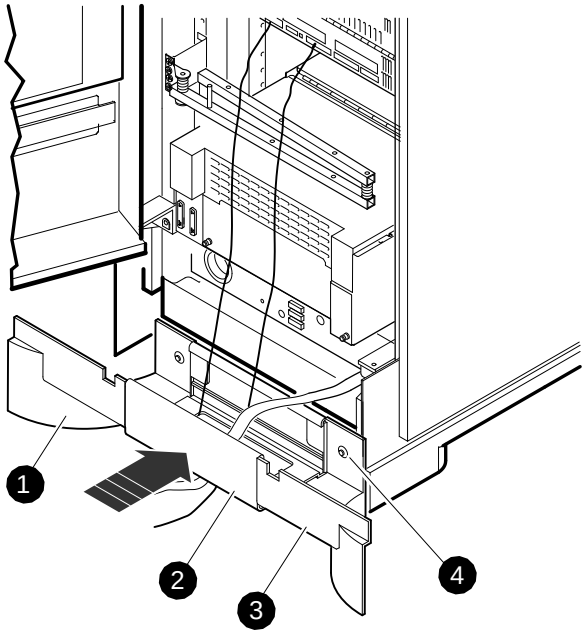


❶ Left and right corner skirts
❷ Center skirt
❸ Long skirt
❹ Ear

2.2.3.3 Rear Skirts

The rear skirt has a rectangular opening through which all external power and signal cables must be run. The rear skirt parts are assembled and attached to the frame with push-in captive screws (see Figure 2–5). The cable cover (74–41660–01) is then fit into the notches on the rear skirt. Attach the lower rear skirt panel with four screws (see Figure 2–6).

Figure 2–5 Rear Skirt



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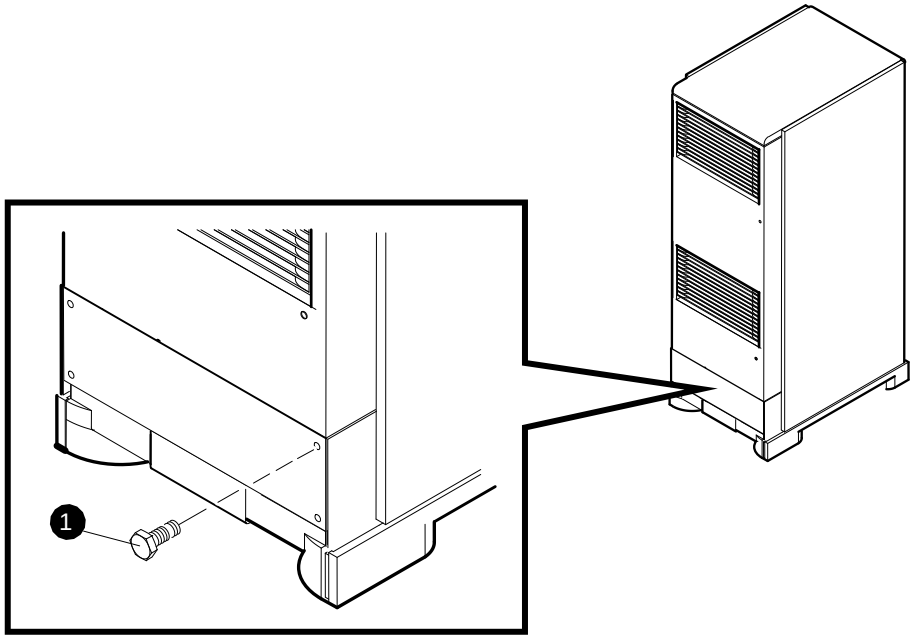
❶ Left rear corner

❷ Cable cover

❸ Right rear corner

❹ Push-in captive screw

Figure 2–6 Attaching the Lower Rear Skirt Panel

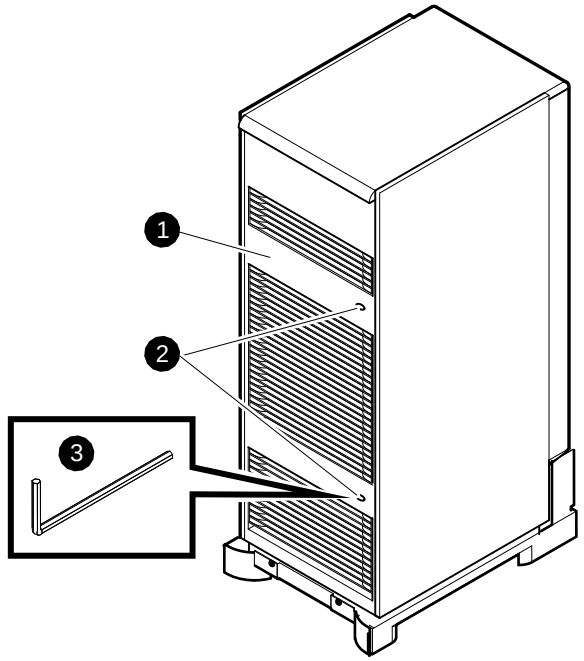


❶ Hex screw

2.2.4 Opening the Doors

The enclosure doors are accessed with a 1/4-inch hex wrench (see Figure 2–7 and Figure 2–8).

Figure 2–7 Opening the Front Enclosure Door

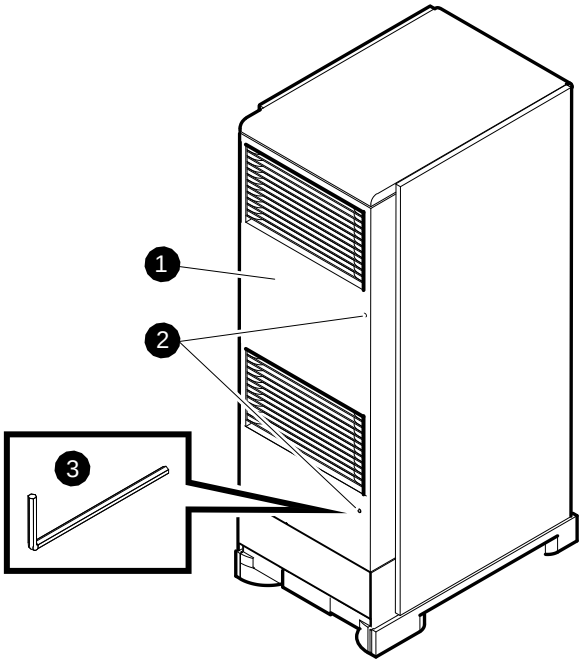


❶ Front door

❷ Latches

❸ Hex wrench

Figure 2–8 Opening the Rear Enclosure Door



❶ Rear door

❷ Latches

❸ Hex wrench

2.2.5 Removing Mass Storage Drawer 1 Shipping Brackets

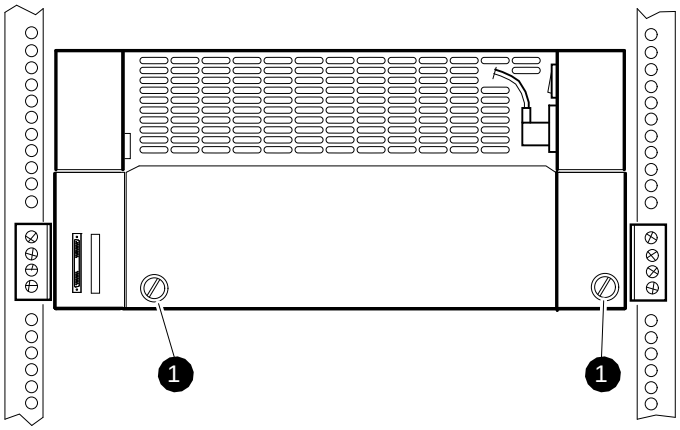
Mass storage drawers in a DECsystem 5900 system are fixed to the enclosure for shipment by rear retainer brackets. To access a mass storage drawer, you must first detach it from the retainers. This procedure is repeated for each mass storage drawer in the DECsystem 5900 system.

1. Loosen the two slotted captive screws holding the lower rear plate of the drawer (see Figure 2–9), and remove the plate.
2. Loosen and remove the two hex slotted bracket screws on each inside wall. Figure 2–10 shows the rear plate removed and the four bracket screws.

You may leave the retainer brackets in place on the cabinet, or detach them for ease of service by removing the four screws on each. (Be sure to save the retainer brackets with the other shipping materials for possible relocation or shipment of the DECsystem 5900 system.)

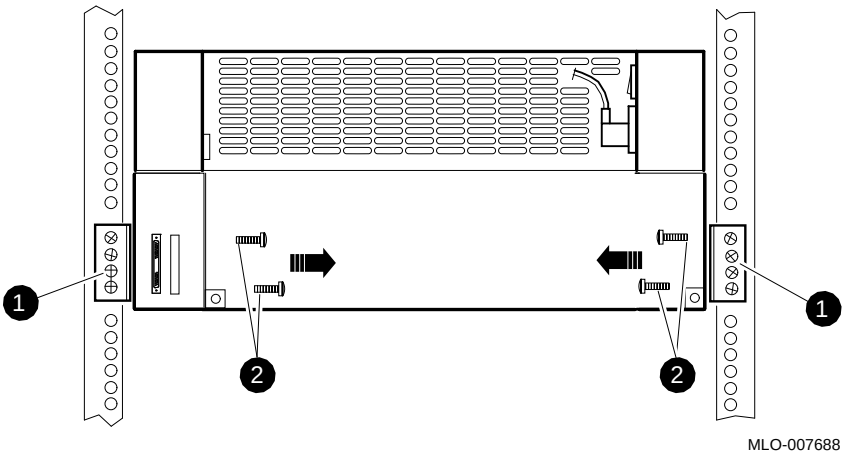
3. Place the hex slotted bracket screws with the rest of materials in the Accessory Kit to be retained on site.

Figure 2–9 Mass Storage Drawer Lower Plate



❶ Slotted captive screws

Figure 2–10 Mass Storage Drawer Bracket Screws



❶ Retainer bracket

❷ Hex slotted bracket screws

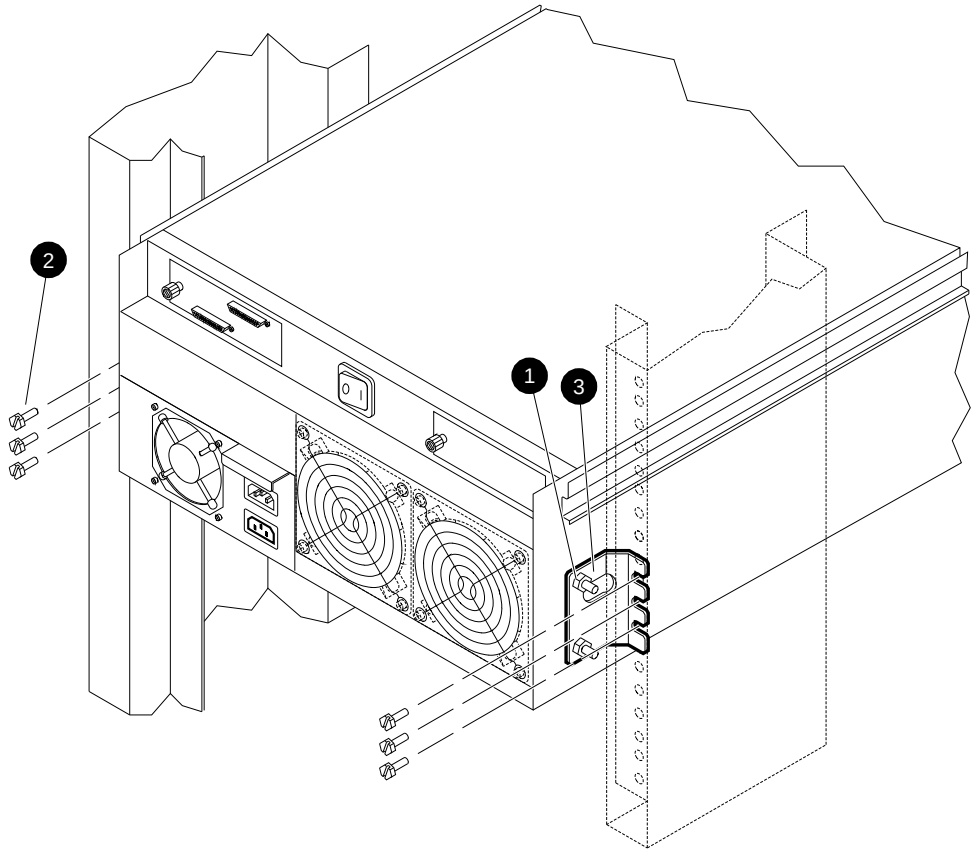
2.2.6 Removing Mass Storage Drawer 2 Shipping Brackets

The mass storage drawer 2 is also fixed to the enclosure for shipment by rear restraint brackets. To access a mass storage drawer 2, you must first detach the retainers (see Figure 2–11).

This procedure is repeated for each mass storage drawer in the DECsystem 5900 system.

1. Remove the four bracket hex screws holding each retainer bracket to the rear cabinet rails.
2. Loosen and remove the two hex nuts holding each retainer to the side of the drawer.
3. Place the bracket hex screws, hex nuts, and retainer brackets in the Accessory Kit to be retained on site for possible relocation or shipment of the DECsystem 5900 system.

Figure 2–11 Mass Storage Drawer 2 Restraint Bracket



❶ Bracket hex nuts

❷ Bracket hex screws

❸ Retainer bracket

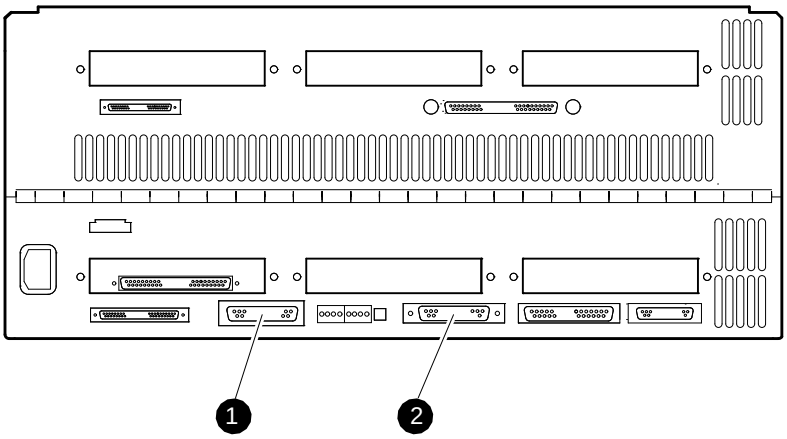
2.3 Console and Network Connections, Power-Up

This section describes cable connections and how to turn on the system.

2.3.1 Connecting the Console Terminal and Ethernet

Connect the console terminal and Ethernet cables to the system ports shown in Figure 2–12.

Figure 2–12 Connecting the Console Terminal and Ethernet Cables



❶ Ethernet port

❷ System console port

2.3.2 Connecting the Power/Turning the System On and Off

Turn on the DECsystem 5900 system in the following sequence:

1. Plug in the power cable to the ac source.
2. Turn on the power controller (see Section 2.3.2.1).
3. Turn on the CPU drawer (see Section 2.3.2.2).
4. Turn on the mass storage drawers one at a time (see Section 2.3.2.3).
5. Reverse these procedures to turn the system off.

The power controller will turn the system on or off if the remote/local switch is in the remote position.

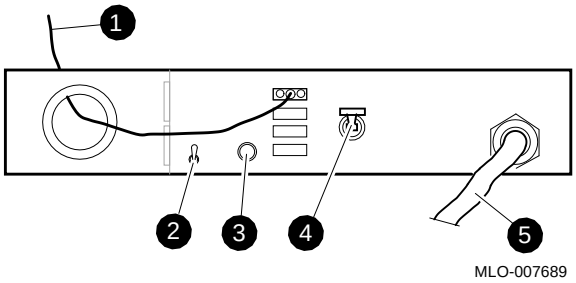
Note

Most U.S. installations have the power cable as part of the power controller. Other installations may have unique detachable cables with the appropriate plug (see Table 2–3).

2.3.2.1 Turning On the Power Controller

Turn on the power controller by setting the remote/local toggle switch to remote, and the main circuit breaker to on (see Figure 2–13). If the remote/local switch is in the local mode (down), the drawers must be turned on individually and manually.

Figure 2–13 Turning On the Power Controller



❶ Cable to CPU drawer system switch

❷ Remote/local toggle switch (up is remote)

❸ LED indicator

❹ Circuit breaker (up is on)

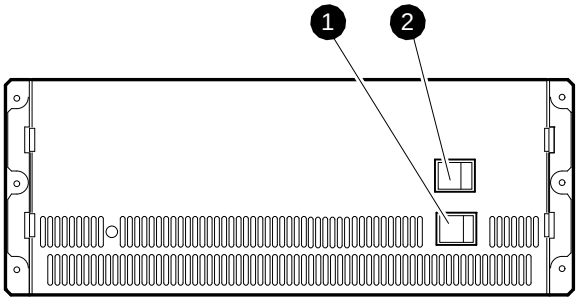
❺ System power cable

2.3.2.2 Turning On the CPU Drawer

A CPU drawer has two power switches on the front; the upper one is a system power master switch for *all* drawers in the DECsystem 5900 system. The lower switch controls power to the CPU drawer *only*. No power will be distributed to the CPU drawer unless both switches are on.

To turn on a CPU drawer, turn on the CPU power switch *and* the master switch (see Figure 2–14); to turn off the CPU drawer, reverse these procedures.

Figure 2–14 Power Switches on the Front of the CPU Drawer



❶ CPU drawer power switch (O/ |)

❷ System power switch (O/ |)

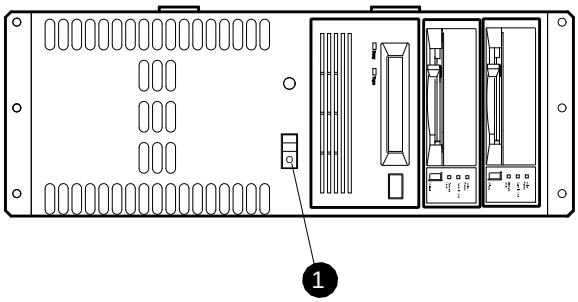
2.3.2.3 Turning On a Mass Storage Drawer

Mass storage drawers have either one power switch in the rear or two power switches (front and rear) which *must* be turned on for the drawer to be powered (see Figure 2–15 and Figure 2–16 for mass storage drawer 1, and Figure 2–17 for mass storage drawer 2). Turn off the mass storage drawer using the same switch(es).

Note

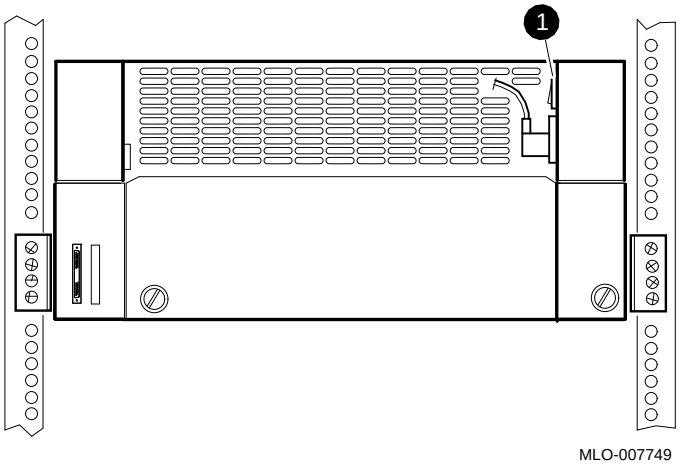
The master switch on the CPU drawer must also be "on" before power will be distributed to *any* of the drawers.

Figure 2–15 Power Switch on the Front of Mass Storage Drawer 1



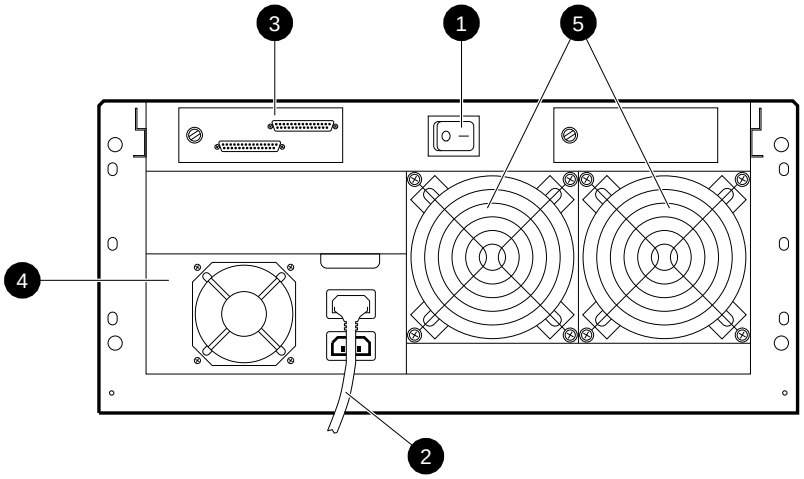
❶ Power switch—green LED indicator is on

Figure 2–16 Power Switch on the Rear of Mass Storage Drawer 1



❶ Power switch (O/ |)

Figure 2–17 Power Switch on the Rear of Mass Storage Drawer 2



❶ Power switch

❷ Power cable that connects to the main power controller

❸ SCSI bus(es) that connect to the CPU drawer and/or SCSI terminator

❹ Power supply

❺ Fans

2.4 Completing the Installation

To complete the installation, remove the blank tape, set the terminal parameters, check the diagnostics, and run the power-up self-test.

2.4.1 Removing Blank Media

For protection during shipping, blank tape and plastic protectors are installed in removable media devices. Remove these after the system is in place and save them in the accessory box for use if the system needs to be reshipped.

2.4.2 Setting Console Terminal Parameters

The console terminal should be set to the following parameters:

Baud rate 9600
8 bits; no parity; 1 stop bit

Refer to the appropriate manual for detailed instructions on setting these controls.

2.4.3 Troubleshooting and Diagnostics

Diagnostics and troubleshooting involve checking the error log and other symptoms to resolve problems at the site.

2.4.3.1 Error Display

Errors, including power-up self-test errors, are displayed in the console error log.

2.4.3.2 Running Diagnostics

In running diagnostics, use console commands to run tests.

Enter the cnfg command to find the numbers of the modules. Enter the t /n ? command to find out which tests are available for that particular module.

2.4.4 Power-Up Self-Tests

Caution

For proper loading and booting procedures, see the *Guide to Installing ULTRIX*, AA–PBL0D–TE.

The power-up process takes about one minute from the time the system is turned on.

Names of tests display on the console as they are performed. The tests also display in hexadecimal values on the pair of four LED indicators on the rear of the CPU drawer. There is neither a keyboard nor printer directly connected to the CPU in the DECsystem 5900 system; these messages can be ignored.

2.4.4.1 Problems with Option Modules

The power-up self-tests do not test the drives or devices in the mass storage drawer(s). Addresses and function of the installed devices can be verified when running extended tests. During the sequence of tests, *n3* indicates the slot number of an option module with an error.

See the *DECsystem 5900 Service Guide* for extended testing of mass storage devices and I/O options and troubleshooting procedures.

2.4.4.2 Resolving Problems

See the *DECsystem 5900 Pocket Service Guide* or telephone 1–800–DEC–8000 for support.

2.5 Accessory Kit Contents

Customers should save all extra parts for future use or system upgrades. Accessories are listed below:

User documents (EK–D590A–DK)
Guide to Installing ULTRIX
Sign kit (Ethernet/CI node)
Hex wrench to open doors
Skirt assembly for cabinet (in a separate box)
MMJ adapter from console
Ethernet loopback connector (12–22196–01) and other loopbacks
Postcard, FTZ label
External cables
Drive ID labels
Drive fasteners
Drive ID jumpers
Drive brackets and removable media device brackets (in mass storage drawer)
Drive tray trim plates

SCSI terminators
Drive shorting jumper
Media for tape and floppy drives
Tape and floppy drive documentation (removable media documentation)

3

Enclosure and CPU Drawer FRU Removal and Replacement

This chapter describes how to remove and replace the field-replaceable units (FRUs) in the DECsystem 5900 cabinet and CPU drawers.

The following sections describe the removal procedure for each FRU. Unless otherwise specified, you can install a FRU by reversing the steps in the removal procedure.

System-specific FRU procedures vary slightly due to varying configurations. As a result, some illustrations of procedures show an *example* of a FRU removal. The variations are noted in the text and in the title of the illustration.

WARNING

Turn off the system power before you remove or install FRUs (see Section 2.3.2).

Caution

- Only qualified service personnel should remove or install FRUs.
- Static electricity can damage integrated circuits. Always use a grounded wrist strap and a grounded work surface (29–26246) when working with the internal parts of a computer system.
- Shut down ULTRIX in an orderly fashion before you remove or install FRUs; the FRU removal and replacement procedures in this document assume that ULTRIX has been shut down first.

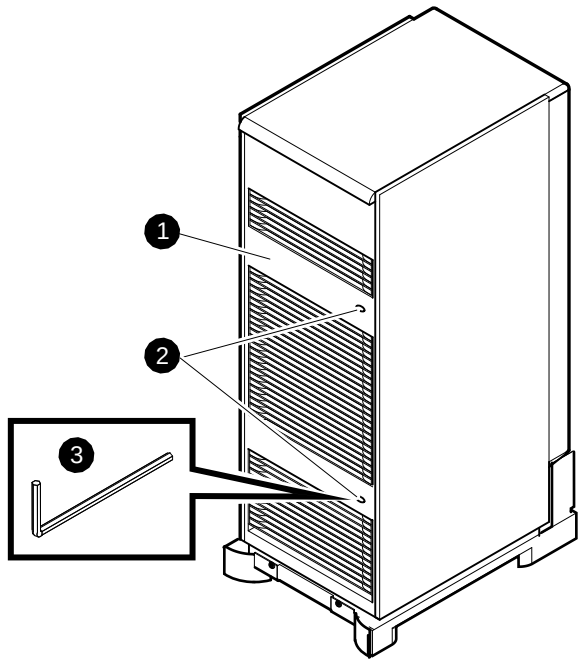
3.1 Removing and Replacing Enclosure FRUs

This section decribes the removal and replacement of enclosure FRUs.

3.1.1 Opening the Enclosure Doors

The enclosure doors are opened with a key (12–26339–01) or with a 1/4-inch hex wrench (see Figure 3–1 and Figure 3–2).

Figure 3–1 Opening the Front Enclosure Door



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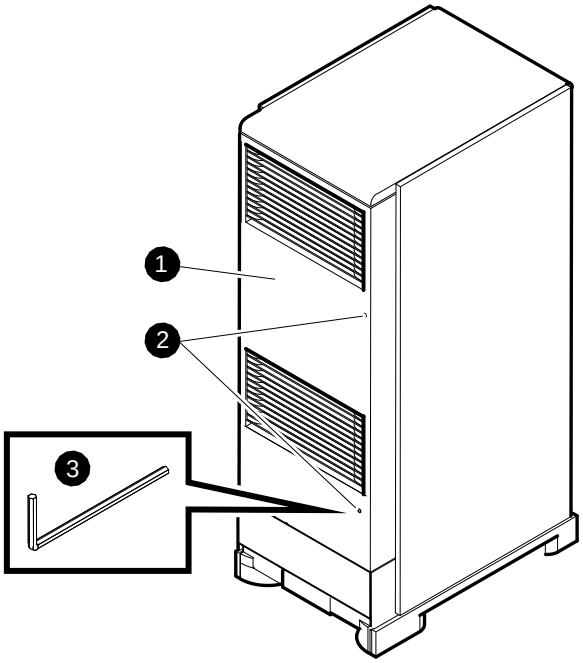
❶ Front door

❷ Latches

❸ Hex wrench

Figure 3–2 Opening the Rear Enclosure Door



❶ Rear door

❷ Latches

❸ Hex wrench

3.1.2 Enclosure Cables

The DECsystem 5900 system is shipped from the factory complete with power cables for a full complement of four mass storage drawers, regardless of the number of drawers initially ordered.

Power cables are attached to the enclosure with wire ties. If it becomes necessary to replace a cable, remove the wire ties, swap the appropriate cable, and replace the ties.

Cables running to the CPU drawer should be routed through the cable arm for protection.

3.1.3 Removing and Replacing Drawer Filler Panels

Slots in the DECsystem 5900 enclosure front which contain no drawers are covered with a filler panel. Slot 0, which contains the power controller (accessed through the rear of the H9A00 enclosure), has a filler panel as well. Filler panels are attached by means of four 5/16-inch hex screws, two on each side. Filler panels may be removed for easier access to adjacent drawers.

3.1.4 Removing and Replacing the Power Controller

The power controller is accessed from the rear of the H9A00 enclosure.

Follow these steps to remove the power controller (see Figure 3–3):

1. Turn off the power using the circuit breaker switch located on the power controller.
2. Unplug the power cable at the power source and thread the plug back through the rear skirt, so that the power controller may be removed (see following steps).
3. Disconnect all power leads to drawers from the left-hand side of the power controller.
4. Disconnect the power sequence cable.
5. Remove the four 5/16-inch hex screws on each corner of the power controller.

Note

Do not remove any other screws; this would disassemble the power controller, and is unnecessary.

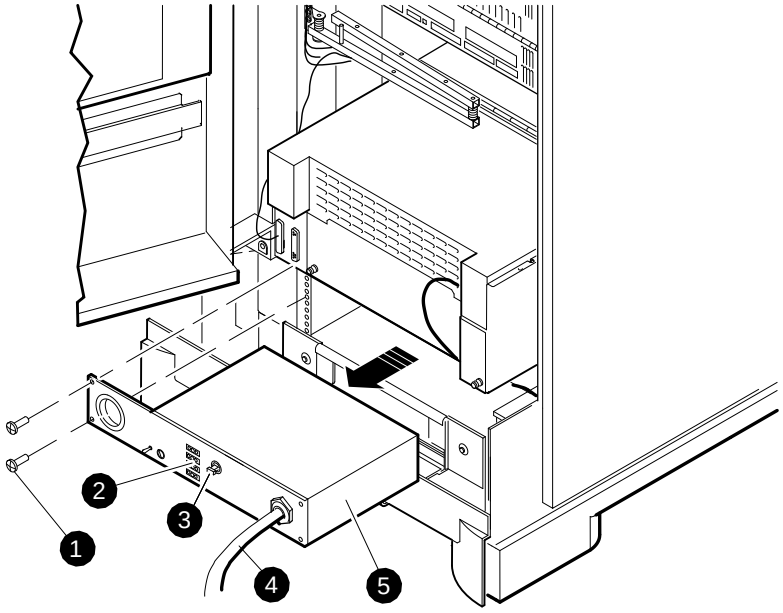
6. Slide the power controller forward and out of the enclosure, complete with the power cable.

7. To replace a power controller, reverse the steps above.

Note

Some variations of the power cable will be detachable at the power controller, and will not be a part of the unit; in this case, unplug the power cable at both ends instead of just at the power source, and proceed as above. The removable power cable will be reused.

Figure 3–3 Removing the Power Controller



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❶ Hex screws

❷ Connectors for power sequence cable(s)

❸ Circuit breaker

❹ Power cable

❺ Power controller

3.2 Removing and Replacing CPU Drawer FRUs

This section describes the CPU drawer FRUs.

WARNING

- **Before accessing either the CPU or the mass storage drawers, be sure that the stabilizer bar located at the bottom front of the enclosure is extended to balance the DECsystem 5900 system (see Figure 3–5).**
- **Do not pull out more than one drawer at a time.**

3.2.1 Accessing the CPU Drawer

Access the CPU drawer using the following procedures.

3.2.1.1 CPU Drawer Compartments and Covers

The CPU power supply, blower, air plenum, and CPU and TURBOchannel Extender module compartments (identified in Figure 3–4) are accessed by pulling out the CPU drawer on its slides and opening the appropriate cover.

Three covers on the CPU drawer access the components listed in Table 3–1.

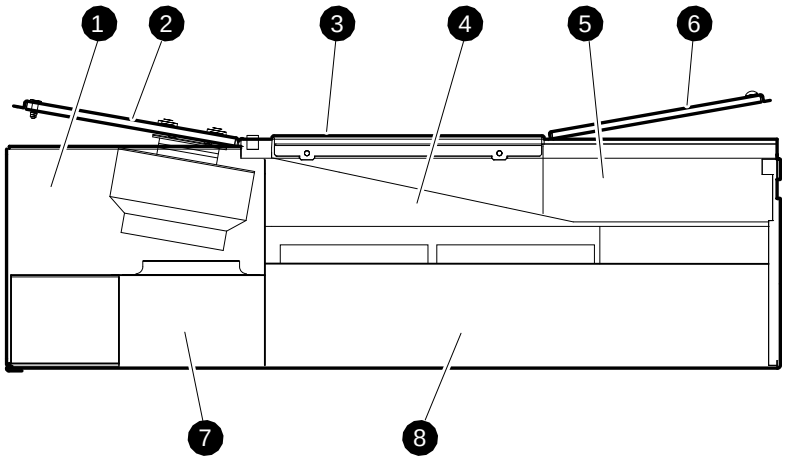
Table 3–1 CPU Drawer Covers

Cover Location	Accesses:
Front	Blower and CPU power supply
Middle	CPU/daughter module, system module, memory, TURBOchannel Adapter and options
Rear	TURBOchannel Extender module and options

Note

All FRU services may be performed without removing the CPU drawer from the cabinet.

Figure 3–4 CPU Drawer Compartments and Covers



❶ Blower compartment

❷ Front top cover

❸ Middle top cover

❹ Air plenum compartment

❺ TURBOchannel Extender compartment

❻ Rear top cover

❼ Power supply compartment

❽ CPU compartment

3.2.1.2 Stabilizing the Enclosure

WARNING

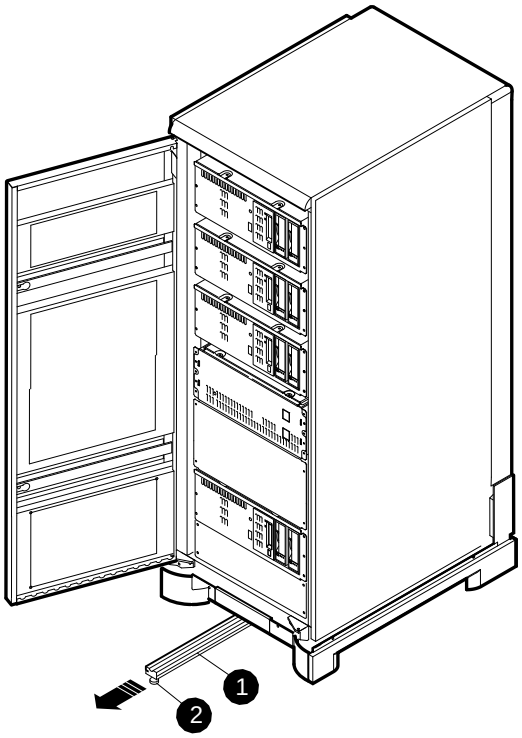
Before accessing either the CPU or the mass storage drawers, the stabilizer bar located at the bottom front of the enclosure must be extended to balance the DECsystem 5900 system (see Figure 3–5).

The DECsystem 5900 system must be balanced before accessing either the CPU or mass storage drawers.

1. If the leveler foot is tightened down to the floor, raise it.
2. Pull the stabilizer bar out until it stops.
3. Screw the leveler foot down firmly by hand.

To retract the arm, reverse these procedures.

Figure 3–5 Stabilizing the Enclosure



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❶ Stabilizer bar

❷ Leveler

3.2.1.3 Pulling Out/Pushing In the Drawer

The CPU drawer is accessed by removing the six hex screws on the front of the drawer with either a screwdriver or a 5/16-inch wrench.

To pull out the CPU drawer, grasp both sides of the drawer's front edge and slide the entire drawer forward from the enclosure until a click is heard. This means that the latches on either of the drawer's slides have sprung out slightly to engage. Check to see that both latches are engaged; if not, pull the drawer out carefully until the remaining one engages, and the middle cover on the top of the drawer (air plenum compartment, Figure 1–8) can be latched in a vertical position (see Figure 3–6).

To push in the CPU drawer, hold the spring tabs in (they should be protruding through the holes) while gently sliding the drawer, and reverse the procedure as depicted in Figure 3–7.

As the CPU drawer is pushed or pulled, the cable arm extends or retracts, keeping the cables organized and out of the way.

Figure 3–6 Pulling Out the CPU Drawer

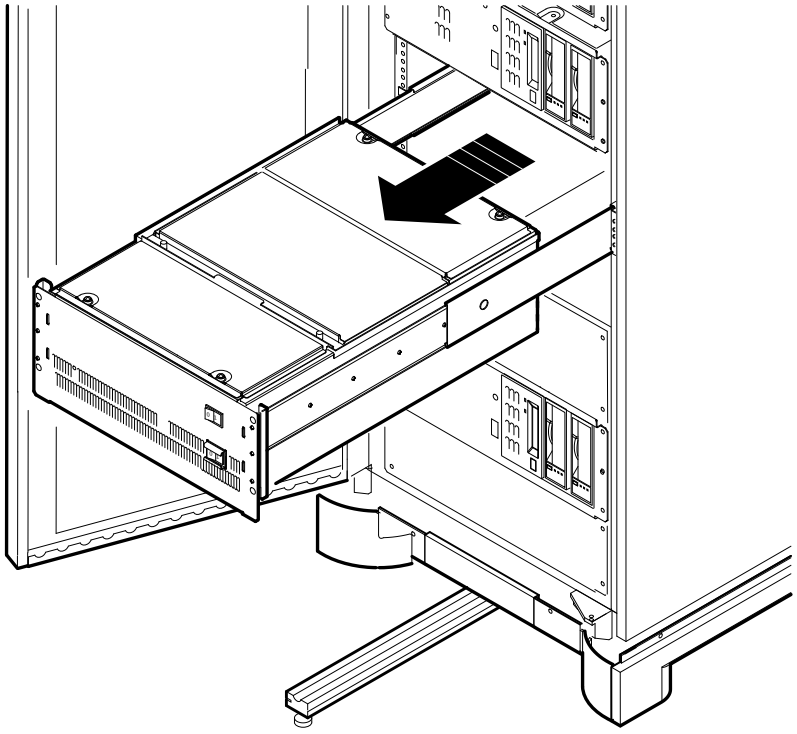

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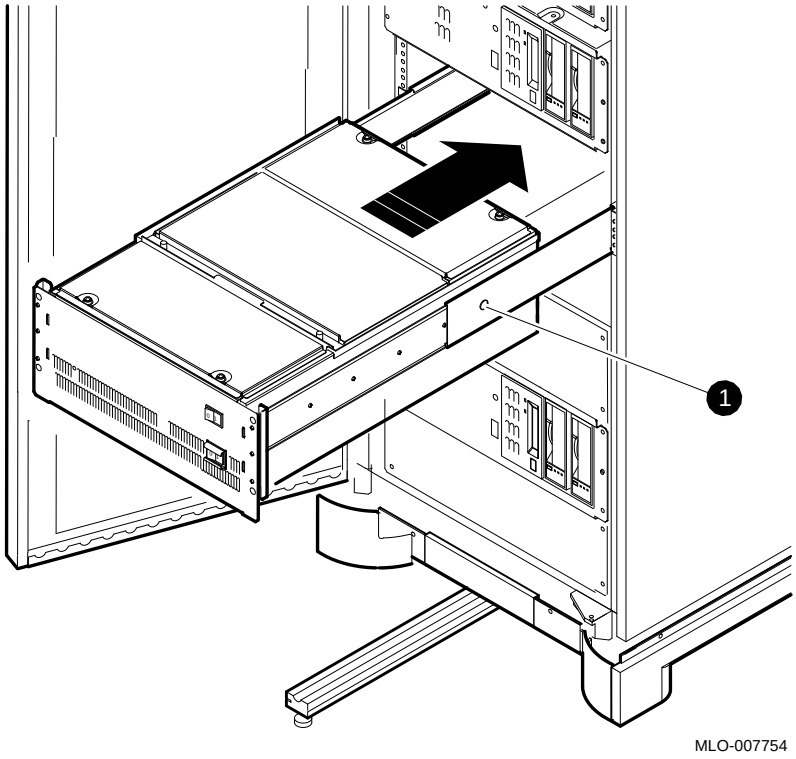
Figure 3–7 Pushing In the CPU Drawer



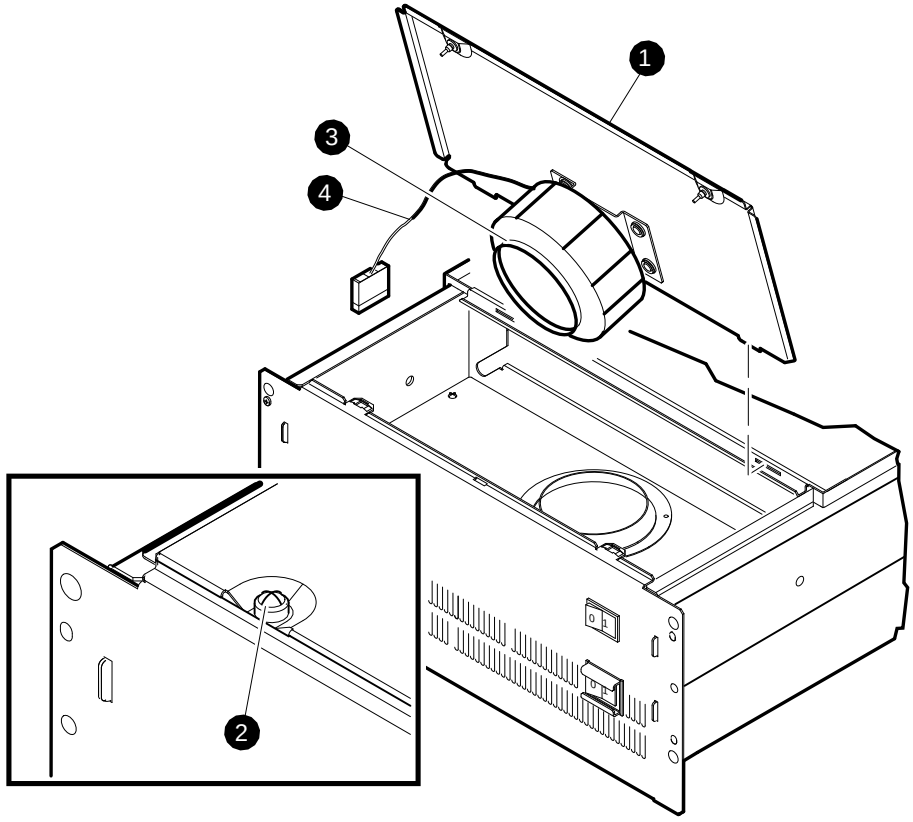
❶ Spring tab in hole

3.2.1.4 Opening/Removing the CPU Drawer Front Top Cover

Open the CPU drawer front top cover (over the blower compartment) by following the steps below. The blower is attached to the bottom of the cover (see Figure 3–8).

1. Loosen the two quarter-turn captive screws along the top edge of the top front cover with a Phillips screwdriver, and lift the front edge of the cover.
2. Unplug the keyed blower power connector from the power supply.
3. Remove the cover (with blower attached) by sliding it forward and up.
4. To close the cover, reverse the above procedures.

Figure 3–8 Opening the CPU Drawer Front Top Cover



❶ Front top cover

❷ Screws

❸ Blower

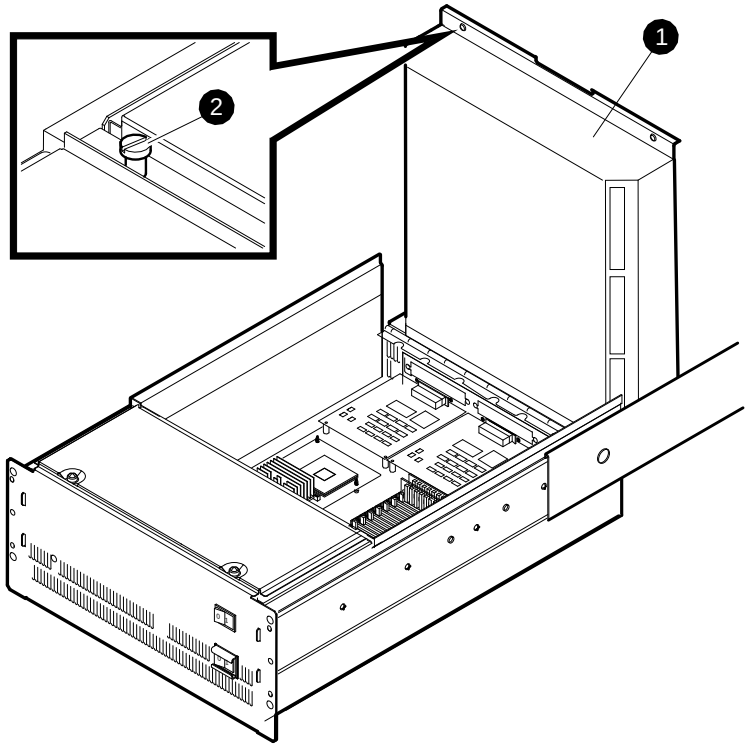
❹ Keyed blower power connector

3.2.1.5 Opening the CPU Drawer Middle Top Cover

To open the middle top cover of the CPU drawer (air plenum compartment), pull out the CPU drawer as described in Section 3.2.1. Lifting up the middle top cover will also lift the TURBOchannel Extender compartment (see Section 1.1.2.3.)

1. Using a slotted screwdriver, loosen the two captive screws along the middle edge of the top cover of the drawer (Figure 3–9).
2. Lift up the middle top cover (air plenum compartment) by grasping the handle on the top and lifting it up and back into an upright position.
3. Slide the latch to the right to hold the cover in place (see Figure 3–10).
4. To close the cover, reverse the above procedures.

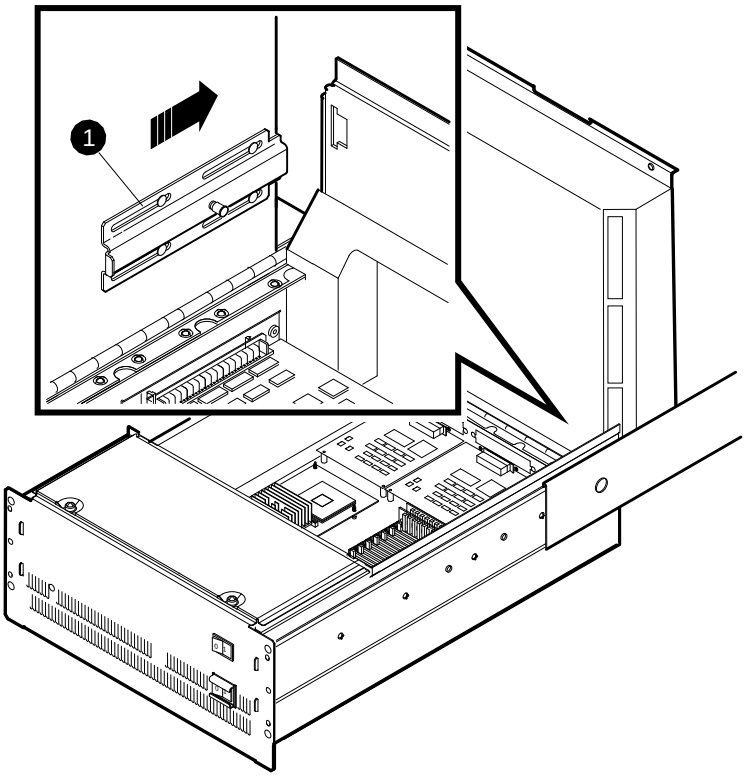
Figure 3–9 Opening the Middle Top Cover Upright



❶ Middle top cover

❷ Screws

Figure 3–10 Latching the Middle Top Cover Upright



❶ Latch

WARNING

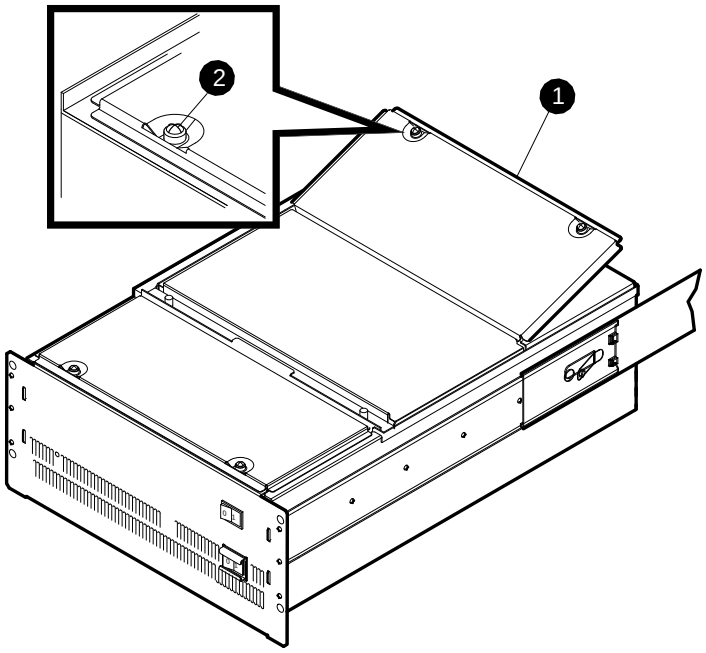
Be sure the middle top cover (air plenum compartment) is latched in an upright position before proceeding.

3.2.1.6 Opening the CPU Drawer Rear Top Cover

Open the CPU drawer rear top cover (over the TURBOchannel Extender compartment) by following the steps below (see Figure 3–11).

1. Use a Phillips screwdriver to loosen the two quarter-turn captive screws along the top edge of the rear cover of the drawer
2. Remove the cover by sliding it out to the rear.
3. To close the cover, reverse the above procedures.

Figure 3–11 Opening the CPU Drawer Rear Top Cover



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❶ Rear top cover

❷ Screws

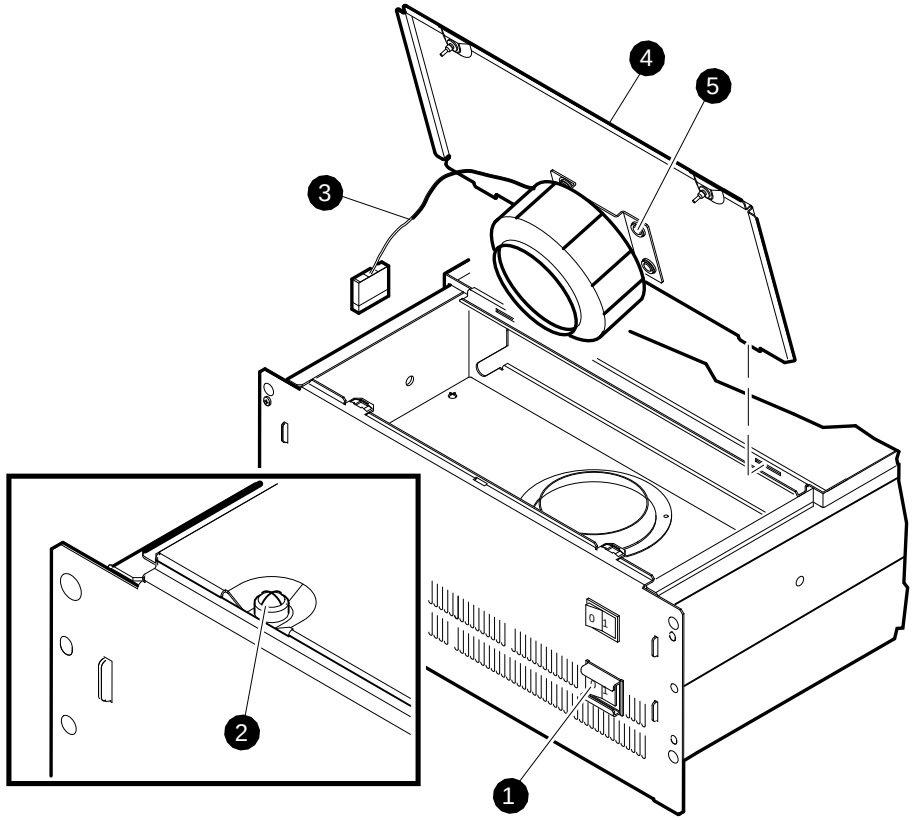
3.2.2 Removing and Replacing the CPU Blower

To remove or replace the CPU blower, follow the procedures below.

Figure 3–12 illustrates removal of the CPU blower.

1. Turn off the power to the CPU drawer (using the lower switch on the front of the drawer).
2. Pull out the CPU drawer as described in Section 3.2.1.
3. Remove the CPU drawer front top cover and unplug the keyed blower power connector (see Section 3.2.1.4). The blower is attached to the bottom of the cover.
4. Note which way the power cable faces (to ensure correct installation of the new blower with the cable facing the power supply).
5. Remove the blower from the cover by loosening the four 11/32-inch nuts, and lifting it off the four posts.
6. Disconnect the mounting bracket from the blower by removing the four Phillips screws which attach it to the blower.
7. To replace the blower, attach it to the mounting bracket, fit the bracket onto the four posts, and reverse the above procedures.

Figure 3–12 Removing the CPU Drawer Blower



❶ CPU drawer switch

❷ Quarter turn captive screws

❸ Blower power cable

❹ Front top cover

❺ Mounting bracket and screws

3.2.3 Removing and Replacing the CPU Power Supply

To remove or replace the CPU power supply, follow the steps below.

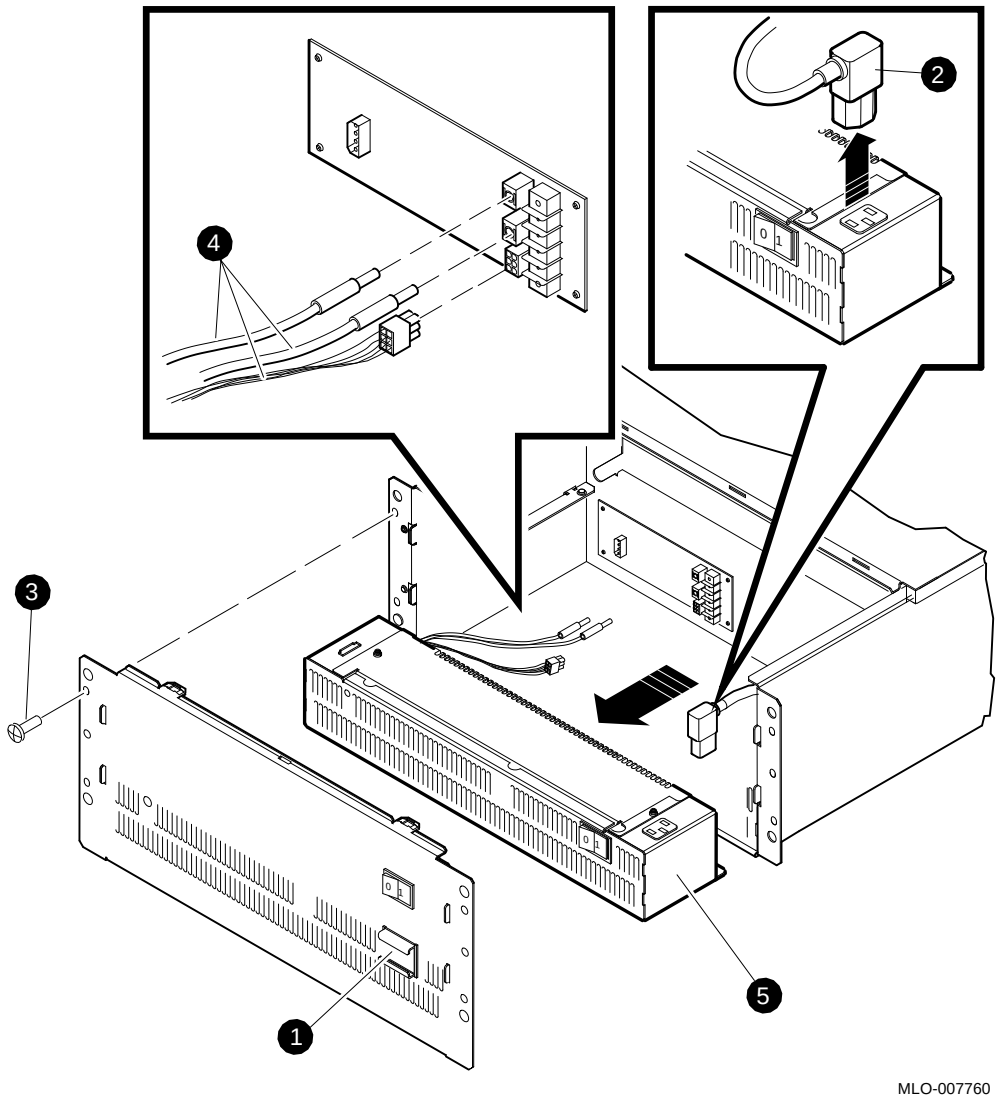
Note

There are no field serviceable parts in the power supply.

The CPU power supply is accessed by removing the front top cover of the CPU drawer and the front panel of the drawer (see Figure 3–13).

1. Turn off the power to the CPU drawer (using the lower switch on the front of the drawer).
2. Pull out the CPU drawer as described in Section 3.2.1.
3. Remove the CPU drawer front top cover and unplug the keyed power connector (see Section 3.2.1.4). The blower is attached to the bottom of the cover.
4. Unplug the ac power supply on the top right-hand side of the power supply.
5. Remove the front panel of the drawer using a Phillips screwdriver on the four screws.
6. Remove the two Phillips screws which hold the blower panel in place.
7. Disconnect the power cables from the power supply at the power distribution module; note the location of the red and black cables.
8. Pull the power supply forward and up to remove it.
9. To replace the power supply, reverse the above procedures.

Figure 3–13 Removing the CPU Drawer Power Supply



❶ CPU drawer switch
❷ AC power cord
❸ Phillips screws
❹ Power cables to power distribution module
❺ Power supply

3.2.4 Removing and Replacing the Power Distribution Module

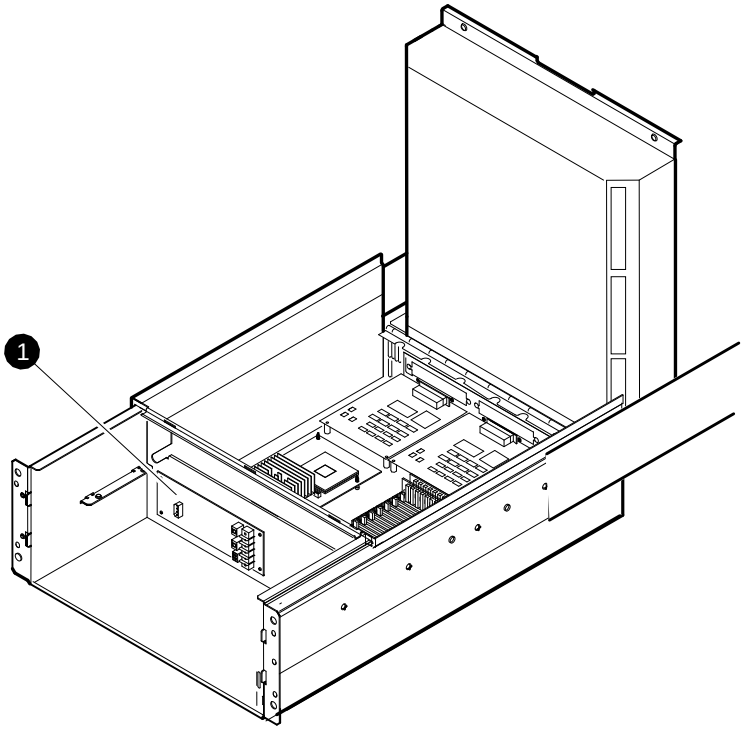
To access the module, raise the front top and middle top covers of the CPU drawer (see Section 3.2.1.4 and Section 3.2.1.5). It is not necessary to remove the front of the CPU drawer unless you wish to access the power supply as well.

To remove or replace the power distribution module, follow the procedures below.

1. Turn off the power to the CPU drawer (using the lower switch on the front of the drawer).
2. Pull out the CPU drawer as described in Section 3.2.1.
3. Remove the CPU drawer top front cover and unplug the keyed power connector (see Section 3.2.1.4). The blower is attached to the bottom of the cover.
4. Remove the front panel of the drawer using a Phillips screwdriver on the four screws.
5. Remove the two Phillips screws which hold the blower panel in place.
6. Locate the power distribution module (Figure 3–14).
7. Disconnect the cables from the power supply to the power distribution module. See Figure 3–13, ❹. (It is not necessary to remove the entire power supply.)
8. Open the middle top cover of the CPU drawer (air plenum compartment), to expose the CPU compartment (see Section 3.2.1.5).
9. In the CPU compartment, disconnect the cables from the power distribution module to the system module; note the position of the red and black cables (Figure 3–15).
10. Disconnect the keyed connector to the system module at the rear of the power distribution module (Figure 3–15).
11. Disconnect all cables from the power distribution module which run to the TURBOchannel Extender compartment; they are bundled together on the side of the drawer (Figure 3–16).

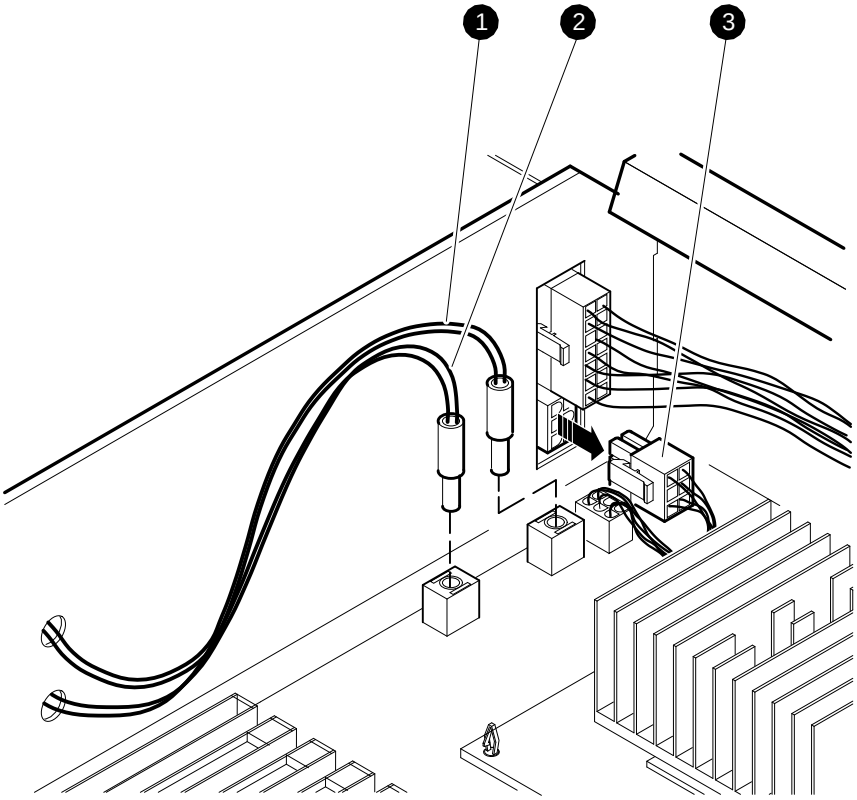
12. Gently pry the power distribution module forward from the retaining posts and thread the red and black cables through the compartment separator (Figure 3–17).
13. Replace the power distribution module by reversing the above procedures.

Figure 3–14 Locating the Power Distribution Module



❶ Power distribution module

Figure 3–15 Disconnecting the Power Distribution Module from the System Module

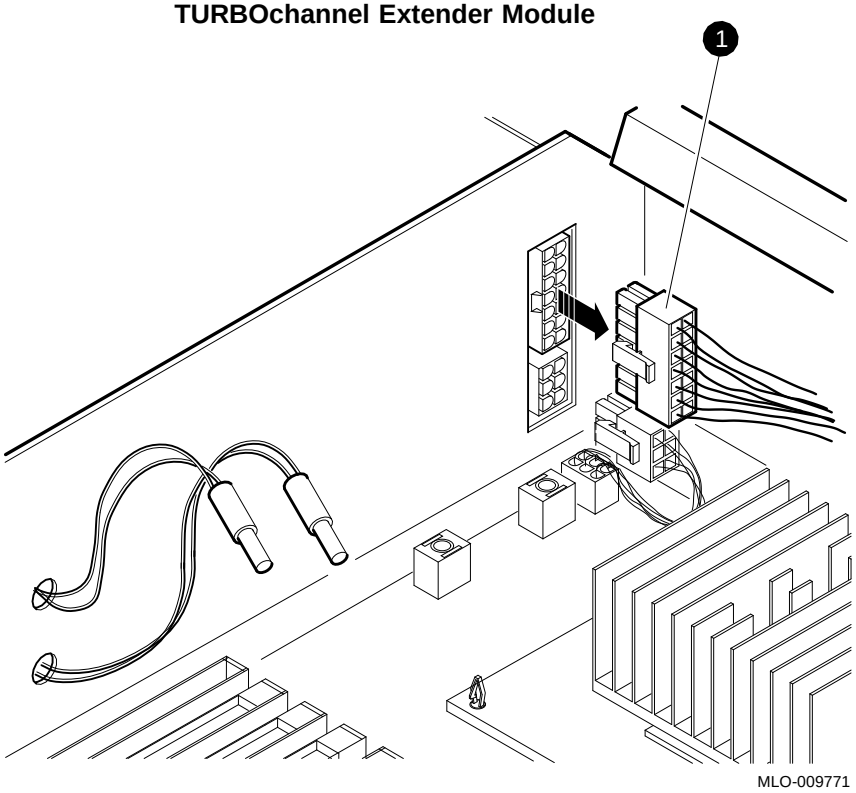


❶ Red cable

❷ Ground (black cable)

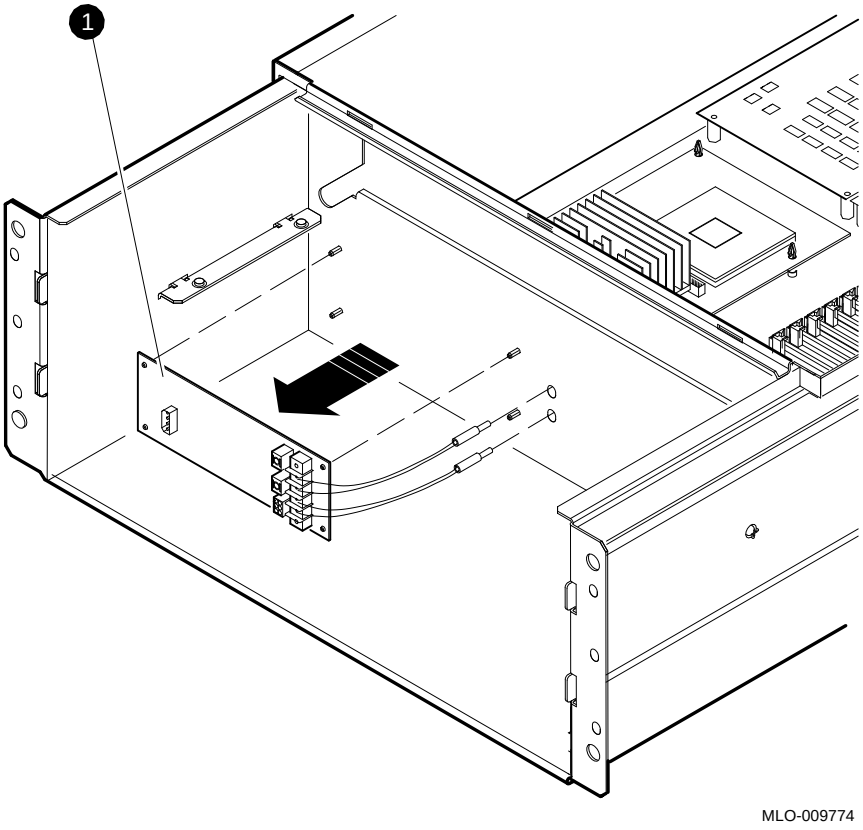
❸ Keyed system module connector

Figure 3–16 Disconnecting the Power Distribution Module from the TURBOchannel Extender Module



❶ Keyed TURBOchannel Extender module connector

Figure 3–17 Removing the Power Distribution Module



❶ Power distribution module

3.2.5 Accessing the CPU Compartment

To remove, replace, or service components in the CPU compartment, turn off the lower power switch on the front of the CPU drawer. Pull out the CPU drawer as described in Section 3.2.1 and raise the middle cover (air plenum compartment) (see Section 3.2.1.5).

WARNING

Be sure the middle top cover (air plenum compartment) is latched in an upright position before proceeding.

3.2.6 Removing and Replacing the CPU/Daughter Card

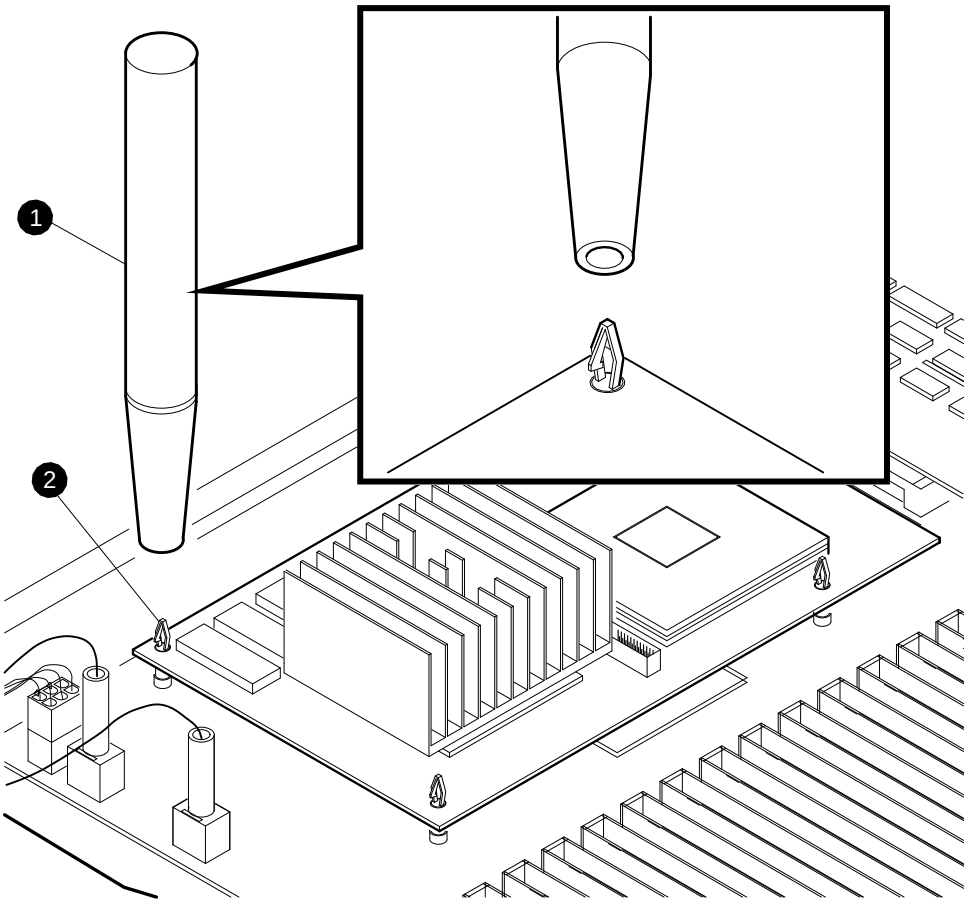
The CPU card is mounted to the system module via a connector and four plastic mounting posts (standoffs). The standoffs have small tabs that lock onto the CPU card. A standoff tool is included in CPU upgrade kits to remove the CPU/daughter card from the standoffs. Handle the card by the edges, not by the heat sinks.

3.2.6.1 Removing the CPU/Daughter Card

Remove the CPU/daughter card as follows (see Figure 3–18):

1. Use the standoff tool (12–46254–01) to press the tabs on a standoff. Gently pull up on the edge of the CPU card nearest that post.
2. Repeat for the remaining three standoffs.
3. When the CPU card is free of the standoffs, grip it by the edges of the card near both ends of the connector located underneath, and gently rock it free of the connector.

Figure 3–18 Removing the CPU/Daughter Card



MLO-009777

❶ Standoff tool

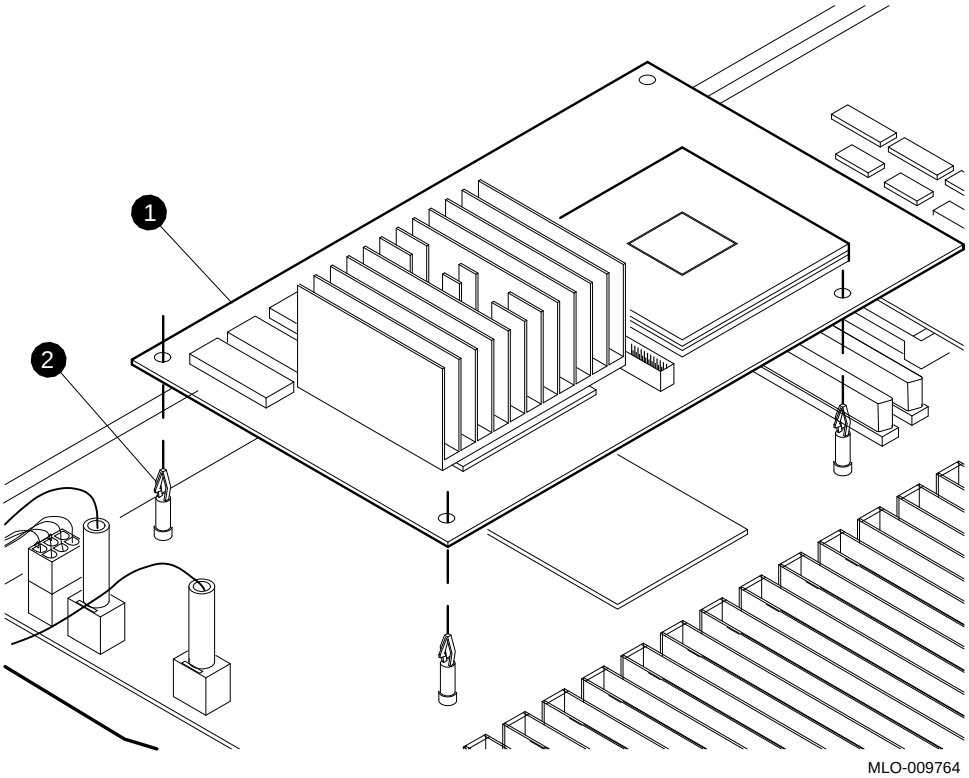
❷ Standoff

3.2.6.2 Installing the CPU/Daughter Card

Replace the CPU/daughter card as follows (see Figure 3–19):

1. Position the CPU card so that its connector is aligned over the CPU card connector on the base system module. Align the four holes in the CPU card over the four mounting posts (standoffs).
2. Gently apply even pressure on the edges of the CPU card so that the connector and standoffs seat firmly.

Figure 3–19 Installing the CPU/Daughter Card



❶ CPU/daughter card

❷ Standoff

3.2.7 Memory Options

There are two memory options which may be located in the CPU drawer:

- MS02–CA (up to 14 modules; two modules are standard)
- NVRAM (one module; in slot 14 only)

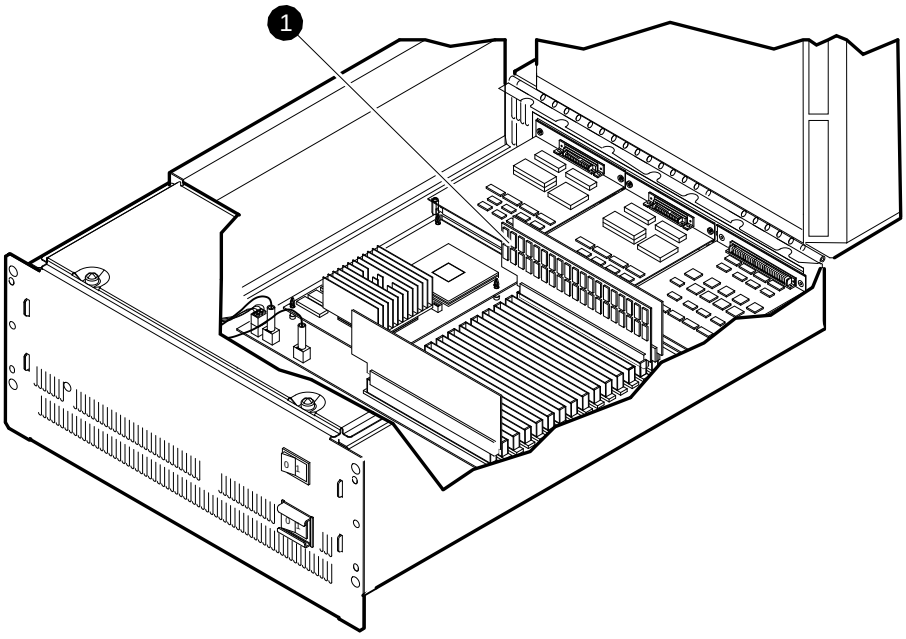
Both are located in the CPU compartment itself; to access them, pull out the CPU drawer as described in Section 3.2.1 and raise the air plenum compartment (see Section 3.2.1.5).

3.2.7.1 MS02–CA

The MS02–CA memory is sequentially located in memory slots marked 0–13, starting with slot 0.

To remove an MS02–CA module, grasp it on each end and gently pull up on each end (see Figure 3–20). The module connectors are “keyed” to fit only the correct way.

Figure 3–20 Removing the MS02–CA Memory Module



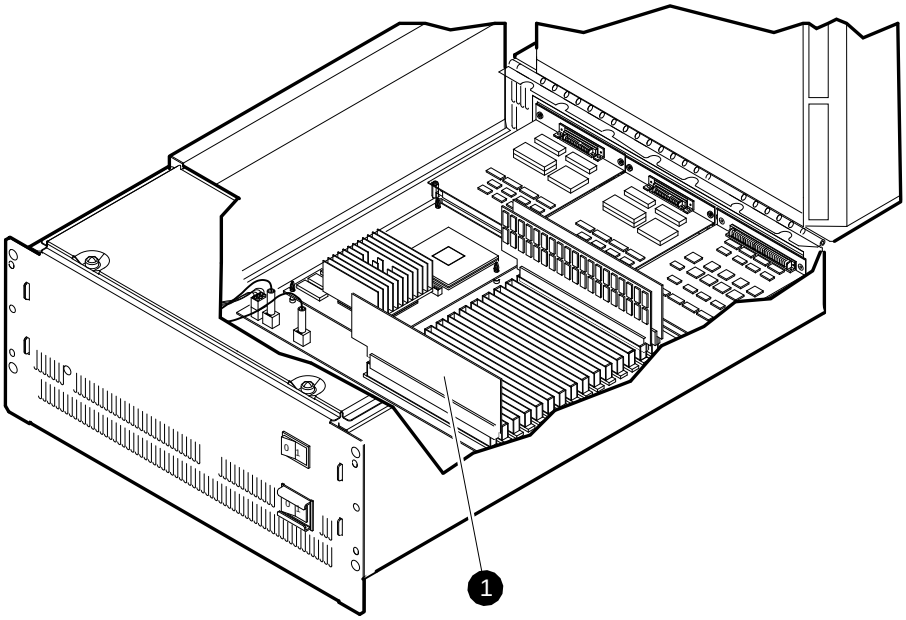
❶ MS02–CA memory modules (two standard; optional up to fourteen)

3.2.7.2 MS02–NV

The 1-Mbyte NVRAM array (MS02–NV) is *always* to be located in memory slot 14. This slot may *only* be used for the NVRAM module.

To remove the MS02–NV module, grasp it on each end and gently pull up on each end (see Figure 3–21). The module connectors are "keyed" to fit only the correct way.

Figure 3–21 Removing the MS02–NV Module



MLO-009776

❶ MS02–NV (NVRAM) module

3.2.8 Removing and Replacing the TURBOchannel Options

Note

The following procedures apply to the removal and replacement of all TURBOchannel slot options, including (but not limited to):

- TURBOchannel Extender Adapter
- PMAD
- PMAZ
- DEFZA
- VME
- DEC WANcontroller 720
- CITCA

The procedures for removal and replacement of TURBOchannel options is the same whether they are located on the system module or on the TURBOchannel Extender.

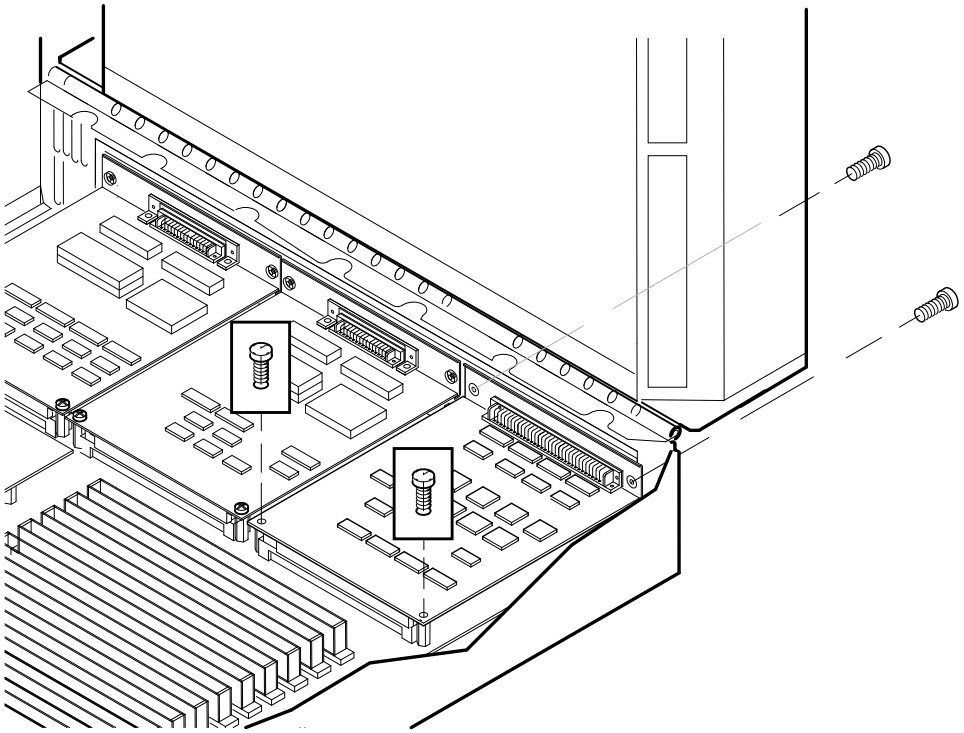
Some TURBOchannel options occupy more than one slot. They are connected to each of the slots in essentially the same manner as the single-slot TURBOchannel options; that is, as if they were two single-slot options or one triple-slot option, and are removed accordingly. An illustration of each is provided for identification.

To remove a TURBOchannel option:

1. Disconnect the signal bus through the rear of the CPU compartment to the drawer or device.
2. From the outside of the drawer, remove the Phillips screws (two for each slot the option occupies) holding the module to the rear of the drawer.
3. Remove the Phillips screws (two for each slot the option occupies) which point downward through the module into the mounting posts on the system module.
4. Gently pry the module up from its connector(s) and retaining posts.

Figure 3–22 depicts a typical one-slot TURBOchannel option (the TURBOchannel Extender Adapter) being removed from the system module; two- and three-slot options would be removed in the same manner. Outlines of the various options are depicted in Section 3.2.8.1.

Figure 3–22 Removing a TURBOchannel Option



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3.2.8.1 Illustrations of Typical TURBOchannel Options

Figure 3–23 depicts the shape of typical one-slot TURBOchannel options and screw fasteners, such as PMAD, PMAZ, DEFZA, and VME modules.

Figure 3–23 PMAD TURBOchannel Option

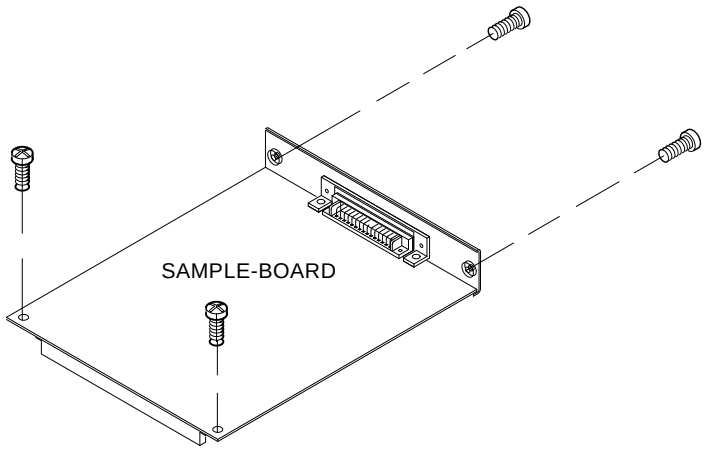


Figure 3–24 depicts the shape of a DEC WANcontroller 720 and its screw fasteners. The DEC WANcontroller is a one-slot option which contains two modules.

Figure 3–24 DEC WANcontroller 720 TURBOchannel Option

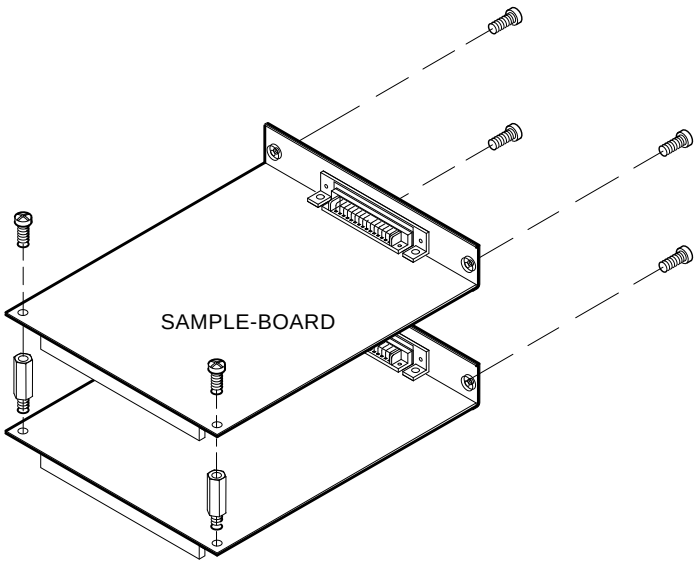
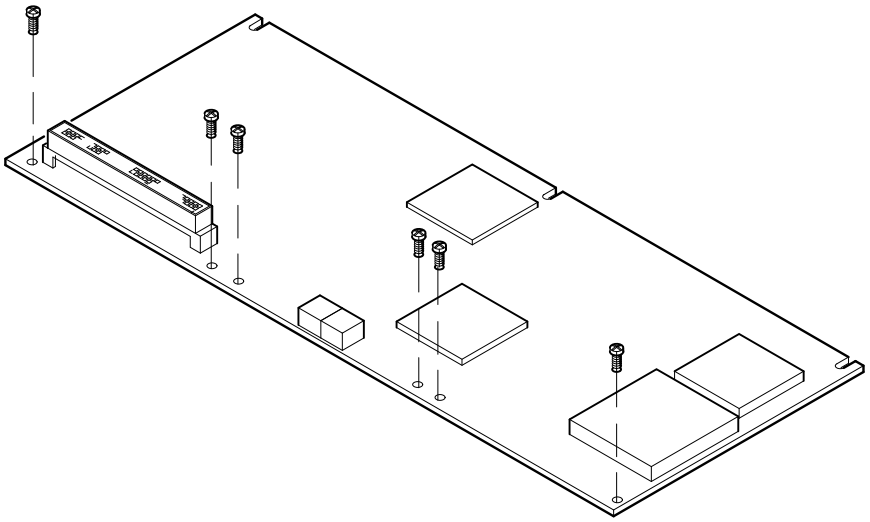


Figure 3–25 depicts the shape of a three-slot option such as CITCA, and its screw fasteners.

Figure 3–25 CITCA TURBOchannel Option



3.2.9 System Module

In order to remove the system module, it is first necessary to remove the CPU/daughter card and any TURBOchannel or memory option modules or blank panels which are part of the configuration. For instructions on the removal of the CPU/daughter card and options, refer to the applicable section indicated in Table 3–2.

Table 3–2 CPU Compartment Modules and Location in This Manual

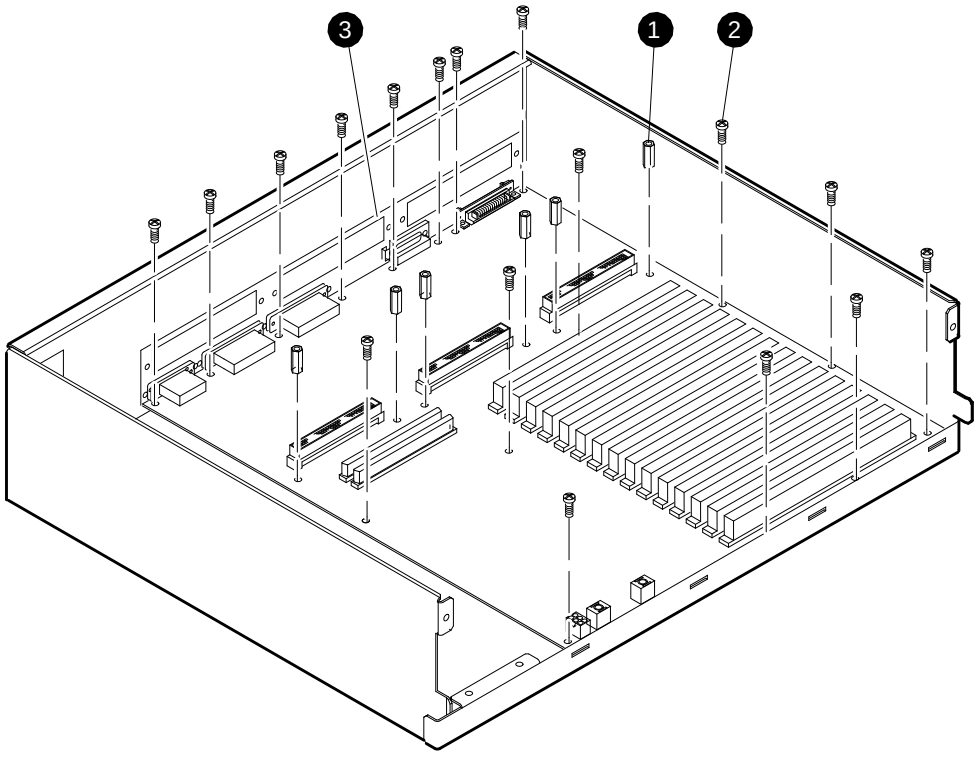
Module	Section
System module	Section 3.2.9
CPU/daughter card	Section 3.2.6
MS02–CA module(s)	Section 3.2.7.1
MS02–NV module	Section 3.2.7.2
TURBOchannel options	Section 3.2.8
Blank panels	Section 3.2.9.3

3.2.9.1 Removing and Replacing the Stiffener for Shipping the System Module

The DECsystem 5900 system module spare is shipped in a protective metal "stiffener" which is removed prior to installation. The replaced system module is returned to the repair center for credit after being installed in the stiffener for protection during shipment.

The stiffener is used as a chassis in another system. Remove all screws and carefully pry the module up from the standoff posts. Take care not to damage the metal gasket. Figure 3–26 depicts the system module as it is shipped in the stiffener.

Figure 3–26 System Module in the Stiffener



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❶ Standoff post

❷ Screw

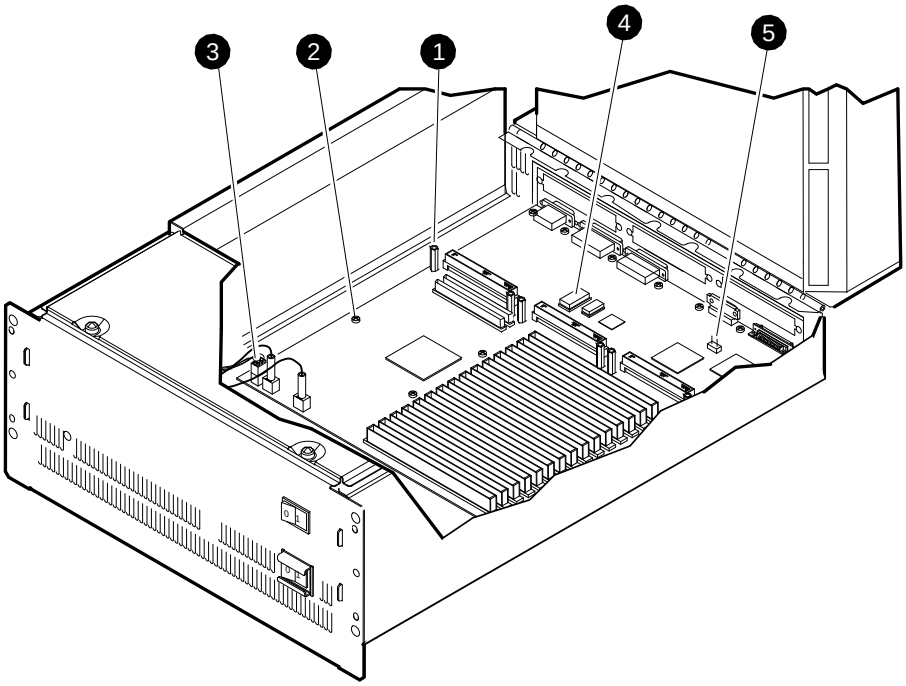
❸ Metal gasket

3.2.9.2 Removing and Replacing the System Module

To remove and replace the system module, follow the procedures below. See Figure 3–27.

1. Disconnect all signal and power leads to and from the CPU compartment and options and note their position for installation of the new module.
2. Remove the CPU/daughter card (see Section 3.2.6).
3. Remove the MS02–CA module(s) (see Section 3.2.7 and Section 3.2.7.1).
4. Remove the NVRAM module (see Section 3.2.7 and Section 3.2.7.2).
5. Remove other TURBOchannel options (see Section 3.2.8).
6. Remove the blank panels where no TURBOchannel options are present (see Section 3.2.9.3).
7. Remove the 3/16-inch screws and standoffs holding down the system module.
8. Gently remove the module by sliding forward and up.
9. Remove the new system module from the stiffener in which it is shipped (see Section 3.2.9.1).
10. To install the new system module, complete the steps below, then reverse the above procedures.
    a. Using standard chip swapping procedures, swap the Ethernet Station address ROM (ESAR) DIP chip from the old module (located under TURBOchannel slot 1 toward the rear) and place it on the new module in the exact same position.
    b. Remove the system ID jumper (if it is installed), located in the TURBOchannel option slot 0 area. The system ID jumper is always out for the DECsystem 5900 system.
    c. Place the old system module in the stiffener for shipment to the repair center (see Section 3.2.9.1.) To avoid damage to the old system module, reuse all the hardware which held the replacement in the stiffener.

Figure 3–27 Removing the System Module



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❶ Standoffs

❷ Screws

❸ Cables

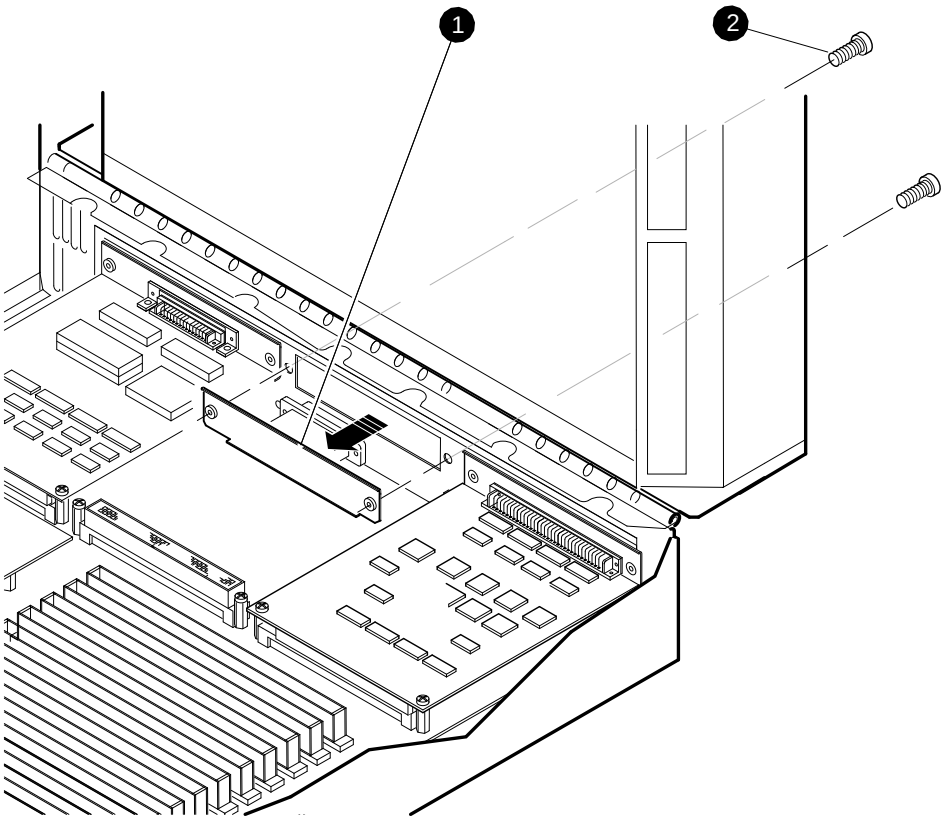
❹ ESAR chip

❺ System ID jumper

3.2.9.3 CPU Compartment Blank Panels

If any of the three TURBOchannel option openings in the rear of the CPU compartment is not in use, there will be a blank panel covering the opening(s). It is necessary to remove the blank panel(s), since they hold the FCC-compliant shield in place. The shield is an integral part of the system module, and is removed with it (see Figure 3–28).

Figure 3–28 Removing CPU Compartment Blank Panels



❶ Blank panel

❷ Screws

3.2.10 Removing and Replacing the TURBOchannel Extender Module

To service the TURBOchannel Extender module, pull out the CPU drawer as described in Section 3.2.1 and open the rear top cover of the drawer (Section 3.2.1.6).

Figure 3–29 illustrates removal of the TURBOchannel Extender module.

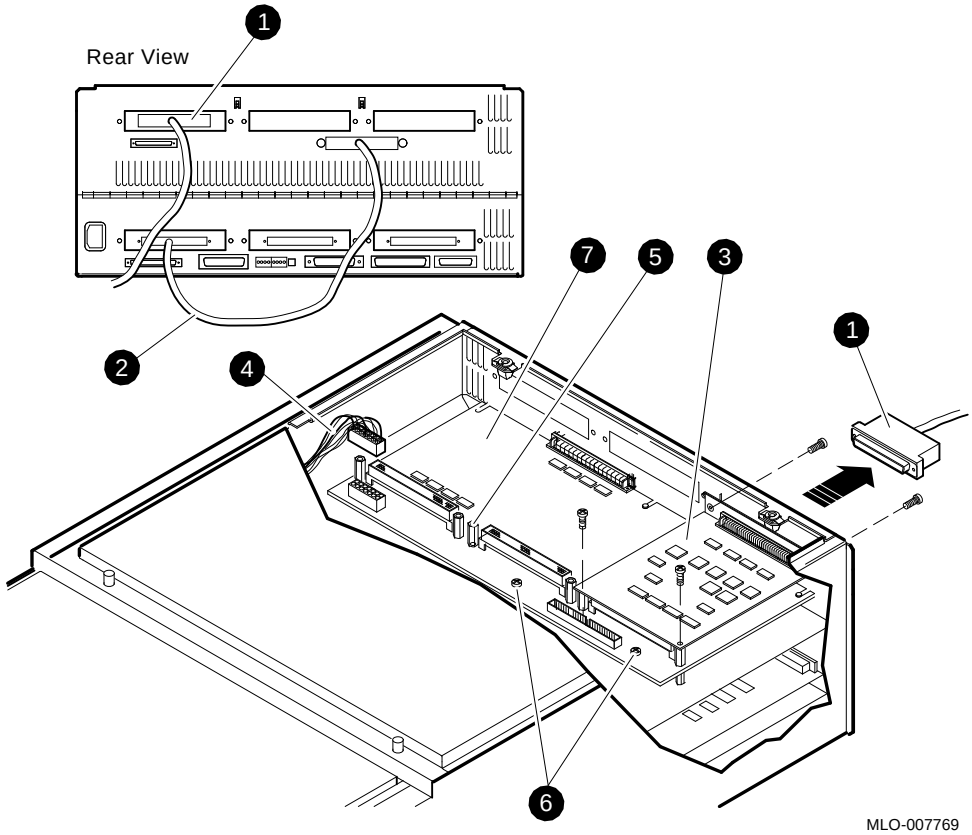
1. Turn off the power to the CPU drawer (using the lower switch on the front of the drawer).
2. Pull out the CPU drawer (see Section 3.2.1).
3. Remove the CPU drawer rear top cover (see Section 3.2.1.6).
4. Disconnect the signal leads to TURBOchannel devices through the rear of the TURBOchannel Extender compartment to drawers or devices.
5. Disconnect the 18-inch cables connecting the TURBOchannel adapter and the TURBOchannel Extender.
6. Remove any option modules attached to the TURBOchannel Extender. (Options are removed in the same manner as options on the system module; see Section 3.2.8.)

Note

To remove the TURBOchannel Extender module, it is not necessary to remove any blank panels from the TURBOchannel Extender module compartment. (It *is* necessary to remove them from the *CPU compartment* when removing the *system module*.)

7. Remove the power connector.
8. Remove the six hex standoffs which attach to the TURBOchannel options.
9. Remove the two screws along the rear of the TURBOchannel Extender module.
10. Slide the module toward the front of the drawer and off the three permanent hold-down slot posts along the rear of the module.
11. To replace the TURBOchannel Extender module, reverse the procedures above.

Figure 3–29 Removing the TURBOchannel Extender Module



❶ Signal lead to SCSI device(s)

❷ System module bus to TURBOchannel Extender

❸ Sample TURBOchannel option module (may be up to three)

❹ Power connector

❺ Standoffs

❻ Screws

❼ TURBOchannel Extender module

3.3 Removing and Replacing the Entire CPU Drawer/CPU Drawer Upgrade

Use the following procedures to remove and replace an entire CPU drawer.

3.3.1 Balancing the System

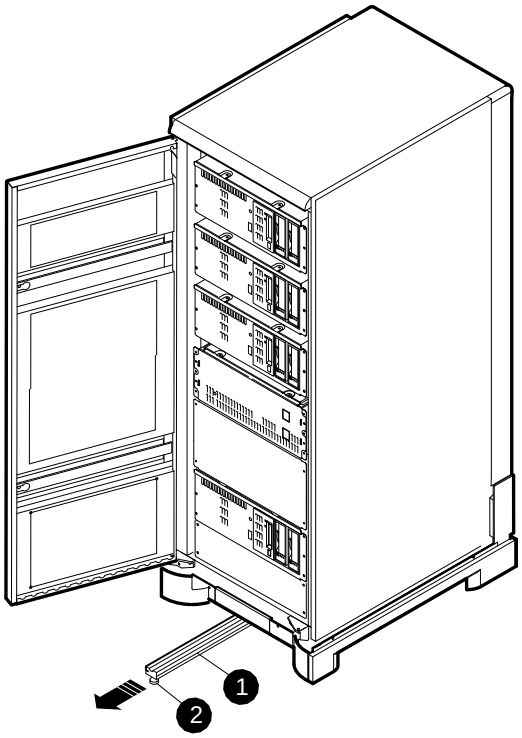
WARNING

Before installing or pulling out either the CPU or a mass storage drawer, the stabilizer bar located at the bottom front of the enclosure must be extended to balance the DECsystem 5900 system.

Balance the system by extending the stabilizer bar located at the bottom front, as depicted in Figure 3–30.

1. If the leveler foot is tightened down to the floor, raise it.
2. Pull the stabilizer bar out until it stops.
3. Screw the leveler foot down firmly by hand.
4. To retract the arm, reverse these procedures.

Figure 3–30 Stabilizing the Enclosure



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❶ Stabilizer bar

❷ Leveler foot

WARNING

The CPU drawer weighs 65 pounds when fully populated. At least two people are required to remove or replace a drawer in the DECsystem 5900 system.

Use the following procedures to remove and replace a CPU drawer (see Figure 3–31). To install the slides the CPU drawer rides on, see Section 3.3.3.2.

1. Clear a workspace for the unattached drawer.
2. Turn off the power to the CPU drawer (using the lower switch on the front of the drawer).

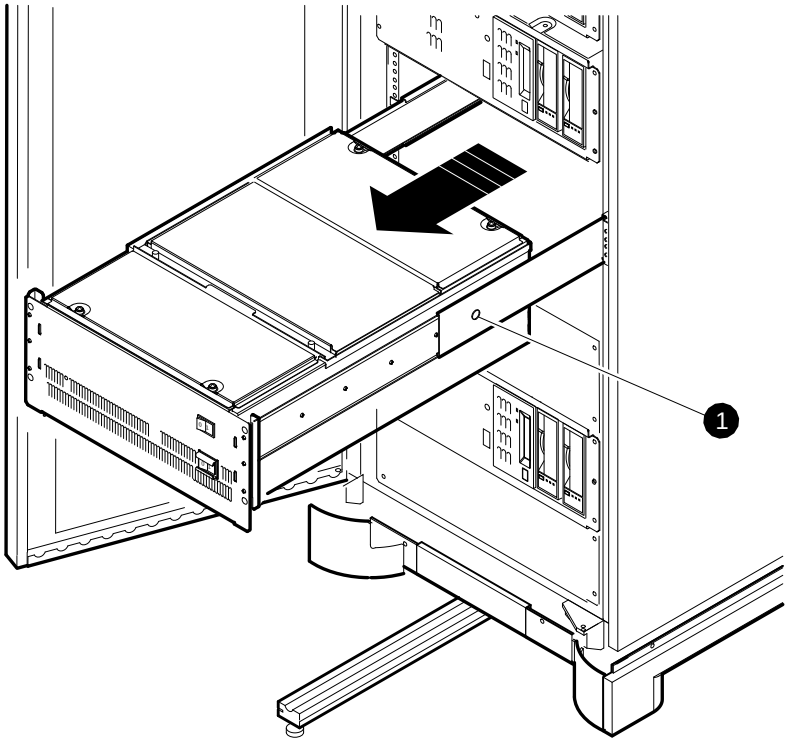
3. Unplug all cables and buses from the back of the drawer (they will be threaded through the cable arm); take note of where each is attached for future reference. (If you must also remove the cable arm, see Section 3.3.2).
4. Pull out the CPU drawer as described in Section 3.2.1.3.
5. Push in (toward the drawer) on the round tabs which prevent accidental removal of the drawer.
6. While holding the tabs in, carefully pull the drawer out past the point where the tabs engage.

WARNING

The drawer is now free to move past the ends of the slide.

7. With the help of another, pull the drawer all the way out to the end of the slides to the point where you are bearing the full weight of the drawer manually (pull it straight forward off the slides), and place it on the workspace.
8. Push in the tabs on the drawer slides and move them back into the cabinet for safety.
9. When you are ready to replace the drawer, pull out the slides until they latch open, and reverse the above procedures (see Section 3.2.1.3).

Figure 3–31 Removing the CPU Drawer



❶ Spring tab in hole

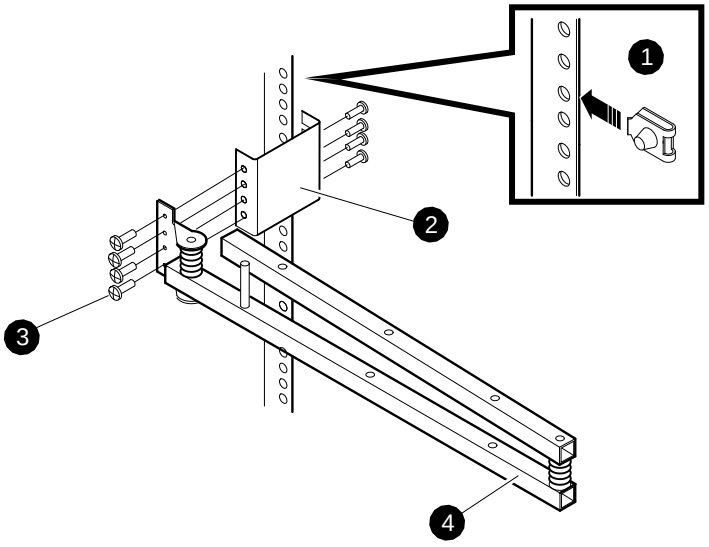
3.3.2 Removing the Cable Arm

Use the following procedure to remove the cable arm (accessed through the rear door of the DECsystem 5900 system). If possible, leave the cables tie-wrapped to the arm for remounting. (If this is not possible, note how they are wrapped before removing them.)

Figure 3–32 shows the cable arm without the tie-wrapped cables for clarity.

1. Leaving the cable arm attached to the bracket, remove the bracket from the rail. This is accomplished by removing only the hex screws which attach to the cabinet rails. (The bracket and cables are still attached to the arm.)
2. Remove the U-nuts from the rail to use in remounting the cable arm bracket.
3. To replace the cable arm, reverse these steps.

Figure 3–32 Removing the Cable Arm



❶ U-nuts

❷ Bracket

❸ Hex screws

❹ Cable arm

3.3.3 Removing the CPU Drawer Slides

Remove the CPU drawer slides from the cabinet by loosening the hex screws and four-holed fasteners which attach the front flange and the rear bracket of the slide to the front and rear cabinet rails, respectively. These are illustrated in Figure 3–33 and Figure 3–34, which depict the assembly and installation of the slides.

3.3.3.1 CPU Drawer Location

The placement of the drawers may be determined by counting the holes in the cabinet rails, beginning on the top and counting down. The location of drawers is described in Table 3–3.

Table 3–3 Drawer Locations on the Cabinet Rails

Cabinet Slot	Typical Application	Hole Numbers (from the Top)
6	Mass storage	5–8
5	Mass storage	20–23
4	Mass storage	35–38
3	CPU	50–53
2	CPU	65–68
1	Mass storage	80–83
0	Power controller	N.A.

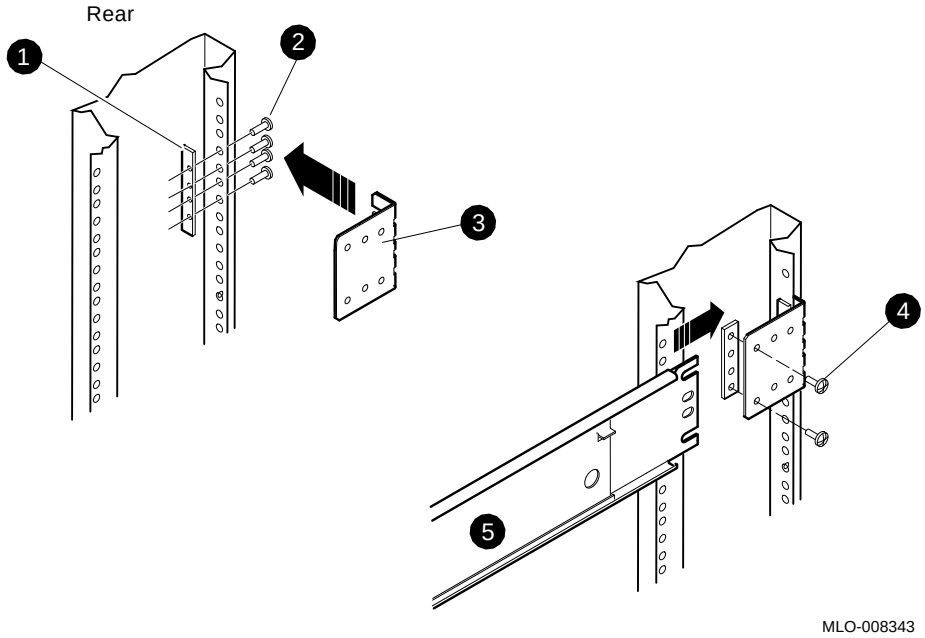
3.3.3.2 Slide Assembly

Assemble and attach the slides to the cabinet in the appropriate location using the following procedures (see Figure 3–33 and Figure 3–34). For the numbering of cabinet rail holes, see Table 3–3.

1. Place the screws and four-holed fasteners loosely on both the front and rear cabinet rails (see Figure 3–33 and Figure 3–34). Do not tighten the screws until the slide is mounted in the following steps.
2. Place the rear bracket on the rear cabinet rail using the screws and four-holed threaded fastener (see Figure 3–33). Do not tighten the screws until you complete the following steps.
3. Loosely attach the front flange of the slide to the screws and four-holed threaded fastener (see Figure 3–34).

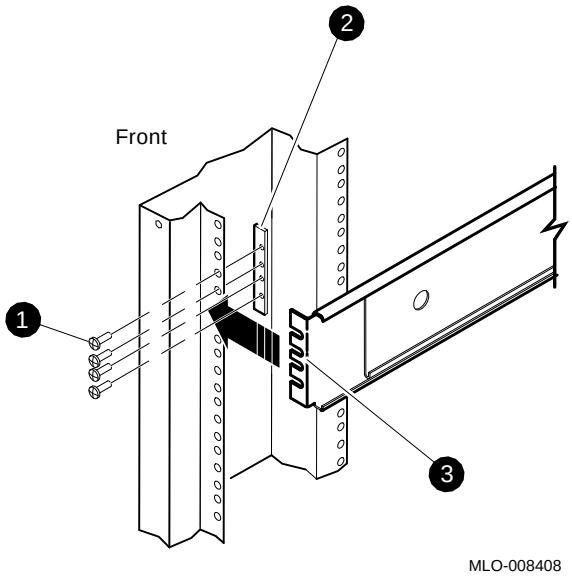
4. Place the rear of the slide in the rear bracket, adjust to the exact length of the cabinet, and loosely attach using screws and a four-holed threaded fastener (Figure 3–33).
5. Seat the front flange of the slide and the rear bracket (now attached to the slide) firmly and squarely against the cabinet rails and tighten them to the cabinet with the screws and fasteners already in place.
6. Tighten the rear of the slide to the bracket.
7. Repeat these steps for the other slide.

Figure 3–33 Attaching the Rear Bracket and Slides to the Cabinet



❶ Four-holed threaded fastener
❷ Hex screws
❸ Rear slide bracket
❹ Hex screws
❺ Slide

Figure 3–34 Attaching the Front of the CPU Slides to the Cabinet



❶ Hex screws

❷ Four-holed threaded fastener

❸ Front flange of slide

3.3.4 Balancing the System

WARNING

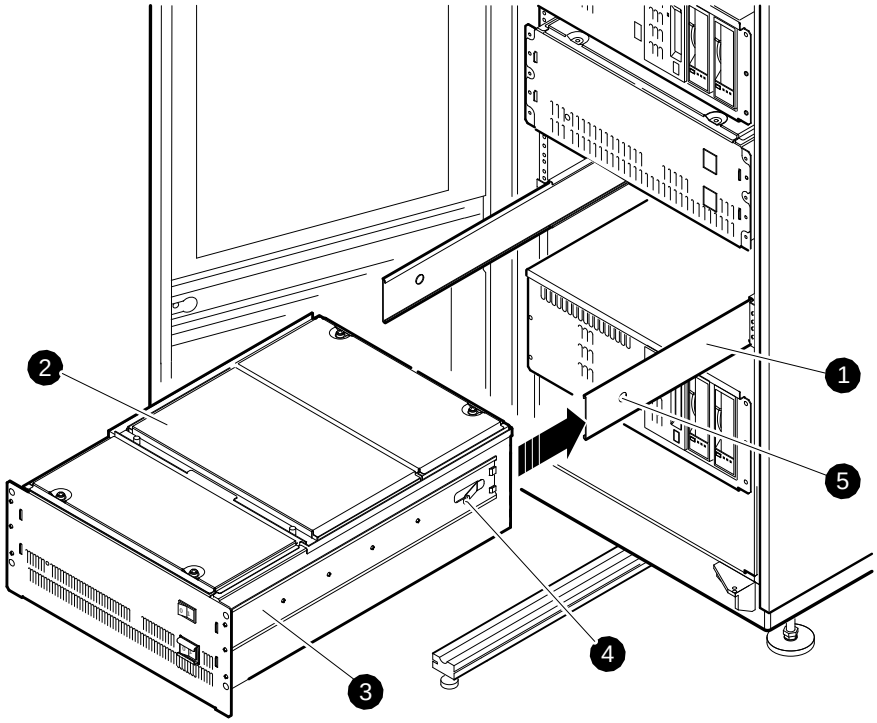
Before installing or pulling out either the CPU or a mass storage drawer, the stabilizer bar located at the bottom front of the enclosure must be extended to balance the DECsystem 5900 system.

3.3.5 Installing the Drawer in the Cabinet

To install the drawer in the cabinet, use the following procedures:

1. Pull the slides (now installed in the cabinet) out until they are fully extended. A “click” will be heard when the outer slide button tabs have latched (see Figure 3–35).
2. Using two people, lift the CPU drawer up and insert the inner slides (attached to the drawer) into the extended slides. Push in until firm pressure is felt, indicating that the button tab on the inner slide (attached to the CPU drawer) is tight against the end of the middle slide.
3. Push in on each of the inner slide button tabs, and continue to push in on the drawer until the button tabs on the inner drawer “click” outward through the holes in the middle drawer slide, indicating that the drawer is securely fastened in its extended position.

Figure 3–35 Installing the CPU Drawer



❶ Middle slide section

❷ CPU drawer

❸ Inner slide

❹ Inner slide button tab

❺ Middle slide holes

3.3.6 Pushing In the Drawer

To push in the CPU drawer, see Section 3.2.1.3.

3.3.7 Connecting the Drawer

Consult with the customer/system manager to determine the configuration desired. If you are replacing a CPU drawer without modification of the system configuration, all cables and buses are connected as they were previously. If changes are to be made (options added, connected to different TURBOchannel ports and so on) refer to Figure 1–7, which identifies all ports on the rear of the CPU drawer, and connect them as desired.

3.3.8 Installing a Dual (Second) CPU Drawer

Refer to the *DECsystem 5900 Dual CPU Drawer Installation Manual*, EK–DECDU–IN. A01 for information on installation of the dual CPU drawer upgrade.

4

Mass Storage FRU Removal and Replacement

This chapter describes how to remove and replace the storage device field-replaceable units (FRUs) in the DECsystem 5900 system.

The following sections describe the removal procedure for each FRU. Unless otherwise specified, you can install a FRU by reversing the steps in the removal procedure.

System-specific FRU procedures vary slightly due to varying configurations. As a result, some illustrations of procedures show an *example* of a FRU removal. The variations are noted in the text and in the title of the illustration.

WARNING

Turn off the system power before you remove or install FRUs (see Section 2.3.2).

Caution

- Only qualified service personnel should remove or install FRUs.
- Static electricity can damage integrated circuits. Always use a grounded wrist strap and a grounded work surface (29–26246) when working with the internal parts of a computer system.
- Shut down ULTRIX in an orderly fashion before you remove or install FRUs; the FRU removal and replacement procedures in this document assume that ULTRIX has been shut down first.

4.1 Accessing the Enclosure and Mass Storage Drawers

The enclosure doors are opened with a 1/4-inch hex wrench (see Figure 3–1 and Figure 3–2).

4.1.1 Enclosure Cables

The DECsystem 5900 system is shipped from the factory complete with power cables for a full complement of four mass storage drawers, regardless of the number of drawers initially ordered.

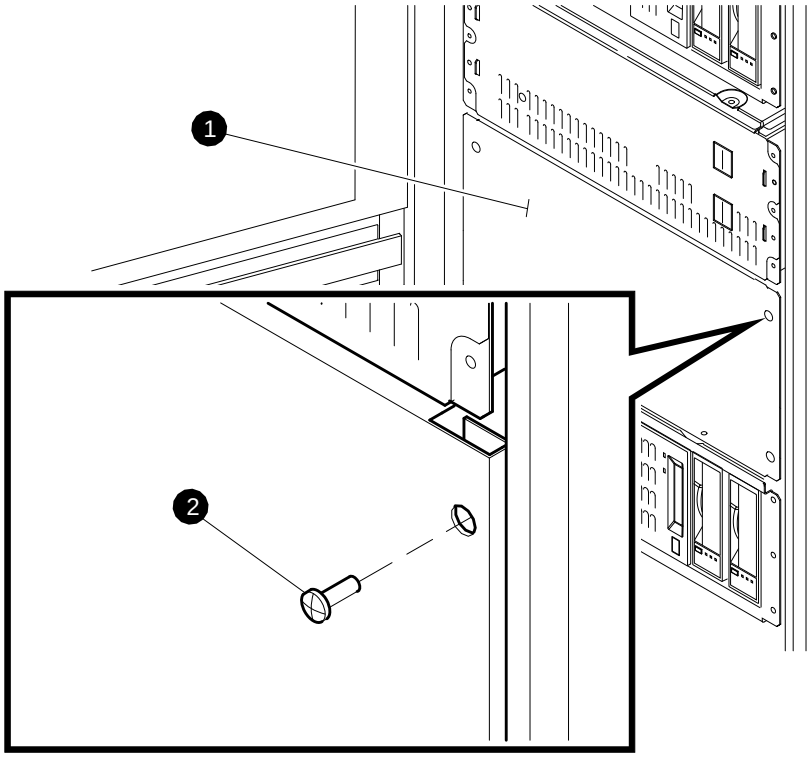
Power and SCSI cables are attached to the HA900 enclosure with wire ties. If it becomes necessary to replace a cable, remove the wire ties, swap the appropriate cable, and replace the ties.

4.1.2 Removing and Replacing Drawer Filler Panels

Slots in the DECsystem 5900 enclosure front that contain no drawers will be covered with a filler panel. Slot 0, which contains the power controller (accessed through the rear of the enclosure), has a filler panel as well.

Filler panels are attached to the front cabinet rails by means of four hex screws, two on each side. Remove the filler panels for slots being filled by inserting a screwdriver through the access holes and removing the hex screws (see Figure 4–1). Save the panel for future use by storing it in the accessory kit.

Figure 4–1 Removing Filler Panel(s)



❶ Filler panel

❷ Hex screw

4.2 Pulling Out/Pushing In a Mass Storage Drawer

WARNING

- **Before accessing either the mass storage drawers or the CPU drawer, the stabilizer bar located at the bottom front of the enclosure must be extended to balance the DECsystem 5900 system (see Section 3.2.1.2).**
- **Do not pull out more than one drawer at a time.**

All mass storage devices and power supplies can be serviced without removing a mass storage drawer from the cabinet. A step ladder or stool is required to service the upper drawers in a DECsystem 5900 system.

There are two versions of mass storage drawers; they are accessed and pulled out in much the same manner, but are *opened* differently. Illustrations in this section depict accessing and pulling out a typical mass storage drawer; the one you are working on may differ slightly.

When you are ready to open the top cover of the drawer, you will need to identify which version you have, and locate the specific instructions for opening that version. For a description of each version of the mass storage drawer and where to locate the information, see Section 4.3 and Table 4–1.

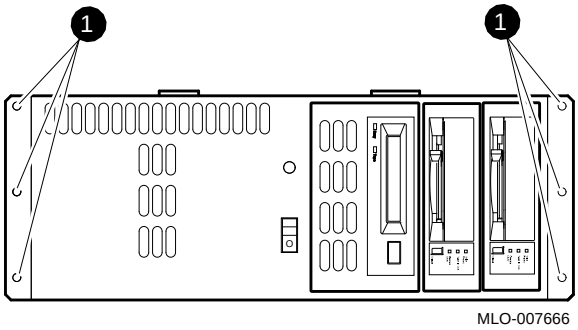
Note

Some mass storage drawers in a DECsystem 5900 system are fixed to the enclosure for shipment by rear retainer brackets which are removed during installation. If they are still in place, see Section 2.2.5 before proceeding.

4.2.1 Removing the Hex Screws

To pull out a mass storage drawer, remove the six hex screws on the front of the drawer with either a screwdriver or a 5/16-inch wrench (Figure 4–2 shows the location on a typical drawer).

Figure 4–2 Removing Drawer Front Hex Screws



❶ 5/16-inch hex screws

4.2.2 Sliding the Drawer In and Out

Grasp both sides of the drawer's front edge and slide the entire drawer forward from the enclosure until a "click" is heard. This means that the spring mechanism on either of the drawer's slides has sprung out slightly to engage and lock the drawer in position. Check to see that both sides are engaged; if not, pull the drawer out carefully until the remaining one engages (Figure 4–3).

Some mass storage drawers have a catch (highlighted in Figure 4–3) which must be pushed up to move the drawer out to the point at which the spring tabs engage.

To push in a mass storage drawer, reverse the procedure (see Figure 4–4).

Figure 4–3 Pulling Out a Mass Storage Drawer

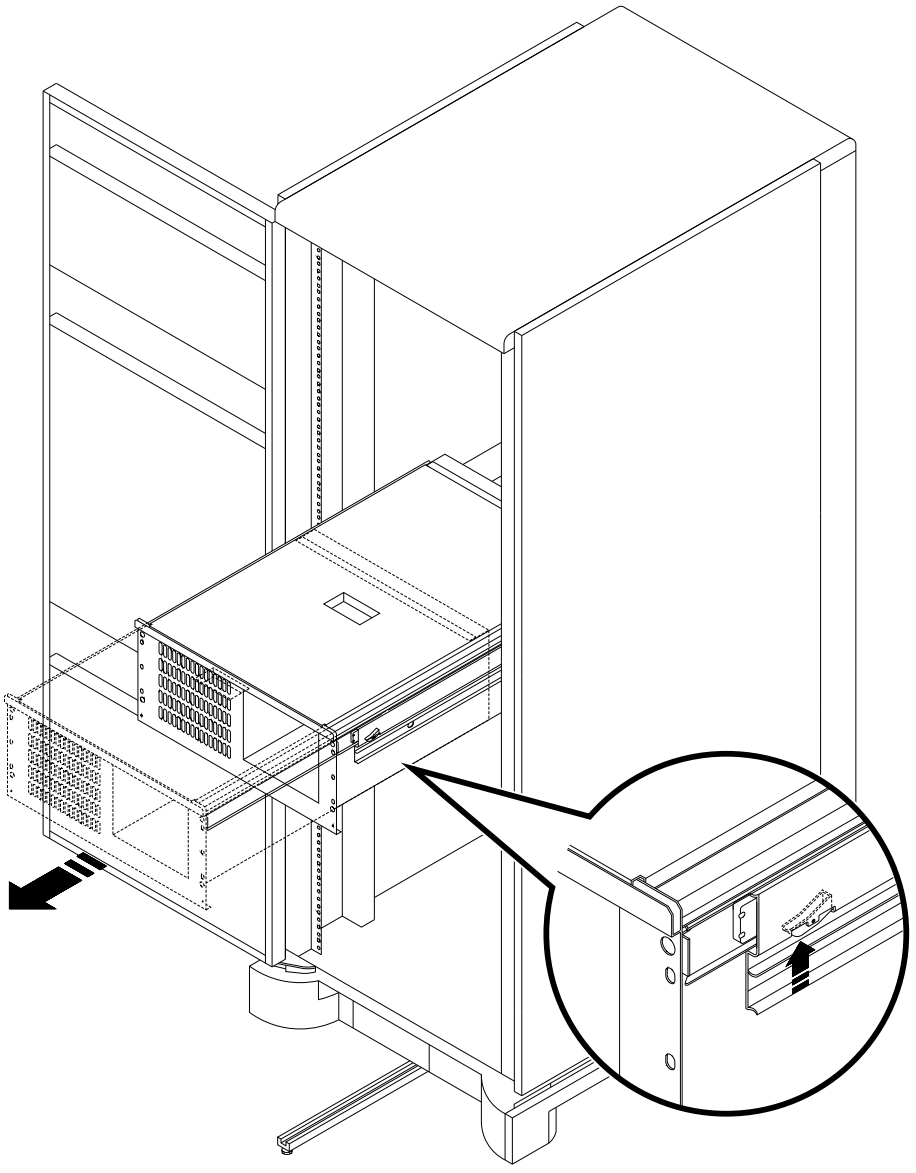


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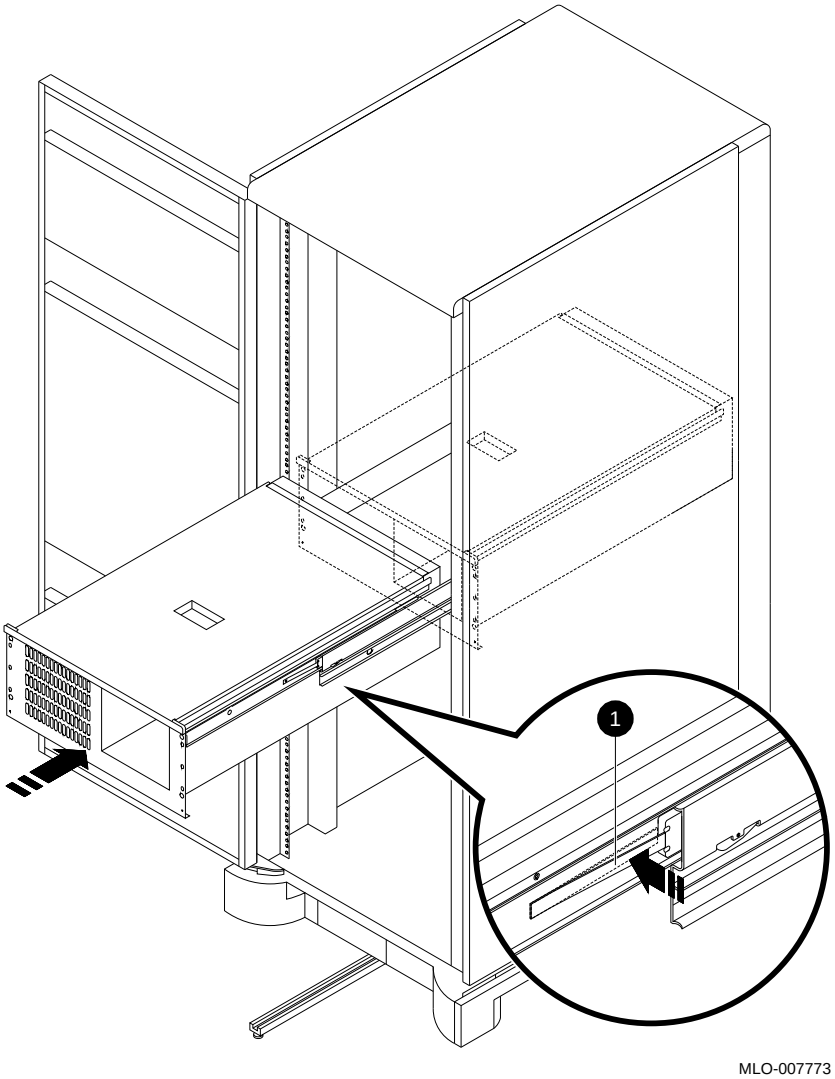
Figure 4–4 Pushing In a Mass Storage Drawer



❶ Spring tab

4.3 Identifying Mass Storage Drawers 1 and 2

There are two different mass storage drawer designs. You may encounter either or both versions in a particular DECsystem 5900 system, depending on when it was manufactured and whether or not a mass storage upgrade has been added.

Before begining a service procedure or upgrade, you must identify which type of drawer you will be working on, and refer to the appropriate section of this chapter for guidance. Use Table 4–1 to determine where the information you need is located.

Table 4–1 Mass Storage Drawer Information

Distinguishing Features	Mass Storage Drawer 1	Mass Storage Drawer 2
Power switch on drawer front	Yes	No
Top cover	Two sections with screws	One piece
Exposed fans on rear of drawer	No	Yes
For detailed information see:	Section 4.4	Section 4.5

The options available in mass storage drawers are the same regardless of the design of the drawer; for a list of available options, see Section 1.1.8.

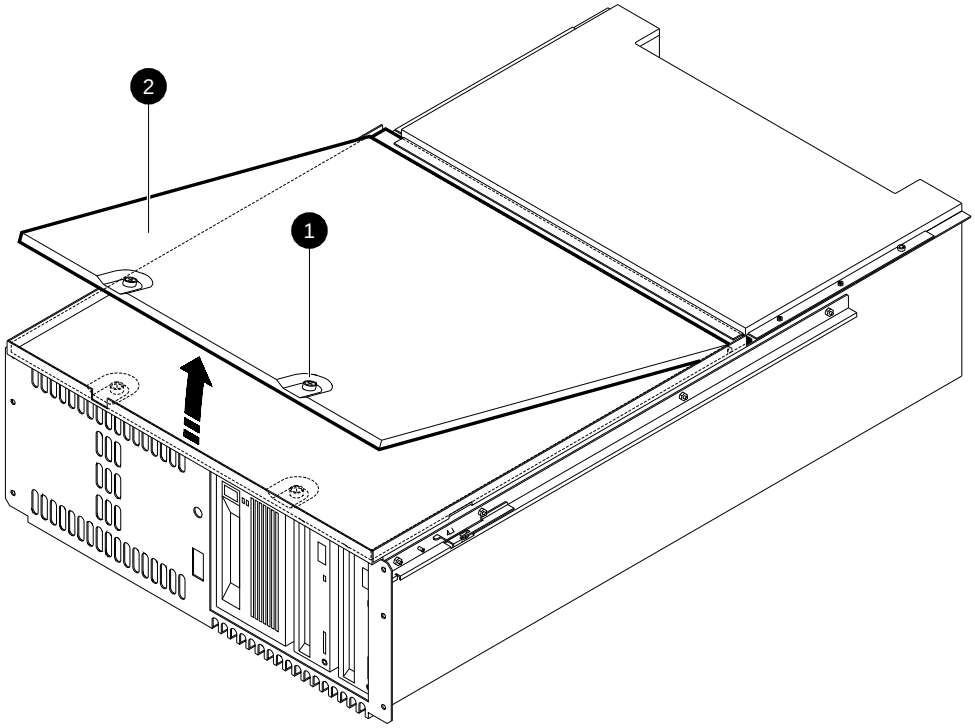
4.4 Mass Storage Drawer 1

This section describes the mass storage drawer 1.

4.4.1 Opening and Closing the Mass Storage Compartment

After pulling out the mass storage drawer 1 (see Section 4.2), access the mass storage compartment by loosening the quarter-turn captive screws on the top front cover of the drawer, and raising the cover. To close the compartment, reverse the procedure (see Figure 4–5).

Figure 4–5 Opening the Mass Storage Drawer 1 Storage Compartment



❶ Quarter turn captive screws

❷ Front top cover (mass storage compartment)

4.4.2 Removing and Replacing Storage Devices

Procedures for removal and replacement of storage devices located in a mass storage drawer 1 are addressed in the following sections. Refer to the appropriate section for details on a particular device.

4.4.2.1 Mass Storage Device Brackets

Each device is held in place within the mass storage drawer with a bracket. There are two types of brackets used, depending upon the size (height) and function of the particular device:

- Drive bracket—for full-height devices which do not utilize removable media (see Figure 4–6).
- Removable media device bracket—for removable media full-height or half-height devices (see Figure 4–7).

The removable media device bracket is always located in one of the removable media slots at the right front of the mass storage drawer, and can accommodate either one full-height, or one or two half-height devices with a divider in the middle.

Table 4–2 matches typical internal devices with required brackets.

Table 4–2 Internal Storage Devices/Required Brackets

Device	Height	Bracket
RRD42	Half	Removable media device bracket with divider
RX26	Half	Removable media device bracket with divider
RZ57	Full	Drive bracket
RZ58	Full	Drive bracket
TLZ04	Full	Removable media device bracket
TLZ06	Full	Removable media device bracket
TKZ09	Full	Removable media device bracket
TZ30	Half	Removable media device bracket with divider
TZK10	Half	Removable media device bracket with divider
TZ85	Full	Removable media device bracket

Figure 4–6 Drive Bracket

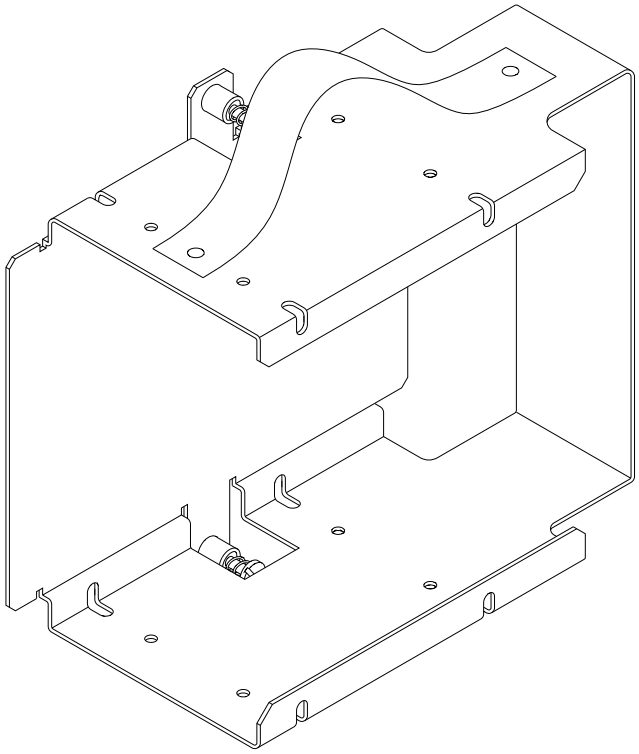


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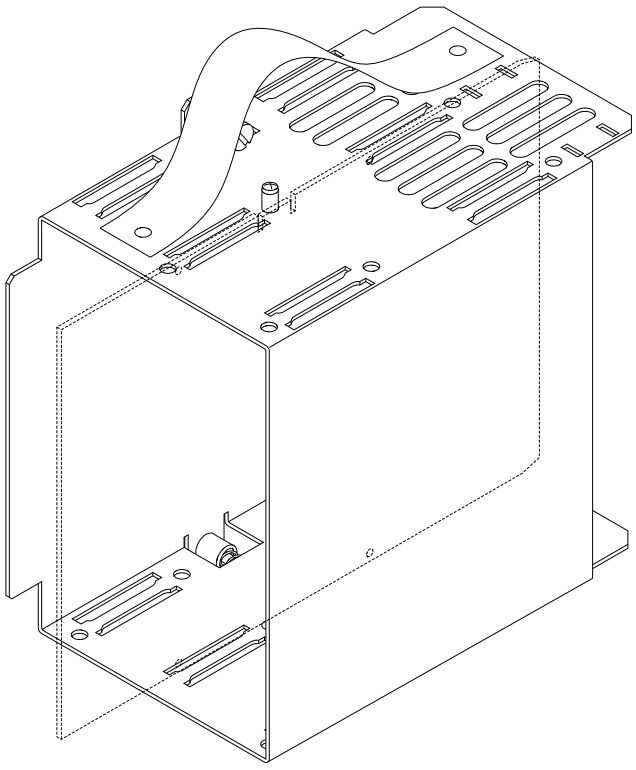
Figure 4–7 Removable Media Device Bracket



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4.4.3 Removing and Replacing Brackets and Devices

This section describes the removal and replacement of brackets and devices in the mass storage drawer 1.

4.4.3.1 Removing Drive Bracket and Devices

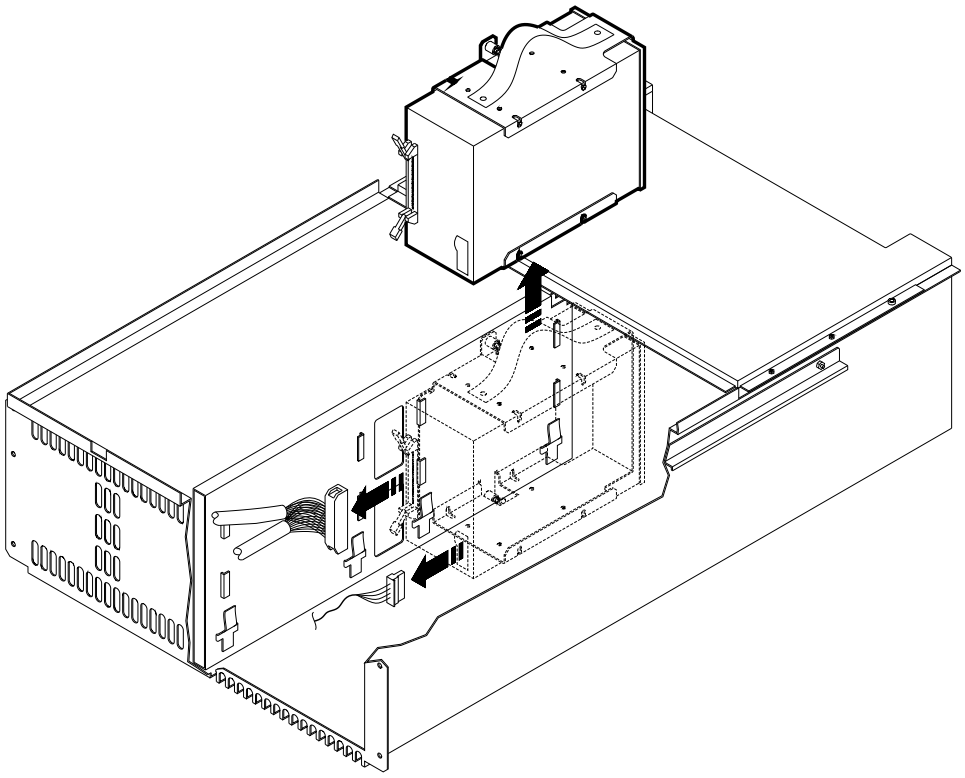
To remove a drive bracket from the mass storage drawer:

1. Completely loosen the captive set screw located at the top of the bracket, and gently pull up on the bracket handle, sliding the bracket and the device it contains, if any, straight up. If it sticks, carefully use a screwdriver to pry up the bracket without touching the device.
2. Disconnect the power and SCSI leads if the bracket contains a device (see the section of this chapter which pertains to the particular device). Mark the cables for easy identification when they are reconnected.

3. To replace or install a drive bracket containing a device in the mass storage drawer, reverse the above procedure.

Figure 4–8 depicts the removal of a drive bracket and device from one position in the drawer; others may be oriented a different way, but are removed in essentially the same manner.

Figure 4–8 Removing a Drive Bracket



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To remove a device from a drive bracket, remove the bracket from the mass storage drawer as instructed above. Remove the Phillips screws (four, two on each side) and lock washers from the bracket, and slide the device out of the bracket (see Figure 4–9).

To replace or install a new device, reverse the above procedures. If you are replacing the device, note the orientation of the connectors to the bracket before removal so that you can mount the replacement in the same manner.

If you are installing a new device, all connectors should face toward the middle of the drawer, and be on the right-hand side as you face the connectors. See Figure 4–10 for an example.

Figure 4–9 Removing a Device from a Drive Bracket

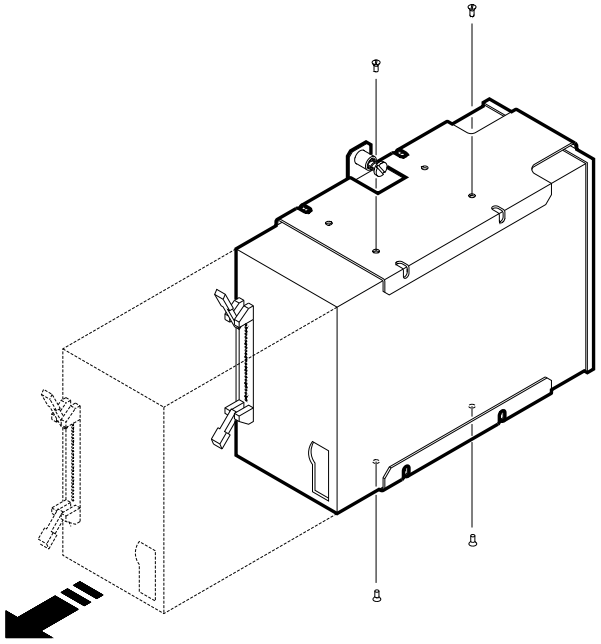

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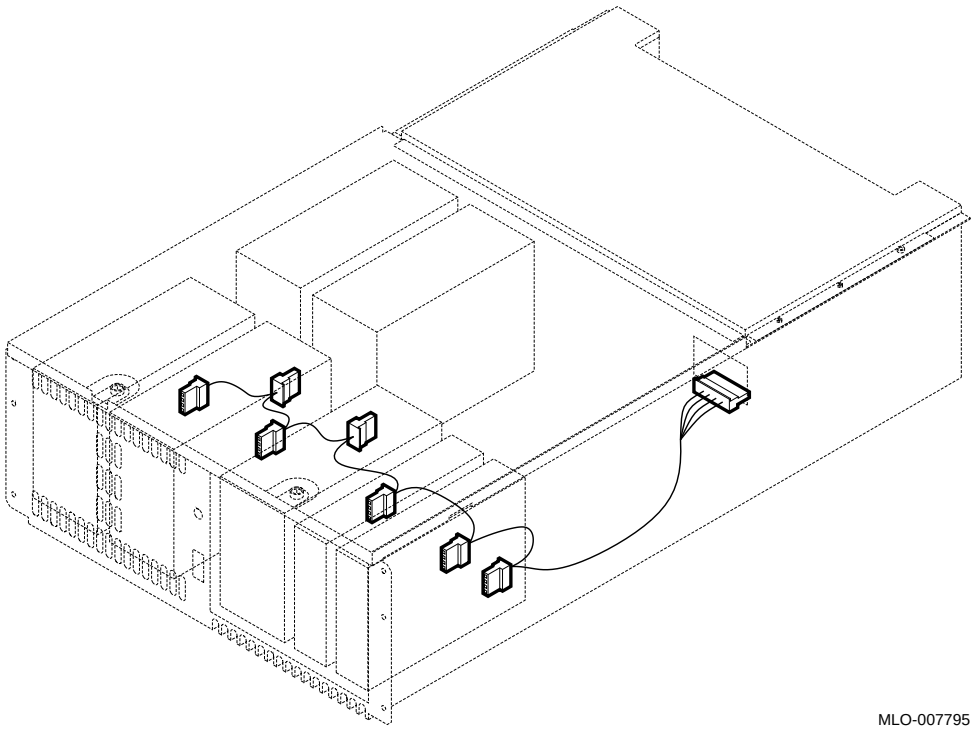
Figure 4–10 Device Orientation Within a Drawer

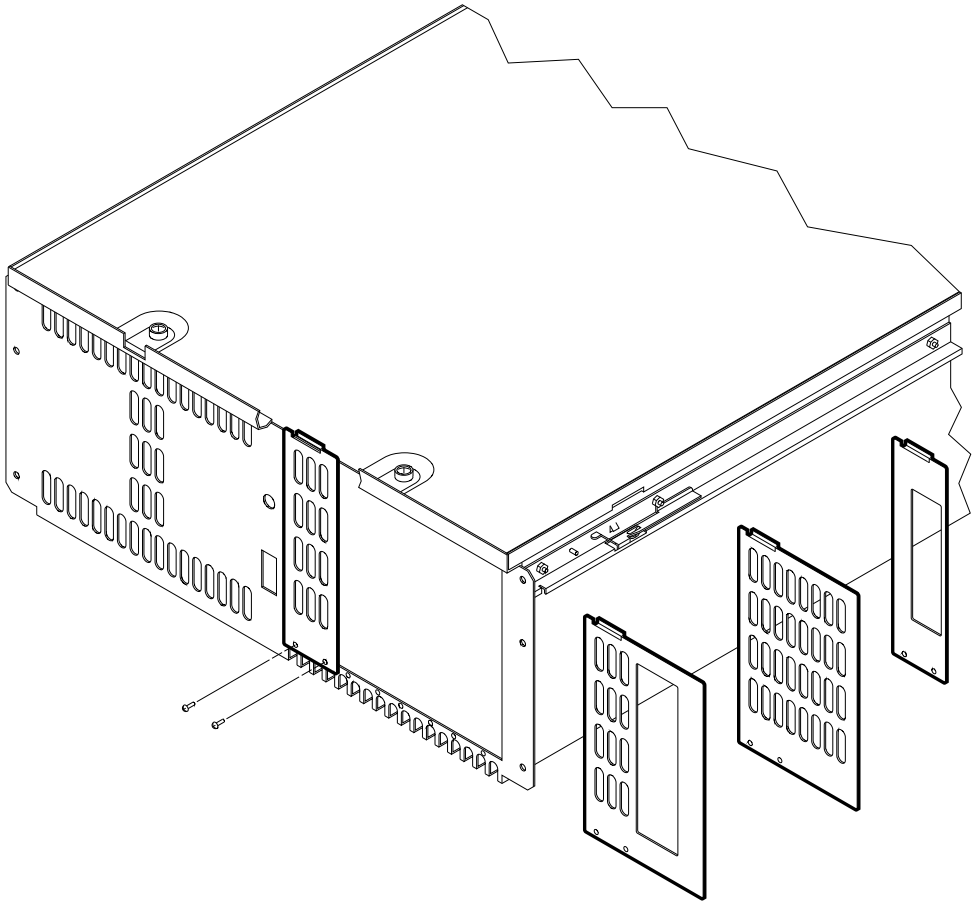


4.4.3.2 Removable Media Filler Panels

Removable media devices are always located in the front right-hand bracket(s) in the mass storage drawer, where the disks or tapes may be inserted and removed through the opening on the right front side of the drawer. Depending upon the combination of removable media devices chosen by the customer (if any), the removable media slots on the drawer will be covered by various filler panels which must be removed to service devices behind them.

Four different panels may be present on the drawer; each panel has a top flange which is fitted under the top of the slot, and each is attached by two screws at the bottom (see Figure 4–11).

Figure 4–11 Removable Media Slot Filler Panels



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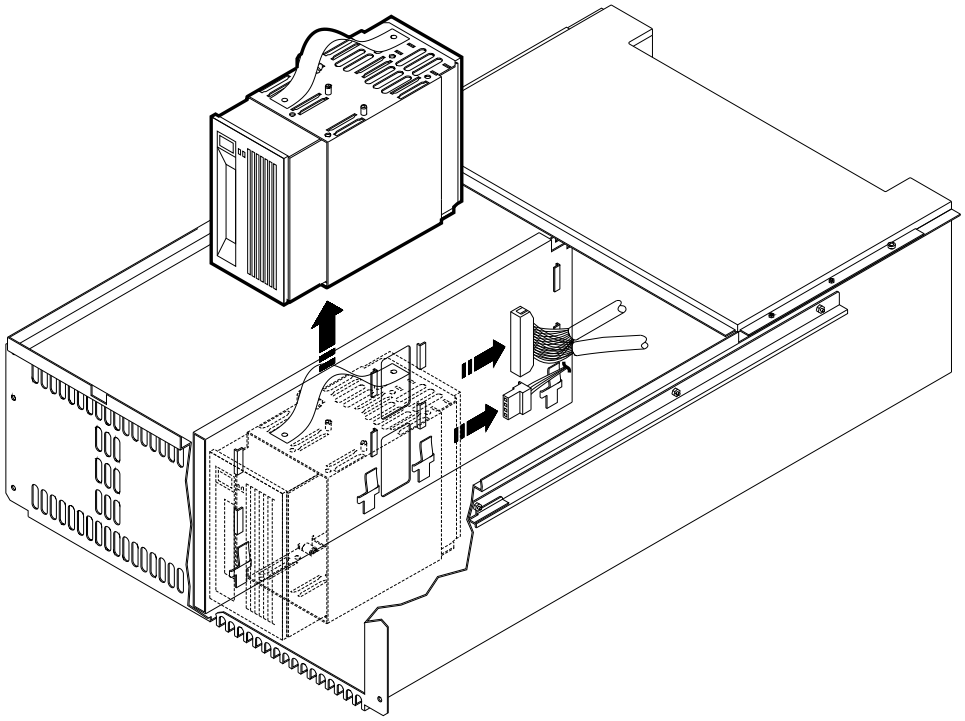
4.4.3.3 Removing Removable Media Device Bracket and Devices

To remove a removable media device bracket from the mass storage drawer:

1. Completely loosen the captive set screw located at the top of the bracket, and gently pull up on the bracket handle, sliding the bracket and the device it contains, if any, straight up. If it sticks, carefully use a screwdriver to pry up the bracket without touching the device (see Figure 4–12). Although not required, you may find it easier to remove the filler panel(s), (see Section 4.4.3.2) on the drawer in front of the device beforehand.
2. Disconnect the power and SCSI leads if the bracket contains a device (see the section of this chapter which pertains to the particular device). You may find it helpful to mark the cables for ease in reconnecting them.
3. It may be necessary to slide the device back into the bracket so that it will clear the front of the drawer as you lift up on the bracket. (Loosening the divider will aid in sliding half-height devices.)

Figure 4–12 Removing a Removable Media Device Bracket



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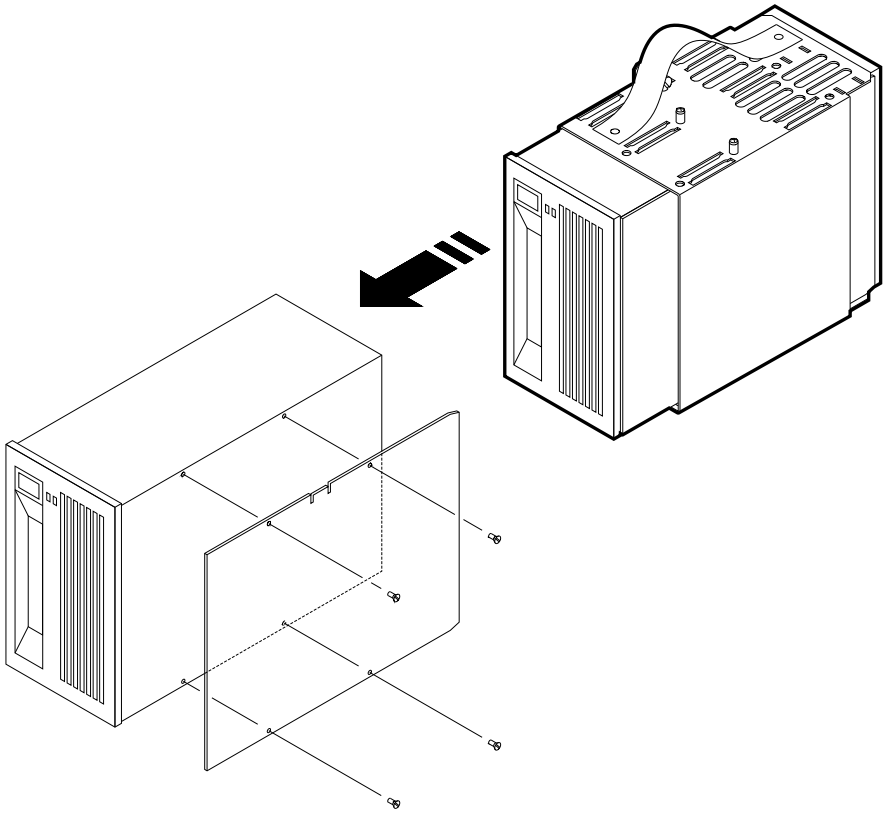
4.4.3.3.1 Full-Height Devices To remove a full-height device from a removable media device bracket, remove the bracket from the mass storage drawer as instructed above. Slide the device forward out of the bracket. There is no divider for full-height devices. See Figure 4–13.

Figure 4–13 Removing a Full-Height Device from a Removable Media Device Bracket



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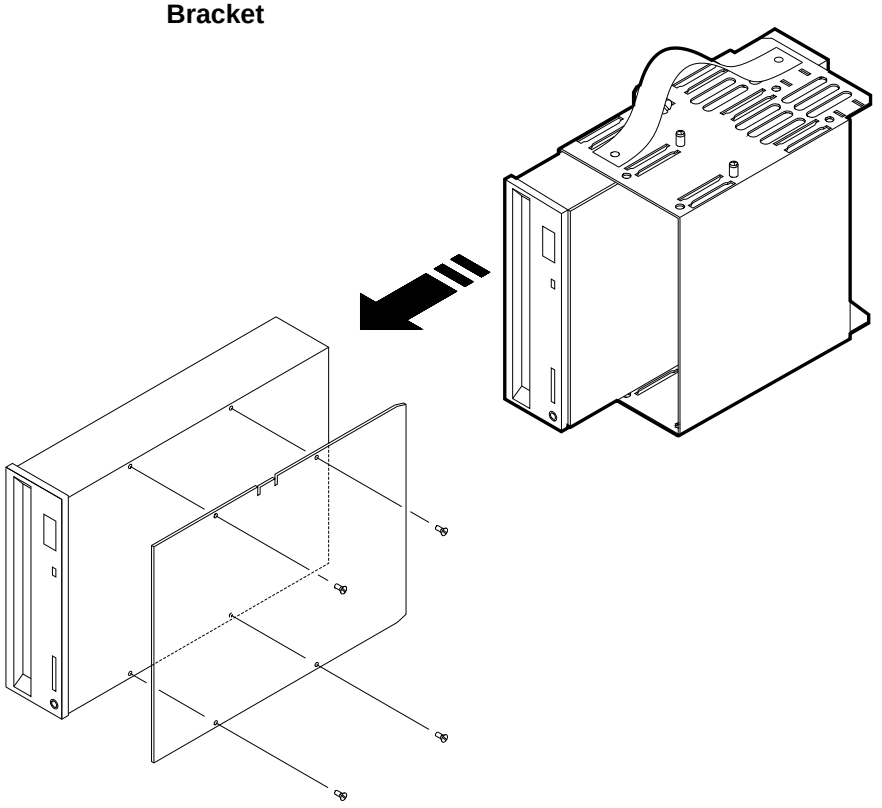
4.4.3.3.2 Half-Height Devices To remove a half-height device from a removable media device bracket, remove the bracket from the mass storage drawer as instructed above. Remove the screw which holds the bracket divider in place. Remove the bracket divider, and slide the device forward out of the bracket (see Figure 4–14).

Figure 4–14 Removing a Half-Height Device from a Removable Media Device Bracket



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4.4.4 Mass Storage Drawer 1 Configuration

Note

If you are simply replacing a failed FRU, it is not necessary to alter the configuration of a drawer.

A mass storage drawer can split SCSI devices between two SCSI controllers. Devices in the mass storage drawer must be configured and connected before turning on the system.

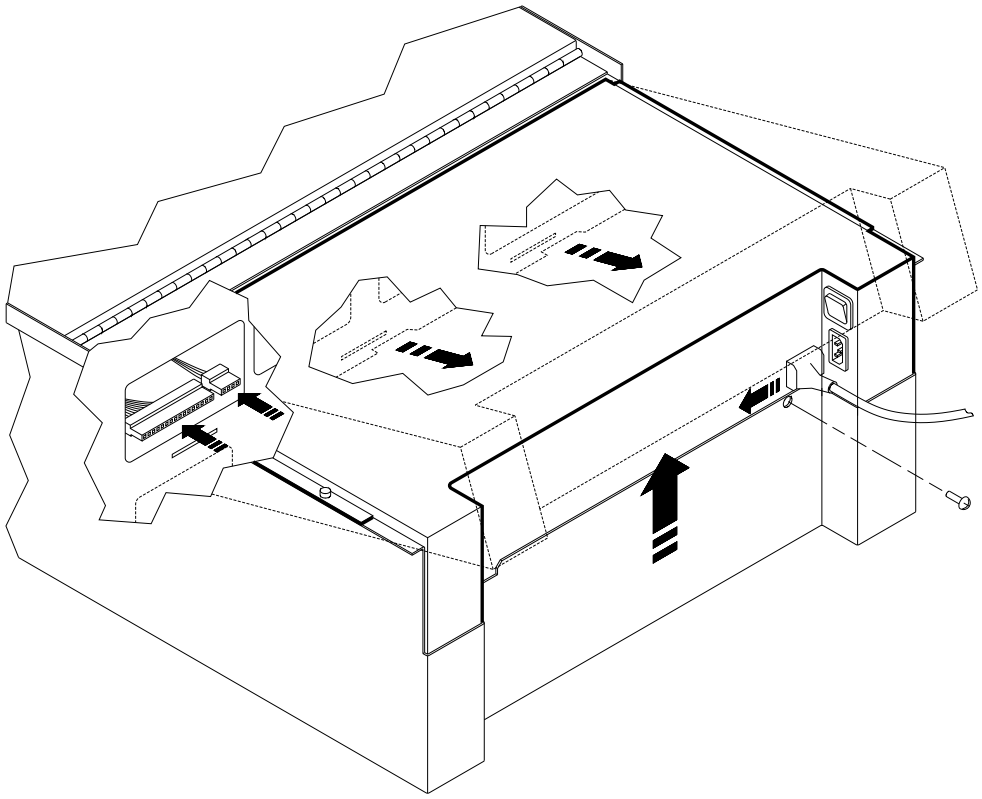
The customer/system manager may wish to alter the configuration of a mass storage drawer; for details, see Section 4.6.

4.4.5 Removing and Replacing the Mass Storage Drawer 1 Power Supply

A mass storage drawer 1 power supply is removed and replaced by the following steps (see Figure 4–15):

1. Turn off the power to the drawer using either of the switches located on the front or rear of the drawer.
2. Disconnect the power lead from the ac power cable on the rear of the drawer.
3. Pull out the drawer as described in Section 4.2.
4. Loosen the quarter-turn captive screws which hold down the mass storage compartment cover (top front) of the drawer, and lift the cover up to access the storage compartment (see Section 4.4.1).
5. Disconnect the four-pin switch cable and the SCSI device power cable from the power supply, and close the cover.
6. Remove the two Phillips screws from the top rear of the power supply.
7. Lift up and back on the power supply.
8. If the power supply does not come out easily, it may be necessary to loosen the lower rear panel on the rear of the drawer (large Phillips screws).
9. To install the new power supply, reverse the above procedures.

Figure 4–15 Removing the Mass Storage Drawer 1 Power Supply



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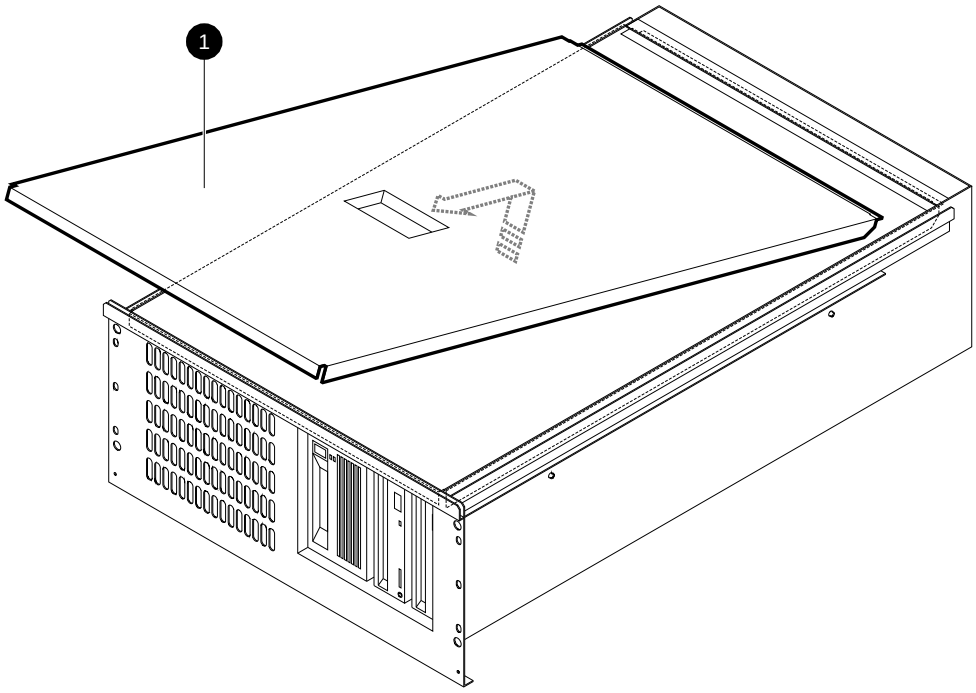
4.5 Mass Storage Drawer 2

This section describes the mass storage drawer 2.

4.5.1 Opening the Mass Storage Compartment

After pulling out the mass storage drawer 2 (see Section 4.2), access the mass storage compartment by grasping the hand-hold in the middle of the top cover and pulling up, raising and removing the cover. To close the compartment, reverse the procedure (see Figure 4–16).

Figure 4–16 Opening the Mass Storage Drawer 2 Storage Compartment



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❶ Cover

4.5.2 Removing and Replacing Storage Devices and Brackets

Procedures for removal and replacement of storage devices located in a mass storage drawer 2 are addressed in the following sections. Refer to the appropriate section for details on a particular device.

4.5.3 Mass Storage Device Brackets

Each device is held in place within the mass storage drawer 2 by means of a bracket which is attached to the device. There are two types of brackets used, depending upon the size (height) and function of the particular device.

The drive bracket accommodates one full-height device which the customer does not need to physically access (see Figure 4–17).

The removable media device bracket is attached to the removable media devices which are placed in the slots at the right front of the mass storage drawer. These brackets can accommodate either full-height, or half-height devices, one per device (see Figure 4–18).

Figure 4–17 Mass Storage Drawer 2 Drive Bracket

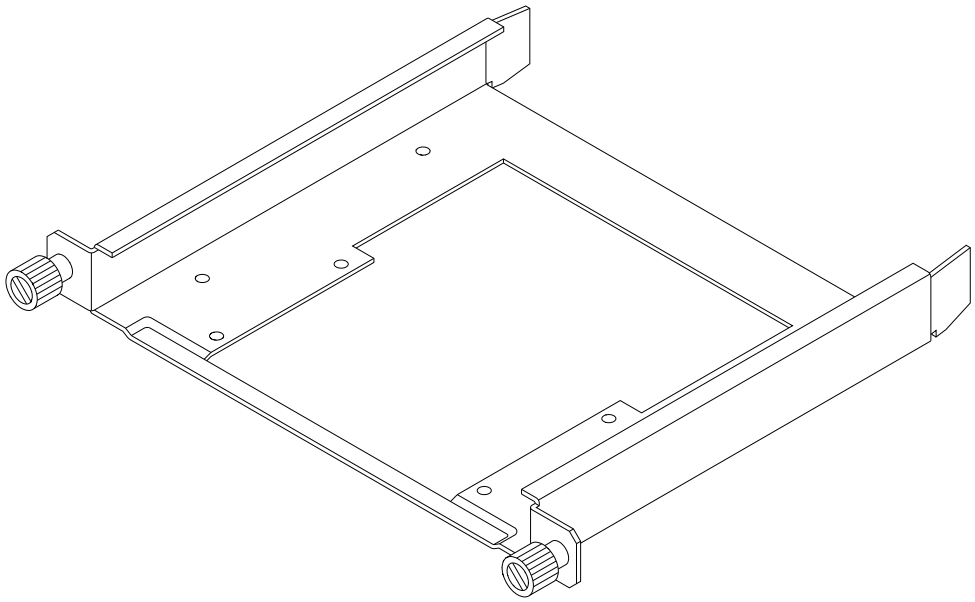

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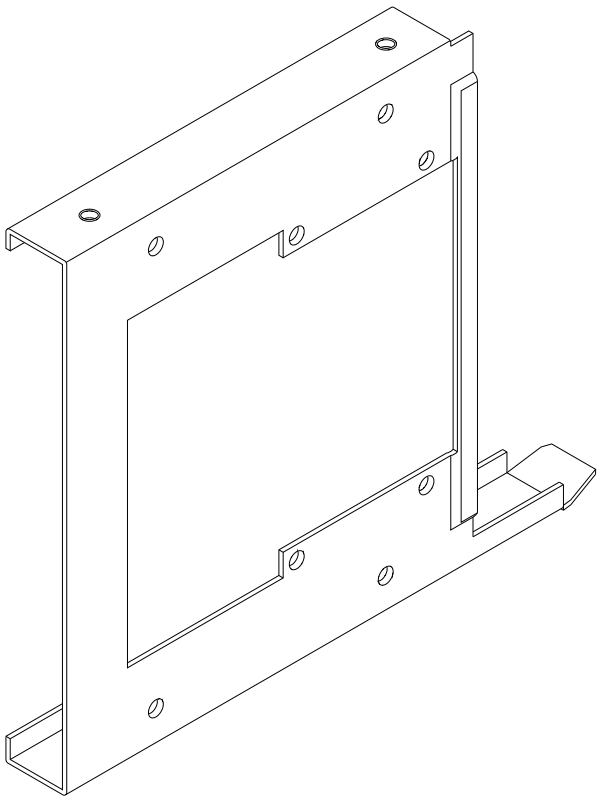
Figure 4–18 Mass Storage Drawer 2 Removable Media Device Bracket



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4.5.4 Removing and Replacing Brackets and Devices

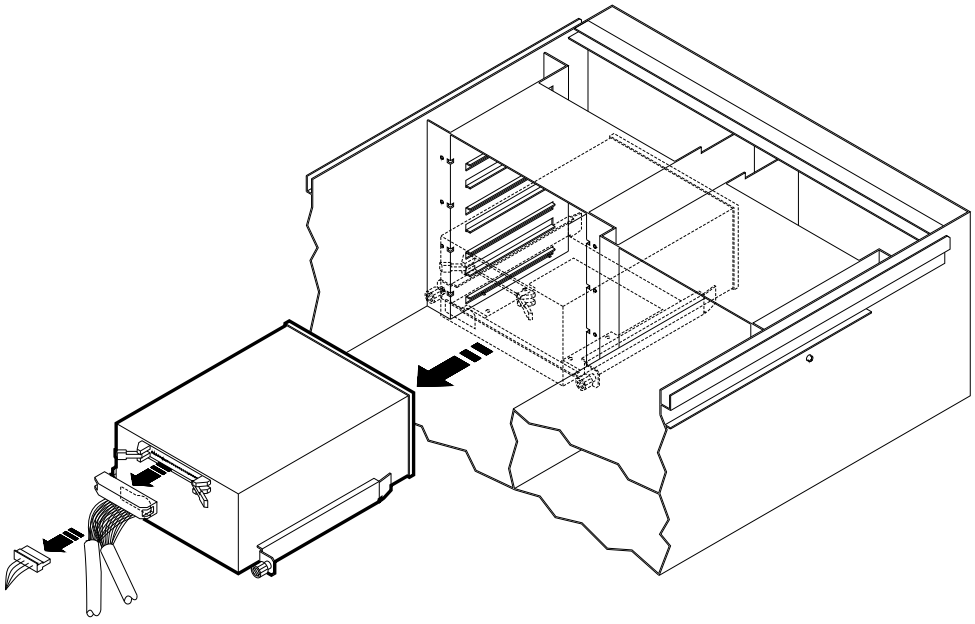
This section describes removal and replacement of devices and brackets in the mass storage drawer 2.

4.5.4.1 Removing a Drive Bracket and Device

To remove a drive bracket (and the device it holds) from a mass storage drawer 2, disconnect the power and internal SCSI leads, then loosen the two captive screws on the bracket, and slide the bracket and device out (see Figure 4–19).

If you will be replacing the device, note the orientation of the connectors to the bracket before removal so that you can mount the replacement in the same manner. (For detailed information about devices, see the specific section in this manual devoted to that device.)

Figure 4–19 Removing a Drive Bracket from the Mass Storage Drawer 2



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4.5.4.2 Removing a Device from a Drive Bracket

A device is removed from (or installed in) a drive bracket using four screws to secure the two together (see Figure 4–20).

If you are installing a new device, all connectors should face toward the middle of the drawer, and be on the bottom (see Figure 4–21).

Figure 4–20 Removing a Device from a Bracket

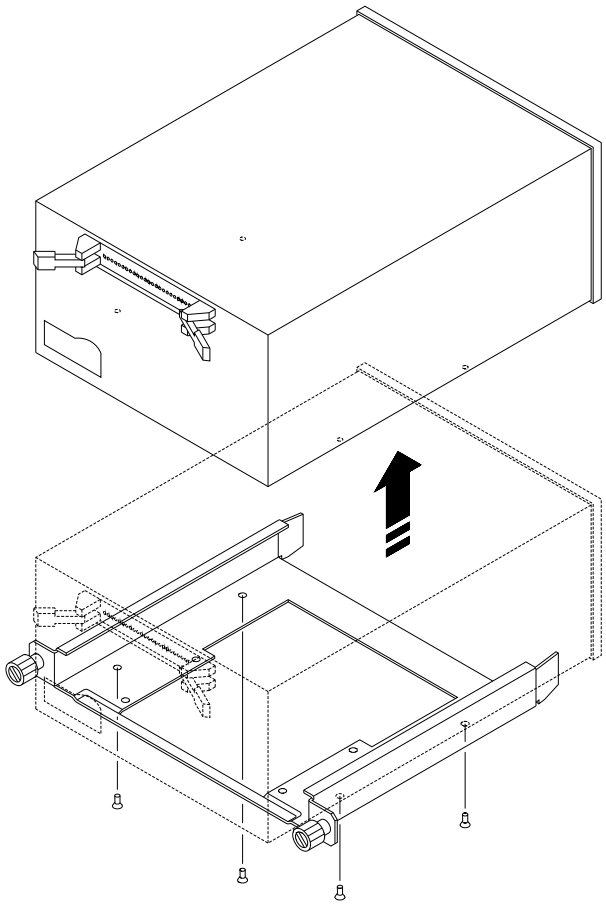

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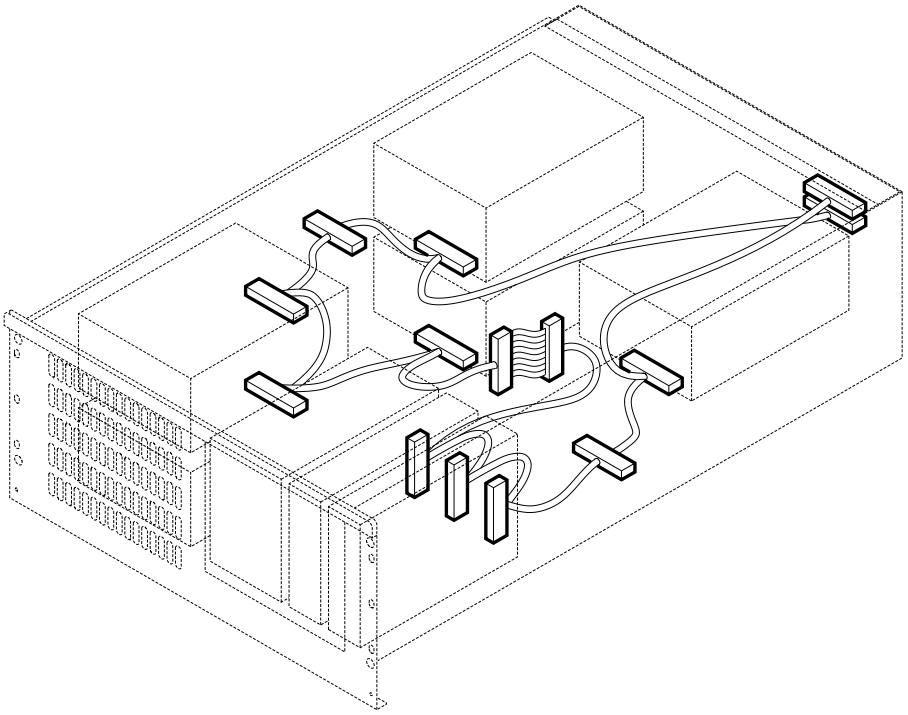
Figure 4–21 Device Orientation Within a Drawer



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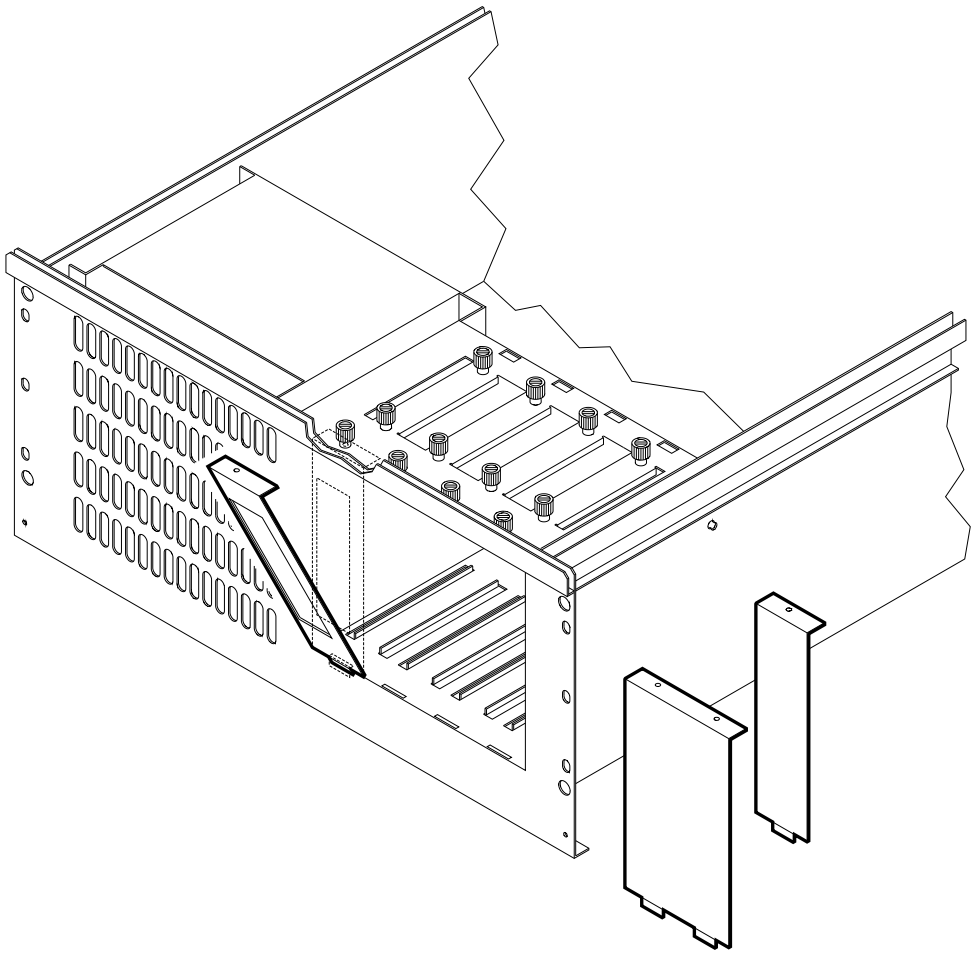
4.5.4.3 Removable Media Filler Panels

Removable media devices are always located in the front right-hand bracket(s) in the mass storage drawer, where the disks or tapes may be inserted and removed through the opening on the right front side of the drawer. Depending upon the combination of removable media devices chosen by the customer (if any), the removable media slots on the drawer will be covered by various filler panels which must be removed to service devices behind them.

Different panels may be present on the drawer; each panel has a top flange which is attached by one or two captive screws at the top (see Figure 4–22).

Figure 4–22 Removable Media Slot Filler Panels



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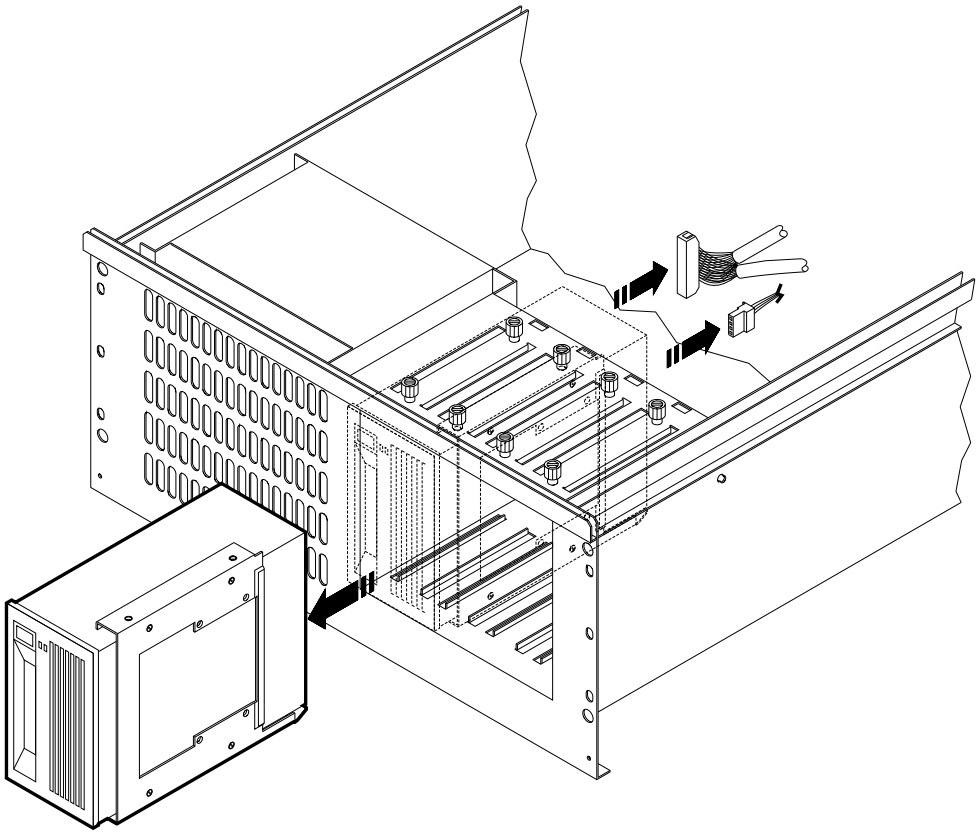
4.5.4.4 Removing Mass Storage Drawer 2 Removable Media Device Bracket and Devices

In the mass storage drawer 2, full- and half-height removable media devices are removed in the same manner.

To remove a removable media device bracket and the device it contains from the mass storage drawer, disconnect the power and SCSI leads, loosen the two captive screws on the top of the drawer by hand or with a Phillips screwdriver, and slide the device and bracket out of the front of the drawer (see Figure 4–23).

If you will be replacing the device, note the orientation of the connectors to the bracket before removal so that you can mount the replacement correctly. (For detailed information about devices, see the specific section in this manual devoted to that device.)

Figure 4–23 Removing a Removable Media Device Bracket from the Mass Storage Drawer 2



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4.5.4.5 Removing Devices from Mass Storage Drawer 2 Removable Media Device Brackets

Both full- and half-height removable media devices are removed from (or installed in) a removable media device bracket using four screws to secure the two together. See Figure 4–24 and Figure 4–25.

If you are installing a new device, all connectors should face toward the middle of the drawer, and be on the right while facing the connector (see Figure 4–21).

Figure 4–24 Removing a Full-Height Device from a Mass Storage Drawer 2 Removable Media Device Bracket

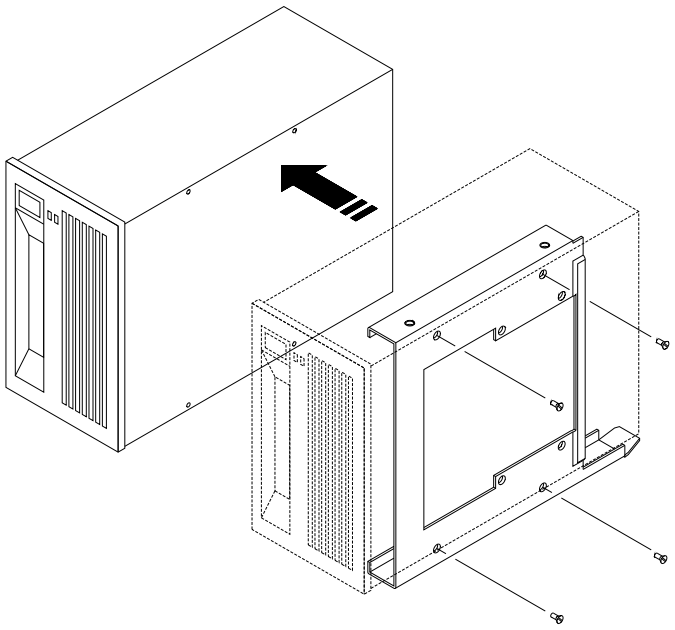

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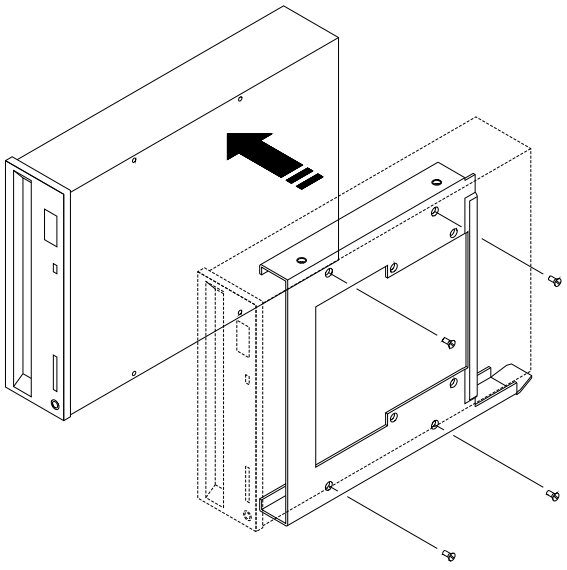
Figure 4–25 Removing a Half-Height Device from a Mass Storage Drawer 2 Removable Media Device Bracket



4.5.5 Mass Storage Drawer 2 Configuration

Note

If you are simply replacing a failed FRU, it is not necessary to alter the configuration of a drawer.

A mass storage drawer can split SCSI devices between two SCSI controllers. Devices in the mass storage drawer must be configured and connected before turning on the system.

The customer/system manager may wish to alter the configuration of a mass storage drawer. For details, see Section 4.6.

4.5.6 Removing and Replacing the Mass Storage Drawer 2 Power Supply

A mass storage drawer 2 power supply is removed and replaced by the following steps (see Figure 4–26):

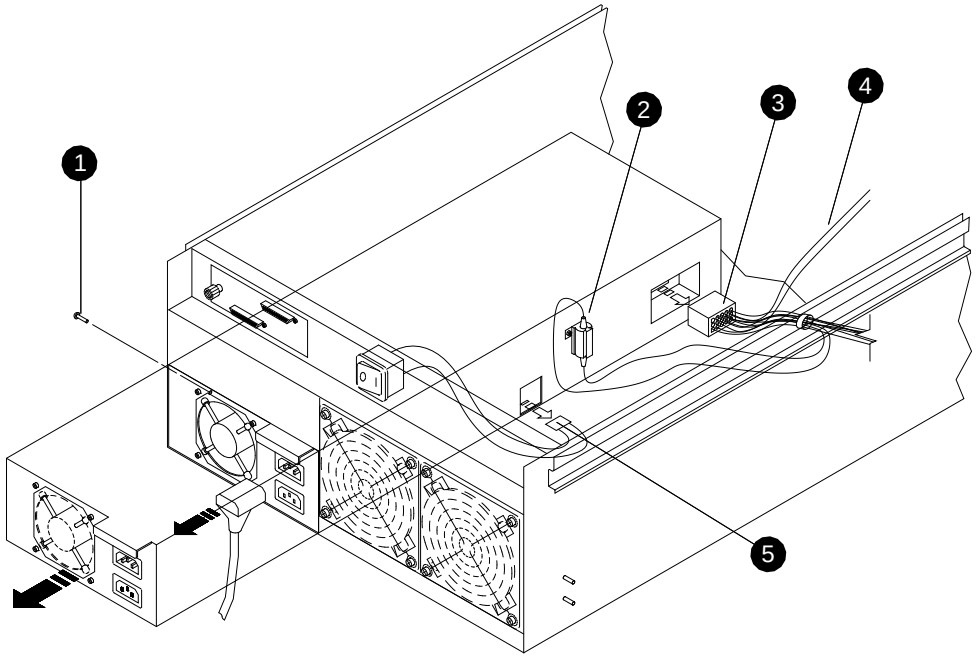
1. Turn off the power to the drawer using the switch located on the rear of the drawer.
2. Disconnect the power lead from the ac power cable on the rear of the drawer.
3. Pull out the drawer (see Section 4.2).
4. Remove the top cover (see Section 4.5.1).
5. Disconnect the 15-pin keyed SCSI device power cable connector from the power supply.

   Note

   If you must change the LED, remove its two lead wires from positions 6 and 10 in the 15-pin keyed SCSI device power cable connector.

6. Disconnect the switch plug by squeezing the black connector vertically.
7. Remove the resistor by disconnecting the two wires and removing the nuts.
8. Remove the screw holding the power supply from the side of the drawer.
9. Push in the drawer (see Section 4.2).
10. From the rear of the system, slide the power supply out from the drawer.
11. To install the new power supply, reverse the above procedures.

Figure 4–26 Removing the Mass Storage Drawer 2 Power Supply



❶ Screw

❷ Resistor

❸ Keyed SCSI power cable connector

❹ LED wires

❺ Switch plug

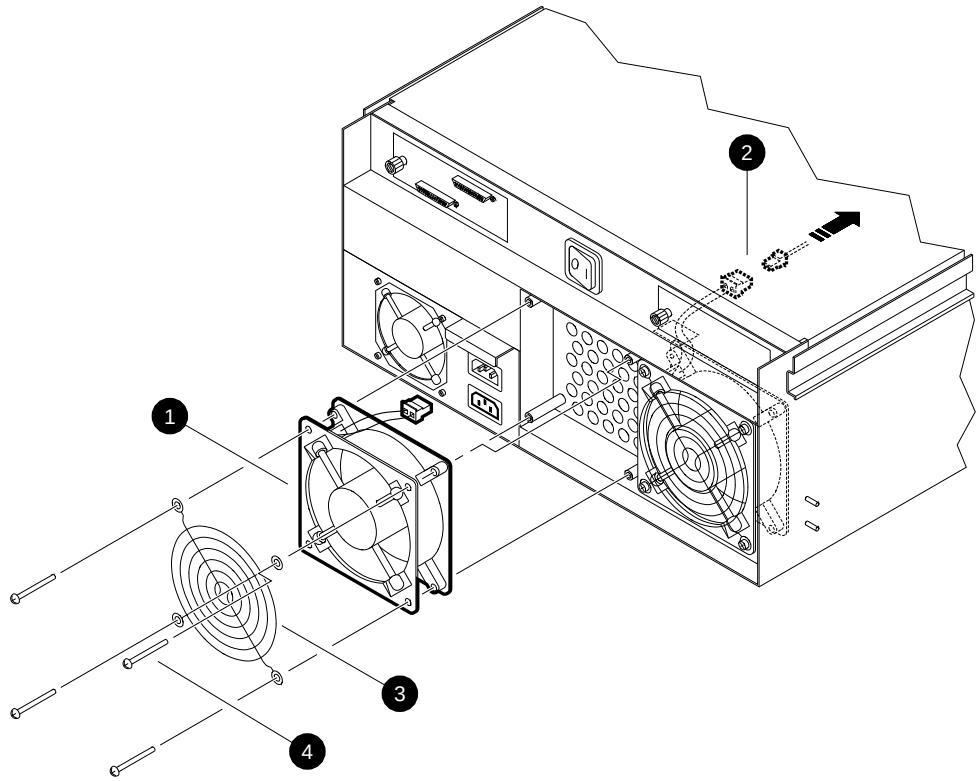
4.5.7 Removing and Replacing the Mass Storage Drawer 2 Fans

The two fans on the rear of the drawer each have a cover; the fan and cover are held in place with four screws (see Figure 4–27). To remove a fan:

1. Turn off the mass storage drawer (see Section 2.3.2.3).
2. Remove the screws and cover.
3. Unplug the connector.

4. To replace a fan, reverse these procedures.

Figure 4–27 Removing the Mass Storage Drawer 2 Fans



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❶ Fan
❷ Plug
❸ Cover
❹ Screws

4.6 Mass Storage Drawer Configuration

Note

If you are simply replacing a failed FRU, it is not necessary to alter the configuration of a drawer.

A mass storage drawer can split SCSI devices between two SCSI controllers. Devices in the mass storage drawer must be configured and connected before turning on the system.

All mass storage drawers in the DECsystem 5900 system are ordered in a specific factory-installed configuration as specified by the customer/system manager (this includes mass storage upgrades ordered at a later date).

Two cabling configuration choices are available:

- Single bus configuration (see Figure 4–28 for mass storage drawer 1, and Figure 4–29 for mass storage drawer 2)
- Split bus configuration (see Figure 4–30 for mass storage drawer 1, and Figure 4–31 for mass storage drawer 2)

4.6.1 Altering the Factory-Set Configuration

The customer/system manager may wish to alter the configuration of a mass storage drawer; the options and advantages are listed in Table 4–3.

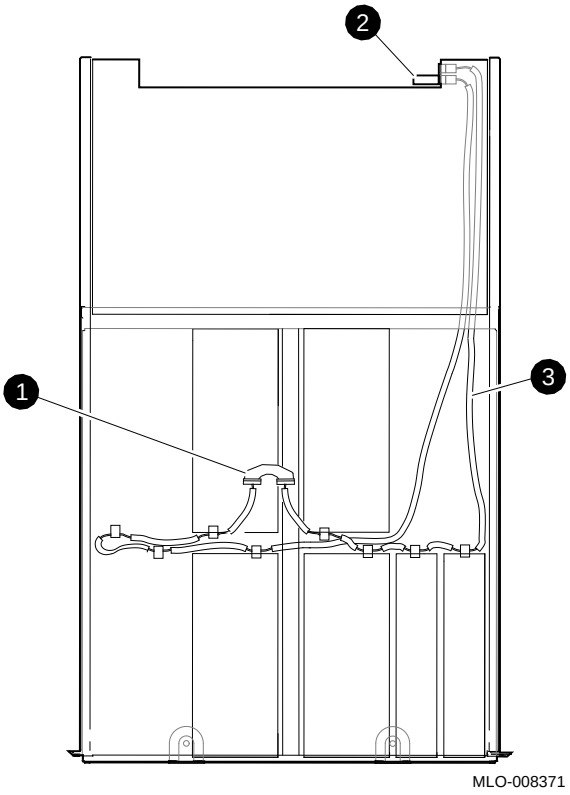
Table 4–3 Configuration Option Choices/Advantages

Configuration Option	Advantages
Single bus	Preserves SCSI slots for other drawers/devices
Split bus	Improves processing speed and efficiency for heavily used devices in the same drawer

4.6.1.1 Single Bus Configuration

For a single bus configuration, you must install a jumper between the SCSI ID 0 device and the SCSI ID 5 device as depicted in Figure 4–28 (mass storage drawer 1) and Figure 4–29 (mass storage drawer 2). The jumper connects the two buses in a mass storage drawer; the resulting single bus configuration is terminated on the rear of the drawer next to the SCSI signal input.

Figure 4–28 Single Bus Configuration for Mass Storage Drawer 1

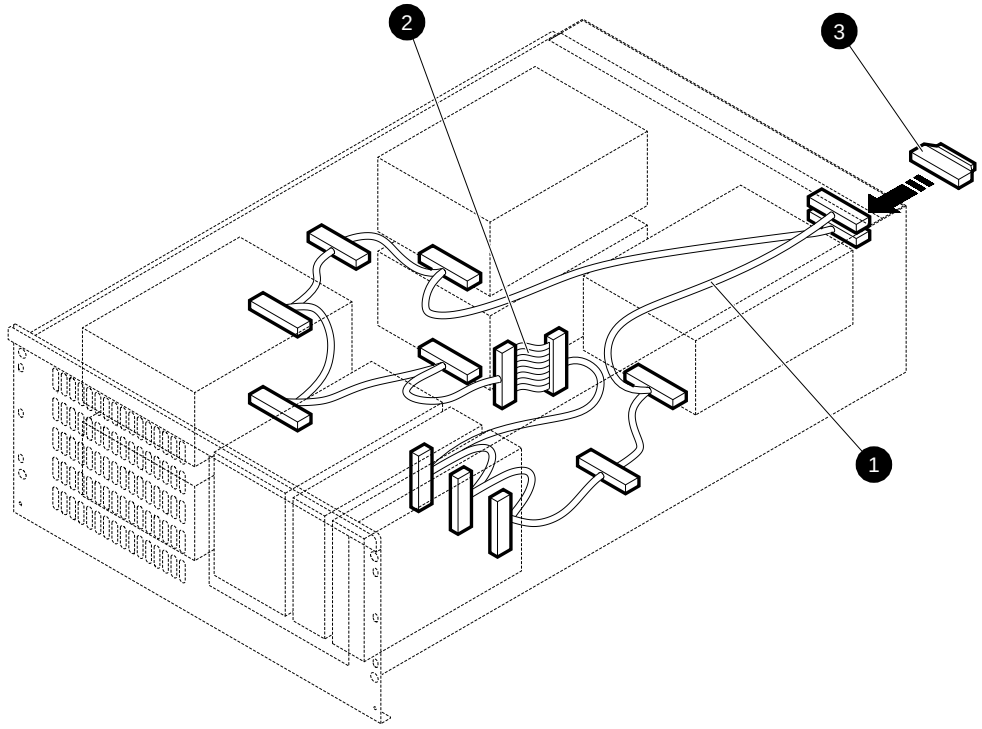


❶ Jumper

❷ Terminator

❸ Signal cable

Figure 4–29 Single Bus Configuration for Mass Storage Drawer 2



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❶ Signal cable

❷ Jumper

❸ Terminator

Note

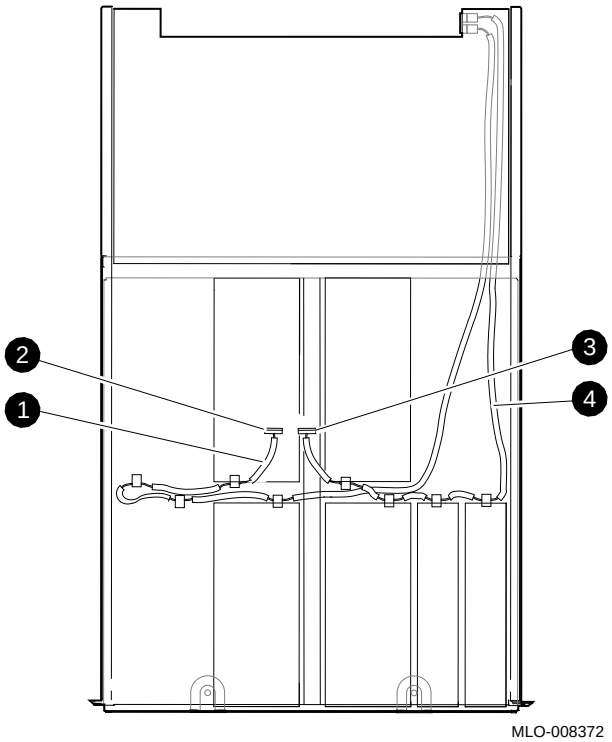
Do not use more than seven SCSI devices on a single controller. Figure 4–29 intentionally depicts a single bus configuration with more than the allowable seven SCSI devices to demonstrate the appropriate spacing and use of connectors for devices in any position in the drawer.

4.6.1.2 Split Bus Configuration

The split bus configuration uses both SCSI signal cables without a jumper. In this configuration both buses must be terminated inside the drawer. See Figure 4–30 (mass storage drawer 1) and Figure 4–31 (mass storage drawer 2).

The split bus configuration can improve throughput by connecting two SCSI controllers to one mass storage drawer.

Figure 4–30 Split Bus Configuration for Mass Storage Drawer 1



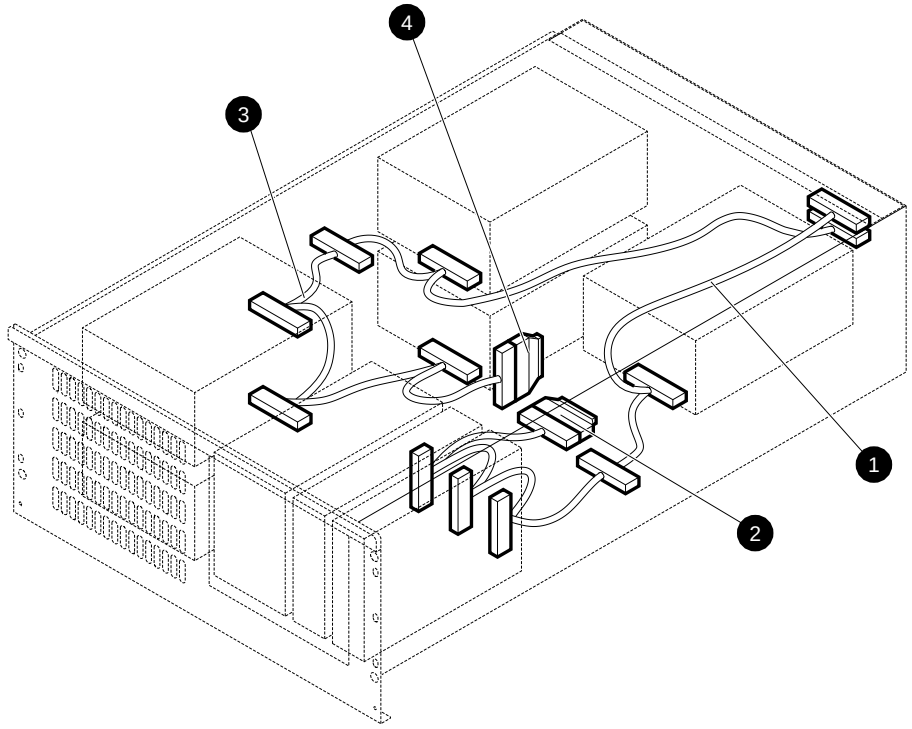
❶ Signal cable

❷ Terminator

❸ Terminator

❹ Signal cable

Figure 4–31 Split Bus Configuration for Mass Storage Drawer 2



❶ Signal cable

❷ Terminator

❸ Signal cable

❹ Terminator

4.7 Identifying and Replacing a Faulty SCSI Device

A faulty device may be located using the ULTRIX UERF error log and ROM-based diagnostics, which will indicate the SCSI bus that the device is on (and therefore which drawer the device is in). The device ID pinpoints the particular device within the drawer. For detailed instruction, see the *DECsystem 5900 Service Guide,* EK–D590A–PS–001.

4.7.1 Procedure for Installing a New SCSI Device

Caution

Digital recommends that you use Digital-supplied buses intended for interconnecting SCSI devices. Digital also recommends that you power all units on the SCSI controller from a common power source. The proper operation of any SCSI controller that uses cable assemblies or buses not supplied by Digital, or not configured in accordance with Digital's recommendations, is not guaranteed.

Use the following procedure to install a device in a mass storage drawer:

1. Bring down the ULTRIX operating system.
2. Get the current system and drive configuration. At the console prompt type the cnfg command. Then type a cnfg x of the system module (3) and each PMAZ (x = the slot number 0–3) and write down the drive numbers on each PMAZ. Remember that you can have a maximum of 7 SCSI devices on each SCSI bus (up to 4 SCSI buses).

   Discuss this with the customer/system manager, decide the new SCSI address to be used, and determine any changes needed to existing device addresses.

   Note

   Duplicate SCSI ID addresses cannot be used on any one SCSI bus; the same ID may appear (only once) on each SCSI bus in the system, however.

3. Shut off the system and/or the mass storage drawer(s) to be reconfigured. To shut off one mass storage drawer, turn off one power switch on the mass storage drawer (either one, if your version has two).

4. Set the address (SCSI ID) of the devices to 0–6, depending on the other addresses on the SCSI bus (see Section 4.8). Do not conflict with other addresses on the SCSI bus(es). Put the appropriate address label on the bracket which contains the drive.
5. If this is an internal device:
   a. Install it in the mass storage drawer. For details on installing devices in a particular version of the mass storage drawer, see Section 4.4.3 (for mass storage drawer 1) or Section 4.5.2 (for mass storage drawer 2).
   b. Connect the power cable and SCSI signal bus to the device. Procedures for specific devices are located in the section of this chapter devoted to that device.
6. If this is an external SCSI device, connect the SCSI signal bus to the CPU drawer.
7. Ensure that the appropriate *ID label* appears on the top surface of each device which was added or reconfigured.
8. Turn on the system/mass storage drawers and make sure (>>cnfg x) shows the drive(s) you installed and other drives/devices.
9. Run the SCSI send diagnostics and target tests on the device(s) to verify that they work.

Caution

Be careful not to write on other drives if you use the w option with the target test.

10. Boot the system and allow the customer/system manager to set up the system to recognize the device(s).

Note

Detailed instructions and illustrations for physically removing/installing and disconnecting/connecting a particular device are located in the appropriate section of this chapter for that device.

4.8 SCSI IDs

This section describes the setting of SCSI IDs.

4.8.1 Default SCSI Device IDs

SCSI default settings for the DECsystem 5900 system are listed in Table 4–4. The settings listed give optimal performance on most systems.

Table 4–4 DECsystem 5900 SCSI Device ID Default Settings

Device	ID
CPU SCSI adapter	7
First removable media device	5
Boot device or first device	0
Remaining devices, in order	1,2,3,4,6,5
Remaining removable media devices	6,4,3,2,1,0

Note

No devices should ever use SCSI ID 7, as this is reserved for the SCSI controller(s).

4.8.2 Setting SCSI IDs

Digital sets each SCSI device to a default SCSI ID setting before the equipment leaves the factory. These default settings should be changed *only* when the server is configured with more than one device.

When adding a SCSI device to the DECsystem 5900 system (or reconfiguring a mass storage drawer) it can be necessary to change the ID (address) of affected SCSI devices. The Digital services representative is responsible for changing the SCSI ID settings as part of the reconfiguration process. In most instances, it will only be necessary to ensure that there is not a SCSI ID conflict.

When each SCSI device is added or reconfigured, a label should be placed on the top (visible) surface indicating what SCSI ID (address) it is. This will help diagnose ID conflicts, which are bound to occur occasionally in both manufacturing and at customer sites.

4.8.2.1 SCSI Jumpers and Switches

Varying means are employed (sets of switches, jumpers, incremental switch, programming via front panel, and so on) to set the SCSI ID and parity, depending on the particular device.

Table 4–5 identifies methods applicable to devices common to the DECsystem 5900 system.

Table 4–5 Common Devices and SCSI ID Method Used

Device Series	SCSI ID set by:
RZ57	Jumpers
TLZ04	Jumpers
TLZ06	Switches
TZ30	Switches
TZ85	Switches
TZK10	Jumpers
TKZ09	Switches
RRD42	Jumpers
RX26	Switches
TSZ07	Programming via front panel
TKZ08	Incremental switch
StorageServer 100	Switches

On devices with jumpers, the SCSI ID is set by inserting (in) or removing (out) any of three jumpers in a specific combination. For the location of jumpers and the proper settings for a particular device, see the section in this chapter pertaining to that device.

On devices with sets of switches, the SCSI ID is set by moving any or all of the switches to on or off. Incremental switches show a number which increments up or down when the switch is pushed. Some devices employ the front panel to set the address. For the method employed, and the location of switches on a particular device, see the section in this chapter pertaining to that device.

Caution

To change SCSI ID switches, use a pen or small pointed object to move the jumper; do not use a pencil point. Graphite particles can damage the device.

4.9 Removing and Installing Storage Devices

This section describes the removal and installation of storage devices.

4.9.1 Nonremovable Media Devices Contained in Mass Storage Drawers

This section describes the removal and installation of nonremovable media storage devices in a mass storage drawer.

4.9.1.1 Removing/Installing an RZ57

The RZ57 is a full-height device entirely self-contained in the mass storage drawer (it is a nonremovable media device).

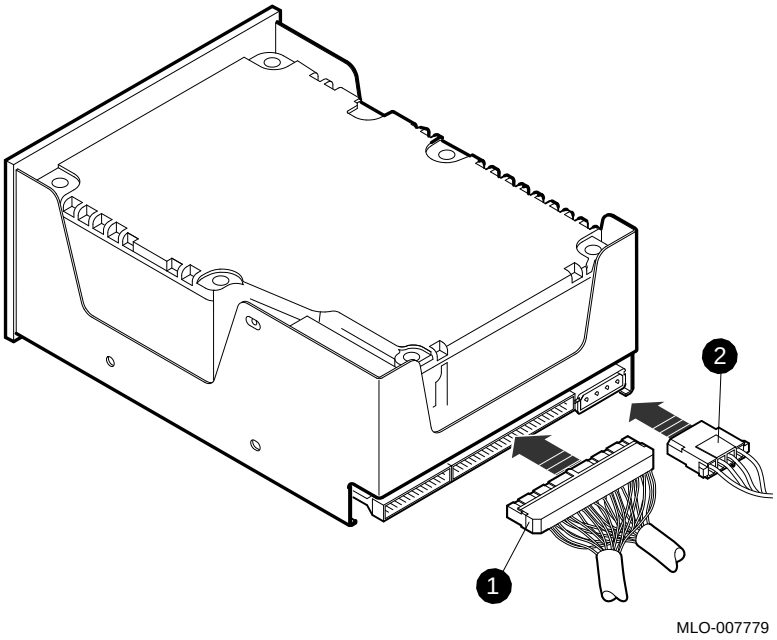
The RZ57 utilizes a drive module (printed circuit board) which is attached to the drive. To replace the drive module on an RZ57, remove the drive as instructed below, and refer to Section 4.9.1.1.1.

To remove an RZ57, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–32), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install an RZ57, reverse the above procedure. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the jumpers to that combination. An example of setting the device ID is shown in Figure 4–33 and Table 4–6.
4. Apply the appropriate SCSI ID label to the device.

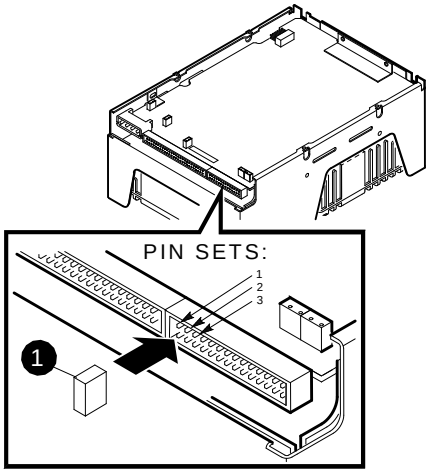
Figure 4–32 Disconnecting/Connecting an RZ57



❶ SCSI connector

❷ Power connector

Figure 4–33 SCSI ID Jumpers on an RZ57



❶ Jumper

Figure 4–33 depicts setting the SCSI ID to "1" as an example.

Table 4–6 RZ57 SCSI Device ID Settings

	Jumper in Position		
To set SCSI ID to:	**1**	**2**	**3**
0	Out	Out	Out
1	In	Out	Out
2	Out	In	Out
3	In	In	Out
4	Out	Out	In
5	In	Out	In
6	Out	In	In
7	In	In	In

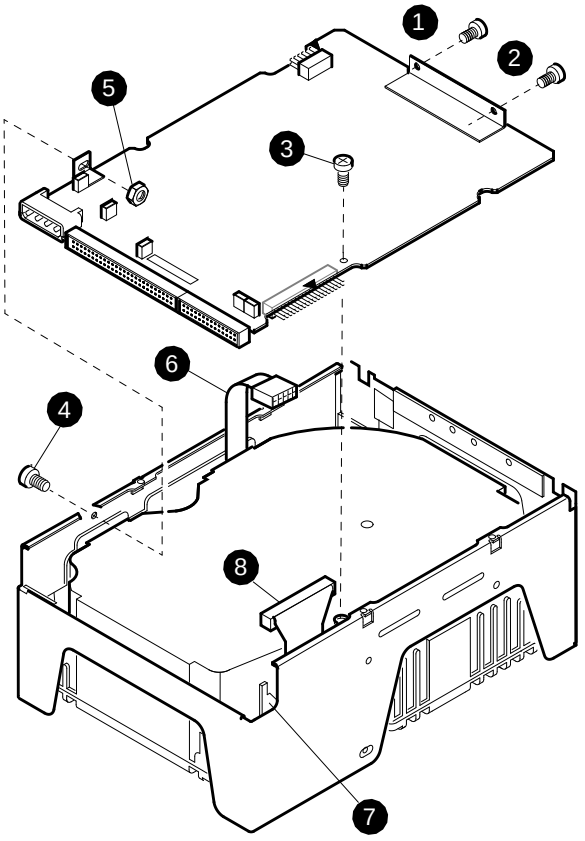
4.9.1.1.1 Replacing RZ57 Drive Module

To replace the drive module on an RZ57, first remove the drive from the mass storage drawer (see Section 4.9.1.1), and follow the steps below:

1. Remove the screws labeled ❶, ❷ and ❸ in Figure 4–34.
2. Remove the 5/32-inch screw ❹.
3. Disconnect the spindle motor cable from its connector.
4. Hold back the clip ❼ while gently lifting the module up and out of the drive.
5. Disconnect the data cable from its connector.

To install a new drive module, reverse the above procedures.

Figure 4–34 Replacing the Drive Module on an RZ57



❶ Screw
❷ Screw
❸ Screw
❹ 5/32-inch screw
❺ Nut
❻ Spindle motor connector
❼ Clip
❽ Data cable

4.9.1.2 Removing/Installing an RZ58

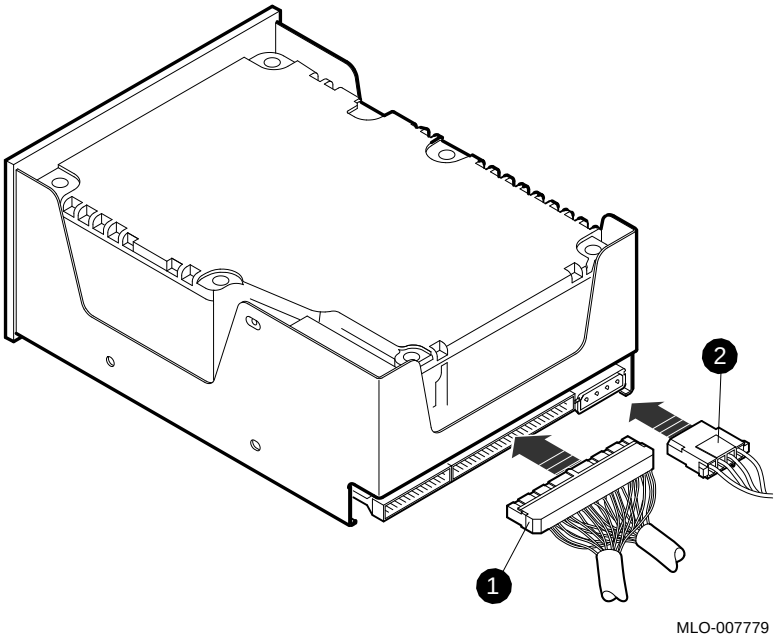
The RZ58 is a full-height device entirely self-contained in the mass storage drawer (it is a nonremovable media device).

To remove an RZ58, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–35), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install an RZ58, reverse the above procedure. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the jumpers to that combination. An example of setting the device ID is shown in Figure 4–36 and Table 4–7.
4. Apply the appropriate SCSI ID label to the device.

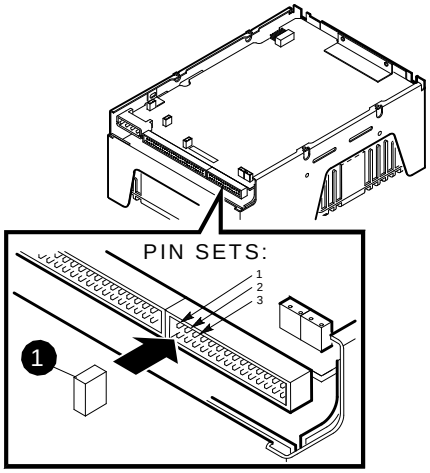
Figure 4–35 Disconnecting/Connecting an RZ58



❶ SCSI connector

❷ Power connector

Figure 4–36 SCSI ID Jumpers on an RZ58



❶ Jumper

Figure 4–36 depicts setting the SCSI ID to "1" as an example.

Table 4–7 RZ58 SCSI Device ID Settings

	Jumper in Position		
To set SCSI ID to:	**1**	**2**	**3**
0	Out	Out	Out
1	In	Out	Out
2	Out	In	Out
3	In	In	Out
4	Out	Out	In
5	In	Out	In
6	Out	In	In
7	In	In	In

4.9.2 Removable Media Devices Contained in Mass Storage Drawers

This section describes the removal and installation of removable media storage devices in a mass storage drawer.

4.9.2.1 Removing/Installing an RRD42

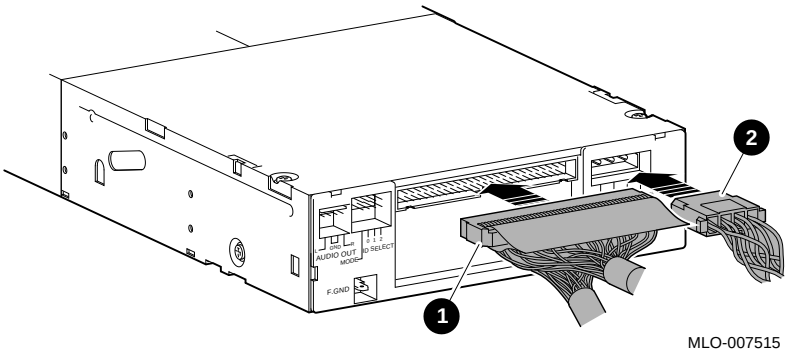
The RRD42 is a half-height device mounted in the removable media slots of the mass storage drawer (right front of the drawer).

To remove an RRD42, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–37), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install an RRD42, reverse the above procedure, making sure to align the front of the device with the filler panel. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the jumpers to that combination. An example of setting the device ID is shown in Figure 4–38 and Table 4–8.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–37 Disconnecting/Connecting an RRD42



❶ SCSI connector

❷ Power connector

Figure 4–38 SCSI ID Jumpers on an RRD42

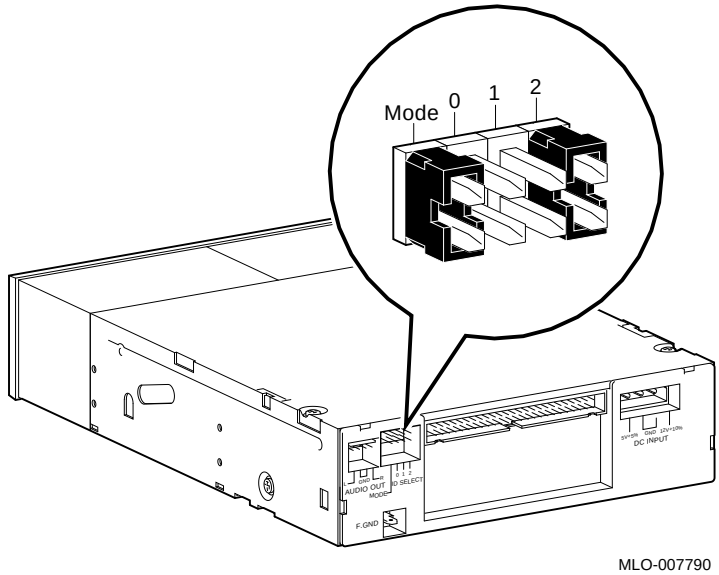


Figure 4–38 shows the SCSI ID set to “4” as an example.

Table 4–8 RRD42 SCSI Device ID Settings

		Jumper in Position		
To set SCSI ID to:	**Parity/Mode**	**0**	**1**	**2**
0	In	Out	Out	Out
1	In	In	Out	Out
2	In	Out	In	Out
3	In	In	In	Out
4	In	Out	Out	In
5	In	In	Out	In
6	In	Out	In	In
7	In	In	In	In

4.9.2.2 Removing/Installing an RX26

The RX26 is mounted in the removable media slots of the mass storage drawer (right front of the drawer).

The FRU part number for an RX26 includes an assembled adapter interface module, and utilizes a drive ID switch to identify the FDD interface in addition to SCSI ID switches. It is necessary to remove the adapter interface module from the device if either the SCSI ID or the drive ID needs to be set.

Removing an RX26

To remove an RX26, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–39), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

Installing an RX26

To install an RX26, there are two switch settings to accomplish: the drive ID switch, and the SCSI ID switches. Both of these settings require the removal of the adapter interface module (see Removing/Installing RX26 Adapter Module). After setting the SCSI and drive IDs, reinstall the RX26 by reversing the above procedure (see Removing an RX26.) Make sure to align the front of the device with the filler panel.

Removing/Installing RX26 Adapter Module

To remove or replace the adapter interface module, disconnect the signal cable from the module to the device at the device end. Remove the four screws which attach the bracket to the device, and lift out the device. See Figure 4–40.

Removing/Installing RX26 Adapter Brackets

Unless you are replacing the adapter interface module itself, it should not be necessary to remove the adapter brackets from the adapter. If necessary, the adapter brackets are attached to the adapter by means of four screws (two each). See Figure 4–41.

Setting RX26 Drive ID Switch

The RX-series drive ID switch is a slide switch on the corner of the device itself which must always be set to identify the particular FDD interface to which the device responds. The factory setting is "0". An RX26 in the DECsystem 5900 system must be set to "2". See Figure 4–42. To access the drive ID switch, you must remove the adapter interface module from the device as described in Removing/Installing RX26 Adapter Module.

Note

Make sure that the drive ID switch on an RX26 (lower right-hand rear corner) in a DECsystem 5900 system is always set to "2". Be careful not to confuse the RX-series device identifier with the SCSI ID switches on the side of the adapter (see Figure 4–42).

4.9.2.2.1 Setting RX26 SCSI ID Switches You must set the SCSI ID address of the device: To access the SCSI ID switches, you must remove the adapter interface module from the device as described in Removing/Installing RX26 Adapter Module.

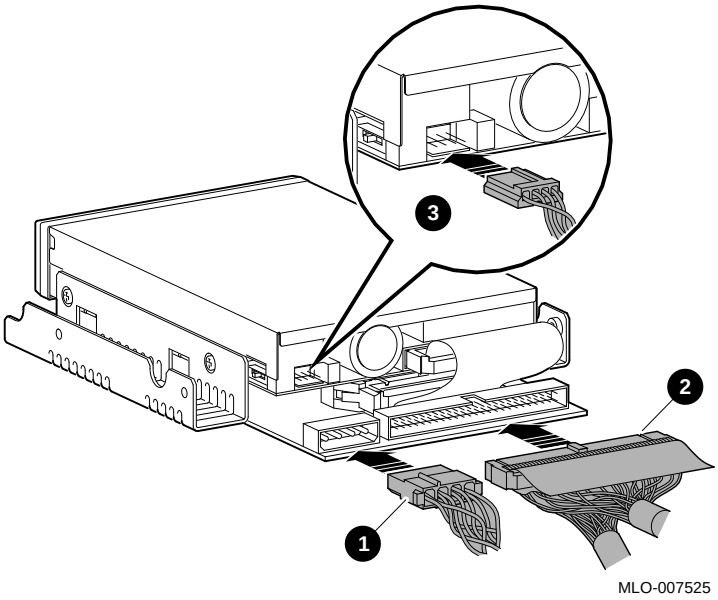
1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches on the adapter to that combination. An example of setting the device ID is shown in Figure 4–43 and Table 4–9.

4. Apply the appropriate SCSI ID label to the device.

Note

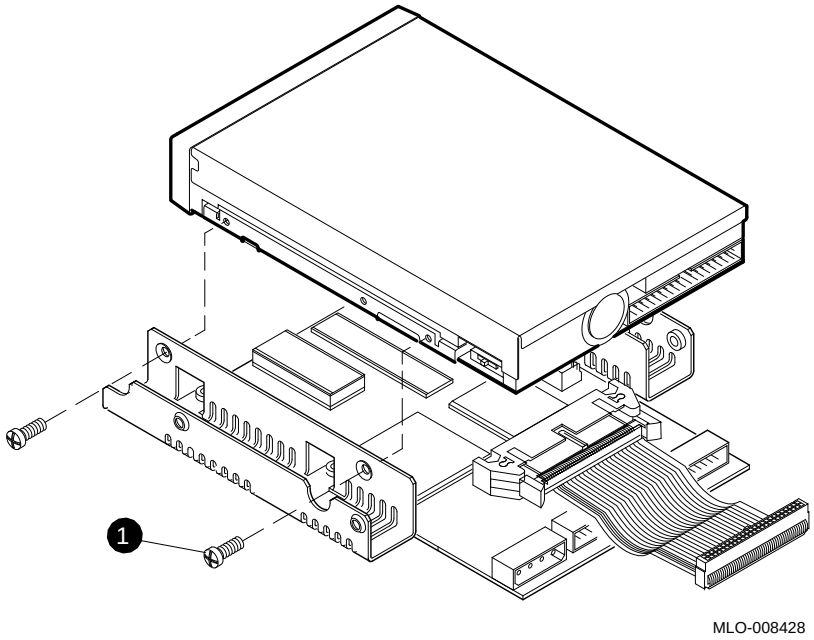
It is not necessary to set the parity on an RX26 device.

Figure 4–39 Disconnecting/Connecting an RX26



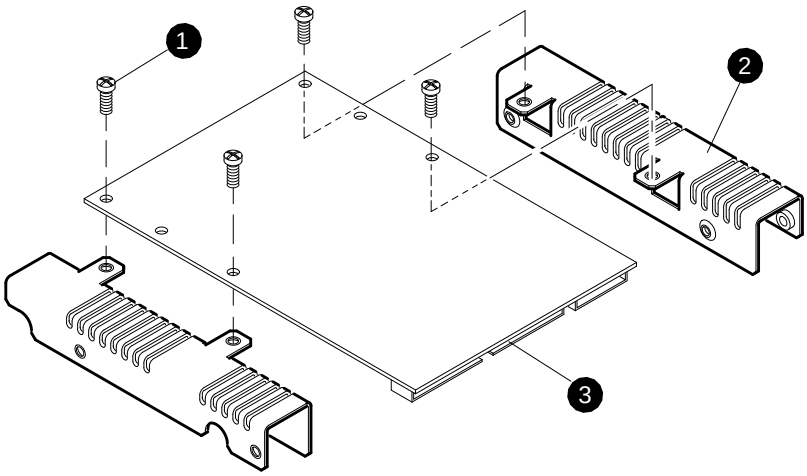
❶ Adapter power connector
❷ SCSI connector
❸ RX26 power connector

Figure 4–40 Disconnecting/Connecting an RX26 Adapter Interface Module



❶ Screws (two from each side)

Figure 4–41 Detaching/Attaching Adapter Brackets

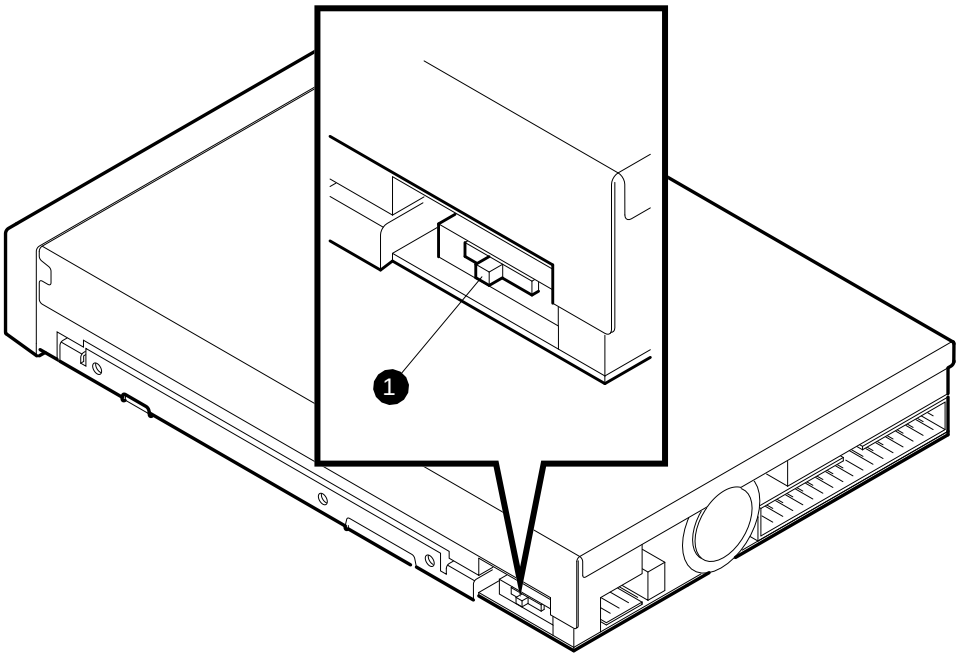


❶ Screws

❷ Bracket

❸ Adapter interface module

Figure 4–42 Setting the RX26 Drive ID Switch



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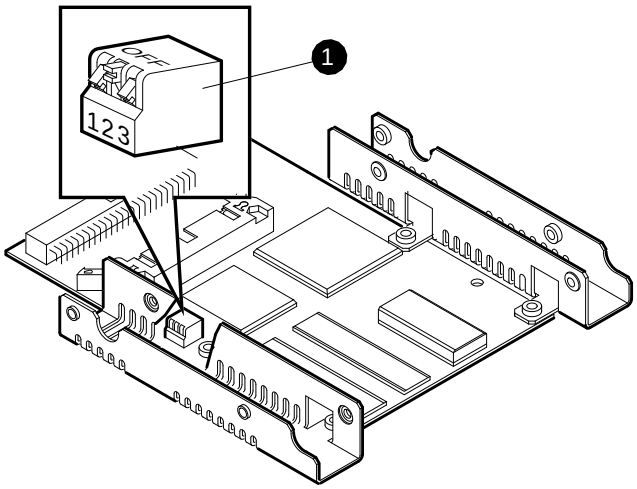
❶ Drive ID switch (always set to “2” for the DECsystem 5900 system)

Figure 4–43 SCSI ID Switches on an RX26



❶ SCSI ID switches

Figure 4–43 shows the SCSI ID set to “5” as an example.

Table 4–9 RX26 SCSI Device ID Settings

	Setting for Switch (On = Down)		
To set SCSI ID to:	**1**	**2**	**3**
0	Up	Up	Up
1	Down	Up	Up
2	Up	Down	Up
3	Down	Down	Up
4	Up	Up	Down
5	Down	Up	Down
6	Up	Down	Down
7	Down	Down	Down

4.9.2.3 TKZ09 (Internal Model)

Note

The TKZ09 is either an internal (to the mass storage drawer) or an external tabletop unit on the DECsystem 5900 system. This section refers to the *internal* model; for removal and replacement of the *external* model, see Section 4.9.3.3.

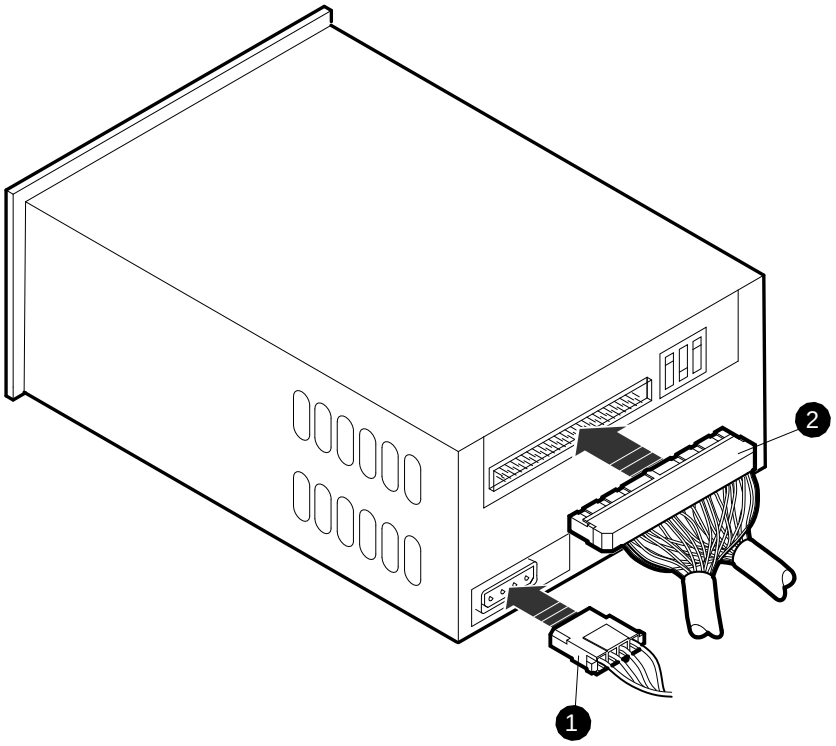
The internal TKZ09 is a full-height device mounted in the removable media slots of the mass storage drawer (right front of the drawer).

To remove an internal TKZ09, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–44), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install an internal TKZ09, reverse the above procedure, making sure to align the front of the device with the filler panel. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches to that combination. An example of setting the device ID is shown in Figure 4–45 and Table 4–10.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–44 Disconnecting/Connecting an Internal TKZ09



❶ Power connector

❷ SCSI connector

Figure 4–45 SCSI ID Switches on an Internal TKZ09

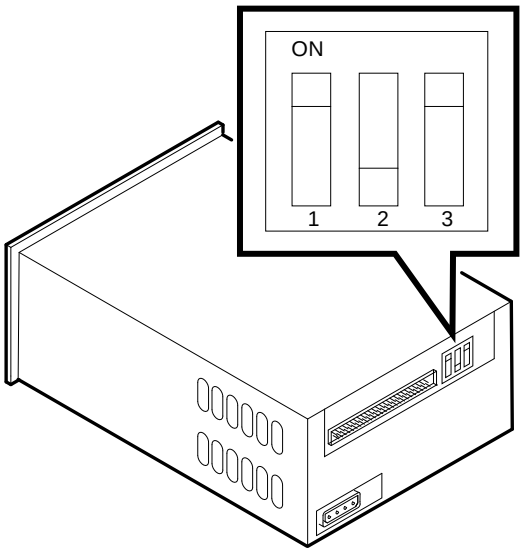


Figure 4–45 shows the SCSI ID set to “5” as an example.

Table 4–10 TKZ09 SCSI Device ID Settings

	Setting for Switch (On = Up)		
To set SCSI ID to:	**1**	**2**	**3**
0	Off	Off	Off
1	On	Off	Off
2	Off	On	Off
3	On	On	Off
4	Off	Off	On
5	On	Off	On
6	Off	On	On
7	On	On	On

4.9.2.4 Removing/Installing an Internal TLZ04

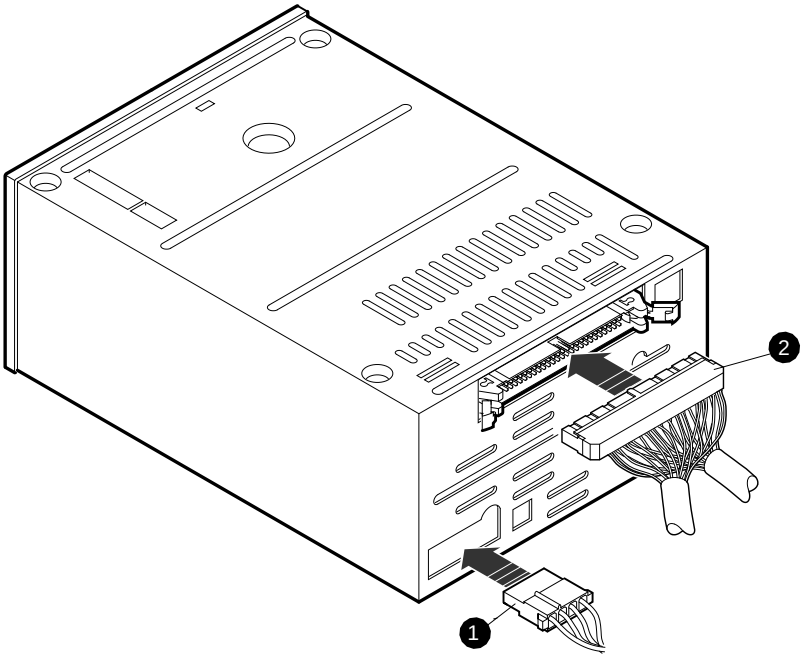
The TLZ04 is a full-height device mounted in the removable media slots in the mass storage drawer (right front of the drawer).

To remove a TLZ04, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–46), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install a TLZ04, reverse the above procedure, making sure to align the front of the device with the filler panel. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the jumpers to that combination. An example of setting the device ID is shown in Figure 4–47 and Table 4–11.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–46 Disconnecting/Connecting a TLZ04



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❶ Power connector

❷ SCSI connector

Figure 4–47 SCSI ID Jumpers on a TLZ04

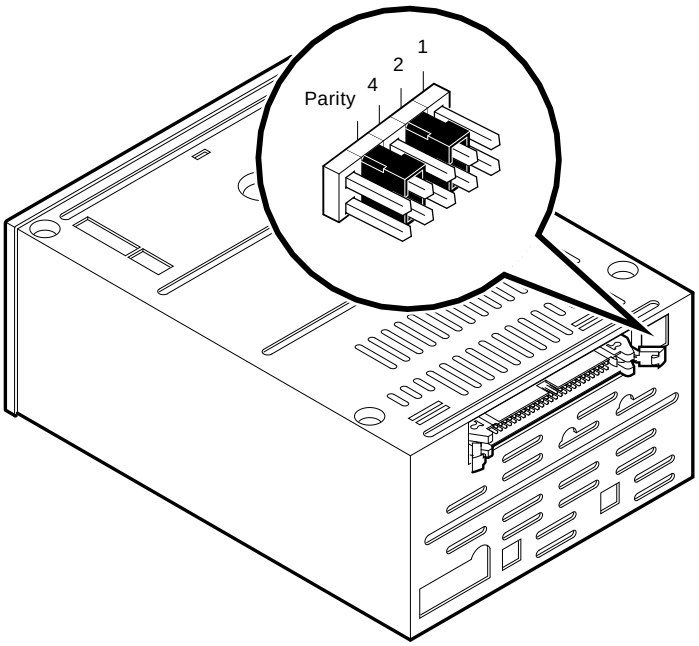


Figure 4–47 shows the SCSI ID set to "6" as an example.

Table 4–11 TLZ04 SCSI Device ID Settings

		Jumper in Position		
To set SCSI ID to:	**Parity/Mode**	**4**	**2**	**1**
0	In	Out	Out	Out
1	In	Out	Out	In
2	In	Out	In	Out
3	In	Out	In	In
4	In	In	Out	Out
5	In	Out	In	Out
6	In	In	In	Out
7	In	In	In	In

4.9.2.5 TLZ06

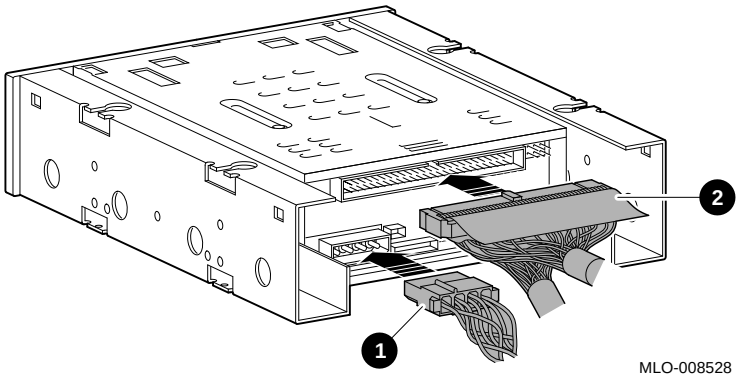
The TLZ06 is a full-height device mounted in the removable media slots of the mass storage drawer (right front of the drawer).

To remove a TLZ06, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–48), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install a TLZ06, reverse the above procedure, making sure to align the front of the device with the filler panel. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches to that combination. An example of setting the device ID is shown in Figure 4–49 and Table 4–12.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–48 Disconnecting/Connecting a TLZ06



❶ Power connector ❷ SCSI connector

Figure 4–49 SCSI ID Switches on a TLZ06

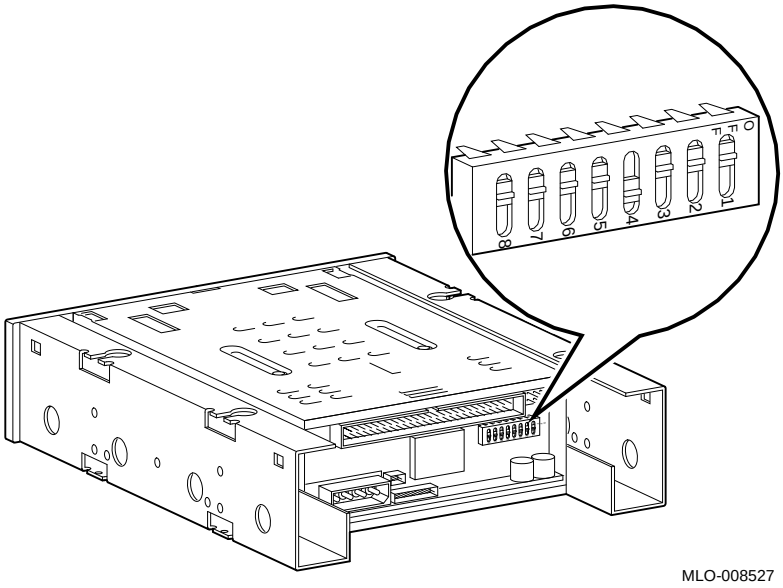


Figure 4–49 shows the SCSI ID set to "0" as an example.

Table 4–12 TLZ06 SCSI Device ID Settings

	Setting for Switch		
To set SCSI ID to:	**S3**	**S2**	**S1**
0	Up	Up	Up
1	Up	Up	Down
2	Up	Down	Up
3	Up	Down	Down
4	Down	Up	Up
5	Down	Up	Down
6	Down	Down	Up
7	Down	Down	Down

4.9.2.6 Removing/Installing a TZ30

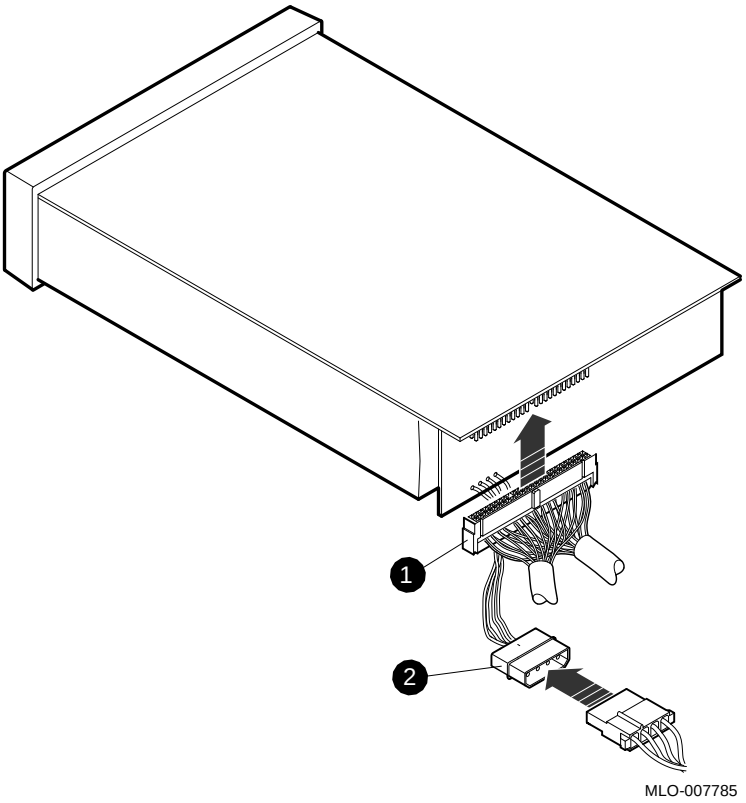
The TZ30 is a half-height device mounted in the removable media slots of the mass storage drawer (right front of the drawer).

To remove a TZ30, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–50), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install a TZ30, reverse the above procedure, making sure to align the front of the device with the filler panel. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches to that combination. An example of setting the device ID is shown in Figure 4–51 and Table 4–13.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–50 Disconnecting/Connecting a TZ30



❶ SCSI connector

❷ Power connector

Figure 4–51 SCSI ID Switches on a TZ30

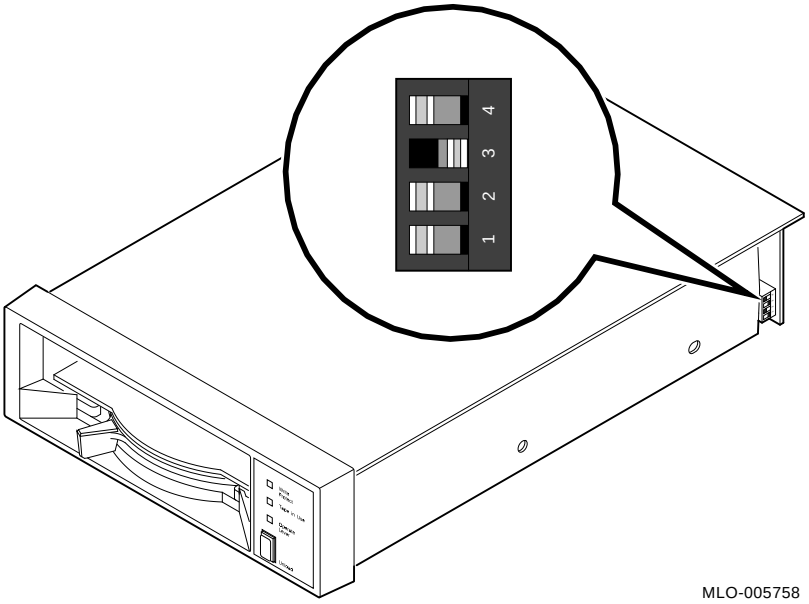


Figure 4–51 shows the SCSI ID set to “5” as an example.

Table 4–13 TZ30 SCSI Device ID Settings

	Setting for Switch			
To set SCSI ID to:	**Parity/1**	**2**	**3**	**4**
0	Left	Right	Right	Right
1	Left	Left	Right	Right
2	Left	Right	Left	Right
3	Left	Left	Left	Right
4	Left	Right	Right	Left
5	Left	Left	Right	Left
6	Left	Right	Left	Left
7	Left	Left	Left	Left

4.9.2.7 Removing/Installing an Internal TZ85

Note

The TZ85 is either an internal (to the mass storage drawer) or an external tabletop unit on the DECsystem 5900 system. This section refers to the *internal* model; for removal and replacement of the *external* model, see Section 4.9.3.5.

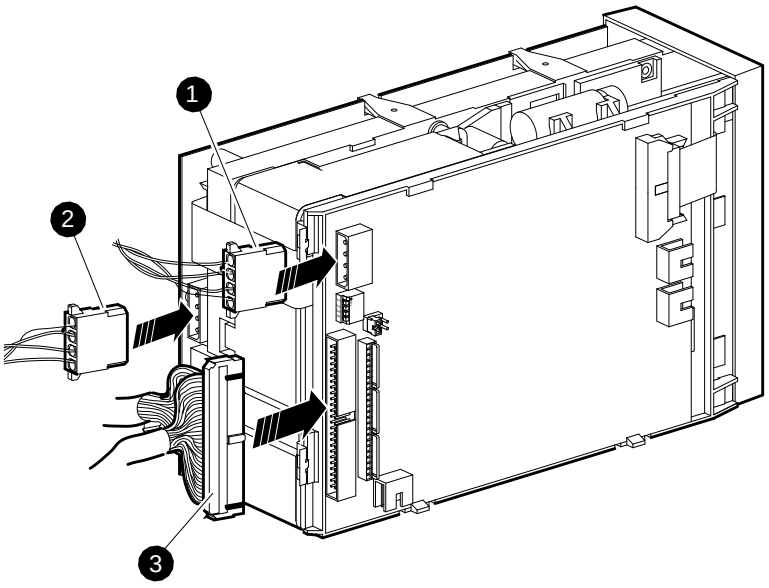
The internal TZ85 is a full-height device mounted in the removable media slots of the mass storage drawer (right front of the drawer).

To remove an internal TZ85, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–52), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install a TZ85, reverse the above procedure, making sure to align the front of the device with the filler panel. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches to that combination. An example of setting the device ID is shown in Figure 4–53 and Table 4–14.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–52 Disconnecting/Connecting an Internal TZ85



❶ Adapter power connector

❷ TZ85 power connector

❸ SCSI connector

Figure 4–53 SCSI ID Switches on an Internal TZ85

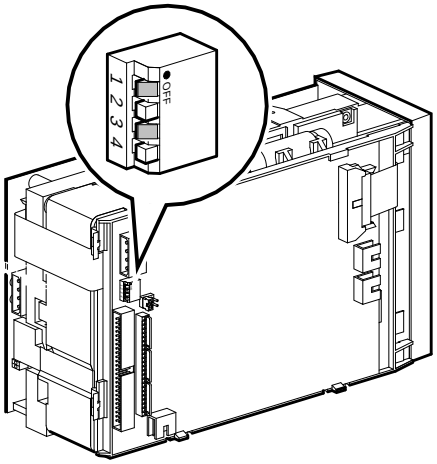


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Figure 4–53 shows the SCSI ID set to "2" as an example.

Table 4–14 Internal TZ85 SCSI Device ID Settings

	Setting for Switch (On = Down)			
To set SCSI ID to:	**Parity/1**	**2**	**3**	**4**
0	On	Off	Off	Off
1	On	On	Off	Off
2	On	Off	On	Off
3	On	On	On	Off
4	On	Off	Off	On
5	On	On	Off	On
6	On	Off	On	On
7	On	On	On	On

4.9.2.8 Removing/Installing a TZK10

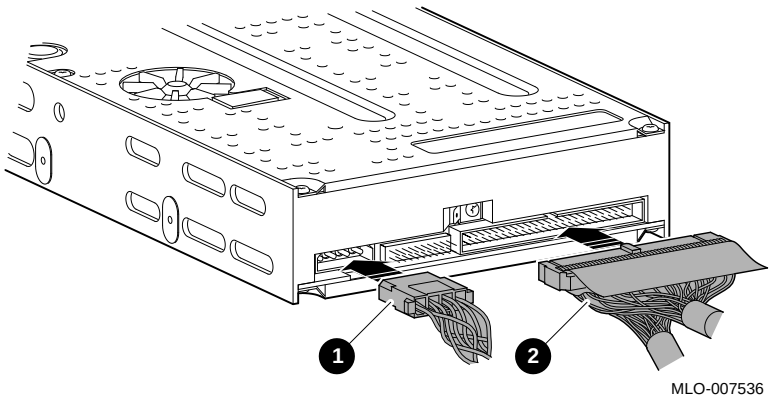
The TZK10 is a full-height device mounted in the removable media slots of the mass storage drawer (right front of the drawer).

To remove a TZK10, mark and disconnect the power and SCSI leads to that particular device (see Figure 4–54), and remove the device from the drawer. See Section 4.4.3 if you have a mass storage drawer 1, or Section 4.5.2 if you have a mass storage drawer 2. (To identify mass storage drawers 1 and 2, see Section 4.3.)

To install a TZK10, reverse the above procedure, making sure to align the front of the device with the filler panel. In addition, you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the jumpers to that combination. An example of setting the device ID is shown in Figure 4–55 and Table 4–15.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–54 Disconnecting/Connecting a TZK10



❶ Power connector ❷ SCSI connector

Figure 4–55 SCSI ID Jumpers on a TZK10

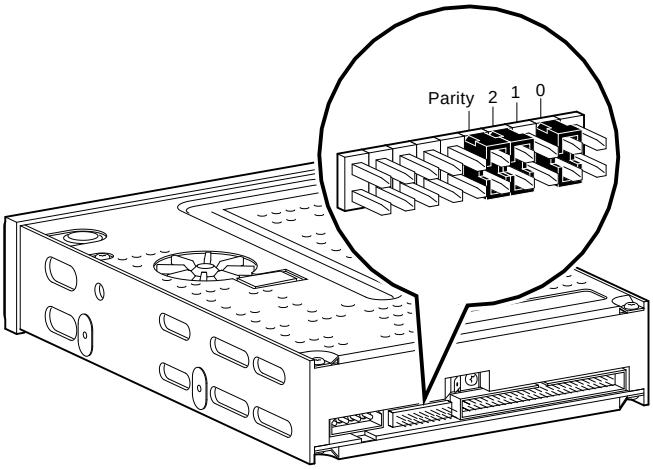


Figure 4–55 shows the SCSI ID set to “5” as an example.

Table 4–15 TZK10 SCSI Device ID Settings

		Jumper in Position		
To set SCSI ID to:	**Parity/Mode**	**2**	**1**	**0**
0	In	Out	Out	Out
1	In	Out	Out	In
2	In	Out	In	Out
3	In	Out	In	In
4	In	In	Out	Out
5	In	In	Out	In
6	In	In	In	Out
7	In	In	In	In

4.9.3 Removing/Installing External Options

This section describes the removal and installation of external tabletop or standalone options.

4.9.3.1 StorageServer 100

Note

The StorageServer 100 is either a rackmounted device which occupies a slot in the DECsystem 5900 enclosure, or an external standalone device. This section refers to the *external standalone* model; for removal and replacement of the *rackmounted* model, see Section 4.9.4.1.

If you are installing a new StorageServer 100, see the *DECsystem 5900 StorageServer 100 Installation Guide*, EK–D59SS–IN for complete installation instructions.

The external and rackmounted StorageServer 100 are similar in many respects: diagnostics are found in Section 4.9.4.1.7, power-on tests in Section 4.9.4.1.8, and a description of the config command in Section 4.9.4.1.9.

An external StorageServer 100 is disconnected/connected via a SCSI cable from one of the SCSI cable connectors to the appropriate SCSI slot on the rear of the DECsystem 5900 CPU drawer (see Figure 4–56). Disconnect/connect the SCSI connector and the power cable connector when removing or installing the external StorageServer 100.

To install an external StorageServer 100, you must set the SCSI ID address of the device:

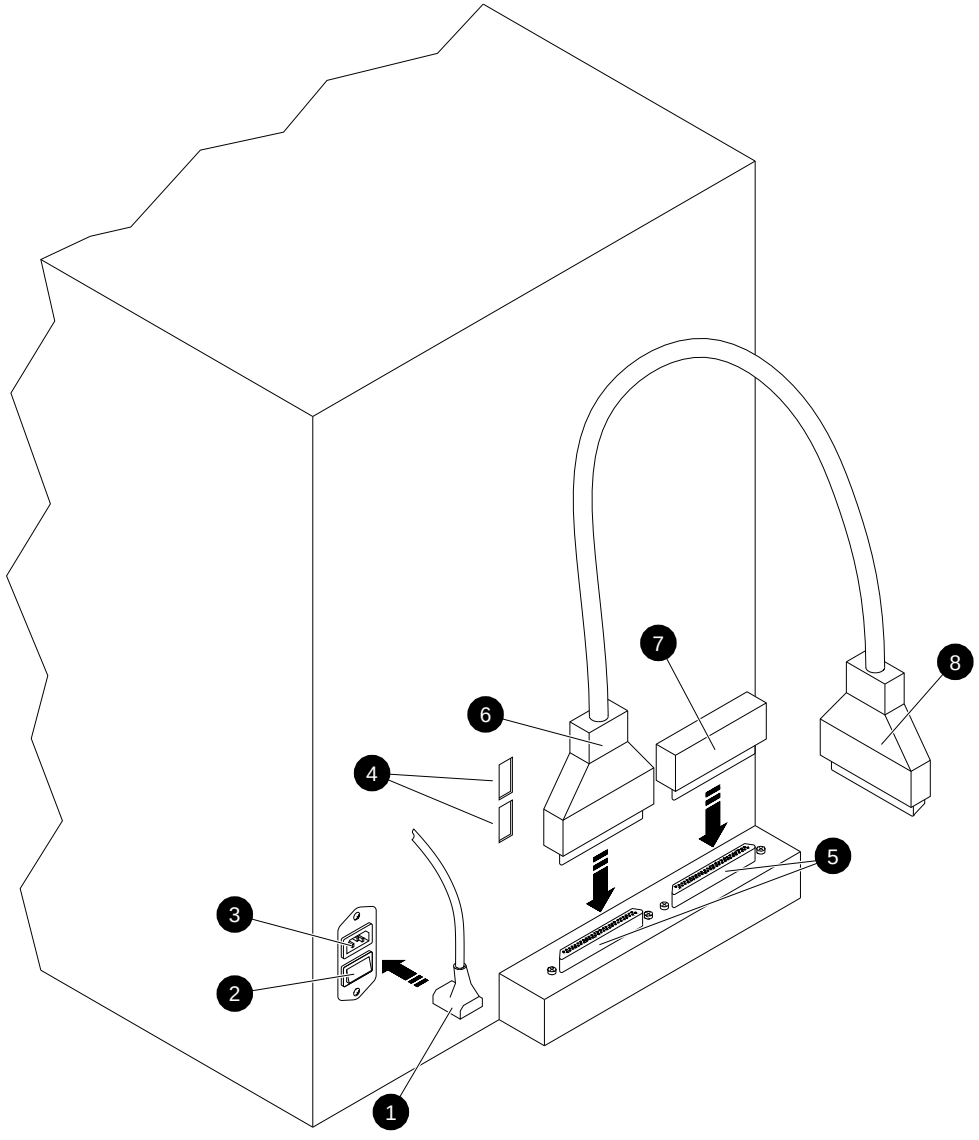
Note

The StorageServer 100 has two optical disk drives enclosed in its cabinet; each must be assigned a SCSI ID. In addition, the autochanger controller must be assigned a third SCSI ID.

1. If you are replacing one StorageServer 100 with another one (in the same configuration), note the optical disk SCSI ID settings of the device you are removing.

2. Set the optical disk switches to that combination. The default setting for optical disk drive one is 4; the default for drive two is 5. If a second StorageServer 100 is connected on the same SCSI bus, its optical disk settings are 1 and 2. An example of setting the device ID for optical disks is shown in Figure 4–57 and Table 4–16. The SCSI ID switches are six, seven, and eight. Drive one switches are on the left as you view the numbers; drive two switches are on the right.
3. Use the front panel to set the SCSI ID for the autochanger controller. The default setting is 3; if a second StorageServer 100 is connected on the same SCSI bus, its SCSI ID should be 0. Use the control panel to set the autochanger controller SCSI ID:
   a. Switch on the StorageServer 100 power.
   b. When the display shows READY, press the OPTION switch; TEST * is displayed.
   c. Press the NEXT switch; CONF * is displayed.
   d. Press the NEXT switch; INFO * is displayed.
   e. Press the NEXT switch; SCSI ID is displayed.
   f. Press the ENTER switch; SCSI ID 3 is displayed.
   g. Press the NEXT switch until the address you want is displayed.
   h. Press the ENTER switch.
4. Apply the appropriate SCSI ID labels to the device.

Figure 4–56 External StorageServer 100 Rear Panel



❶ Power cord from the power controller

❷ Power switch

❸ Power connector

❹ SCSI ID address select switches

❺ SCSI ports

❻ 50-pin connector to the SCSI port on the StorageServer 100

❼ SCSI terminator

❽ 68-pin connector to the SCSI port on the DECsystem 5900 system

Figure 4–57 External StorageServer 100 SCSI ID Switches

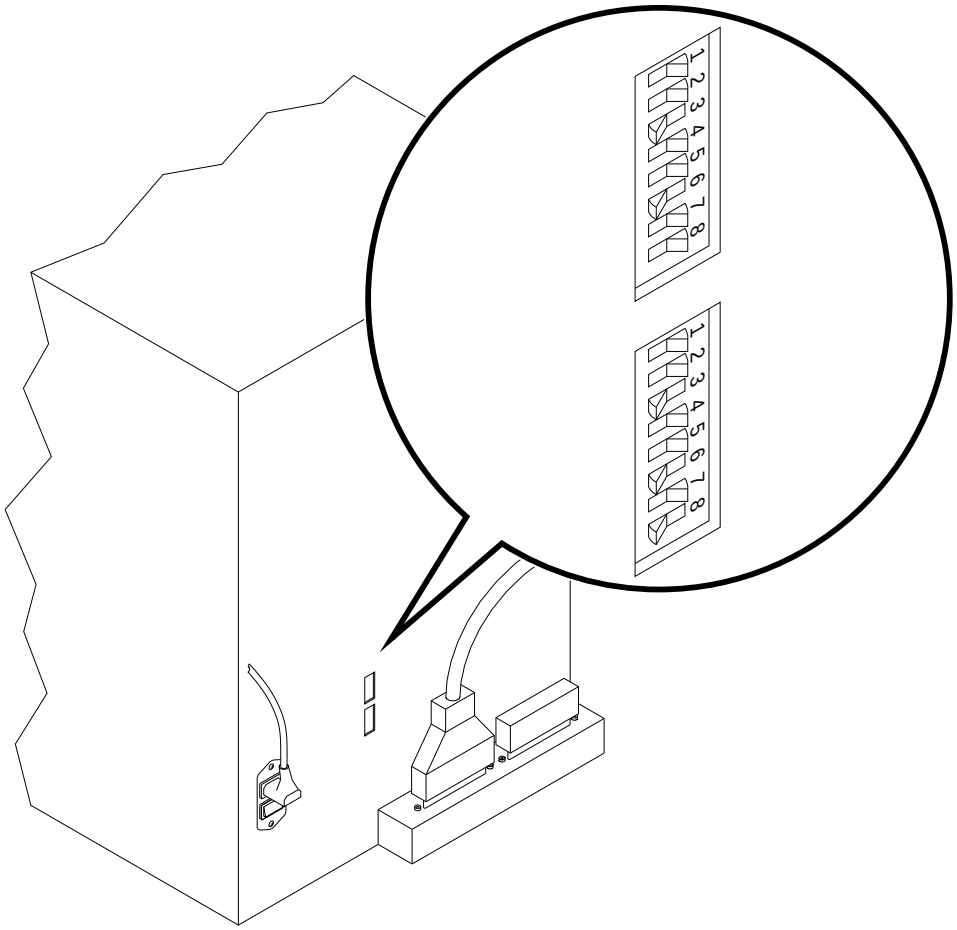


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Figure 4–57 shows the SCSI ID switches for optical drive one set to “4” as an example, and the switches for drive two set to “5” (the default settings).

Table 4–16 StorageServer 100 SCSI Device ID Settings

	Setting for Switch (On = Up)		
To set SCSI ID to:	**6**	**7**	**8**
0	Off	Off	Off
1	Off	Off	On
2	Off	On	Off
3	Off	On	On
4 (drive 1 def)	On	Off	Off
5 (drive 2 def)	On	Off	On
6	On	On	Off
7	On	On	On

4.9.3.2 TKZ08

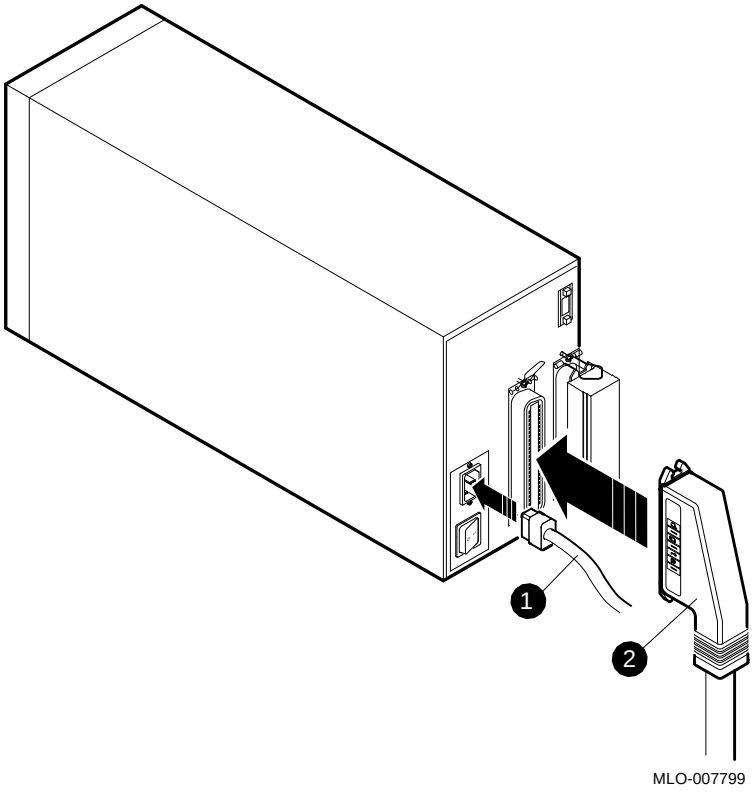
The TKZ08 is an external tabletop unit on the DECsystem 5900 system.

A TKZ08 is disconnected/connected via SCSI cable from one of the SCSI connectors on the TKZ08 (the other is where it is terminated) to the appropriate SCSI slot on the rear of the DECsystem 5900 CPU drawer (see Figure 4–58). Disconnect/connect the SCSI connector and the power cable connector when removing or installing a TKZ08.

To install a TKZ08 you must set the SCSI ID address of the device:

1. Refer to Section 4.8 to determine the SCSI ID to assign to the device.
2. Set the switch on the back of the unit to that combination by pressing with a pointed object on either of the “buttons” beside the indicator to increment it up or down. An example of setting the device ID is shown in Figure 4–59.
3. Apply the appropriate SCSI ID label to the device.

Figure 4–58 Disconnecting/Connecting a TKZ08



❶ Power connector ❷ SCSI connector

Figure 4–59 SCSI ID Incremental Switch on a TKZ08

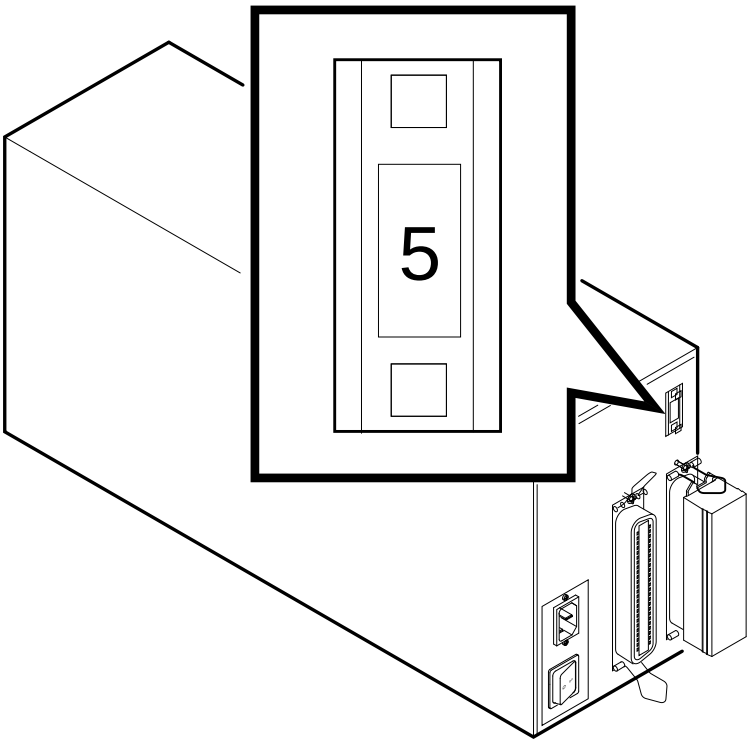


Figure 4–59 shows the SCSI ID set to “5” as an example.

4.9.3.3 TKZ09 (External Model)

Note

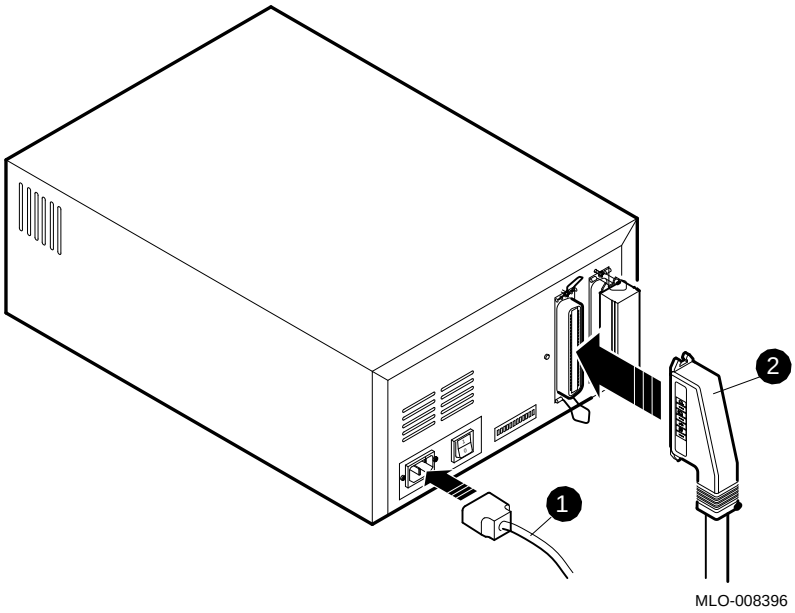
The TKZ09 is either an internal (to the mass storage drawer) or an external tabletop unit on the DECsystem 5900 system. This section refers to the *external* model; for removal and replacement of the *internal* model, see Section 4.9.2.3.

An external TKZ09 is disconnected/connected via SCSI cable from one of the SCSI connectors on the TKZ09 (the other is where it is terminated) to the appropriate SCSI slot on the rear of the DECsystem 5900 CPU drawer (see Figure 4–60). Disconnect/connect the SCSI connector and the power cable connector when removing or installing an external TKZ09.

To install a TKZ09 you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches to that combination. An example of setting the device ID is shown in Figure 4–61 and Table 4–17.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–60 Disconnecting/Connecting an External TKZ09



❶ Power connector

❷ SCSI connector

Figure 4–61 SCSI ID Switches on a TKZ09

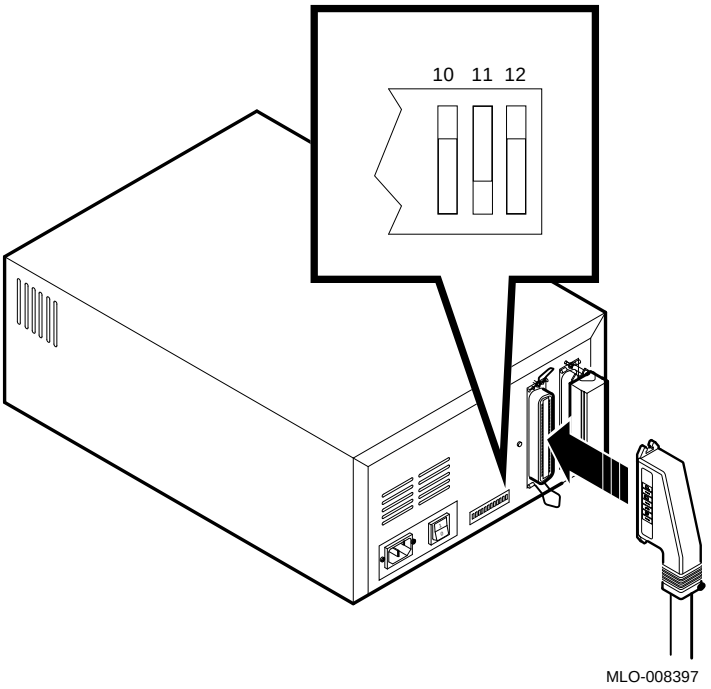


Figure 4–61 shows the SCSI ID set to “5” as an example.

Table 4–17 TKZ09 SCSI Device ID Settings

	Setting for Switch (On = Up)		
To set SCSI ID to:	**10**	**11**	**12**
0	Off	Off	Off
1	Off	Off	On
2	Off	On	Off
3	Off	On	On
4	On	Off	Off
5	On	Off	On
6	On	On	Off
7	On	On	On

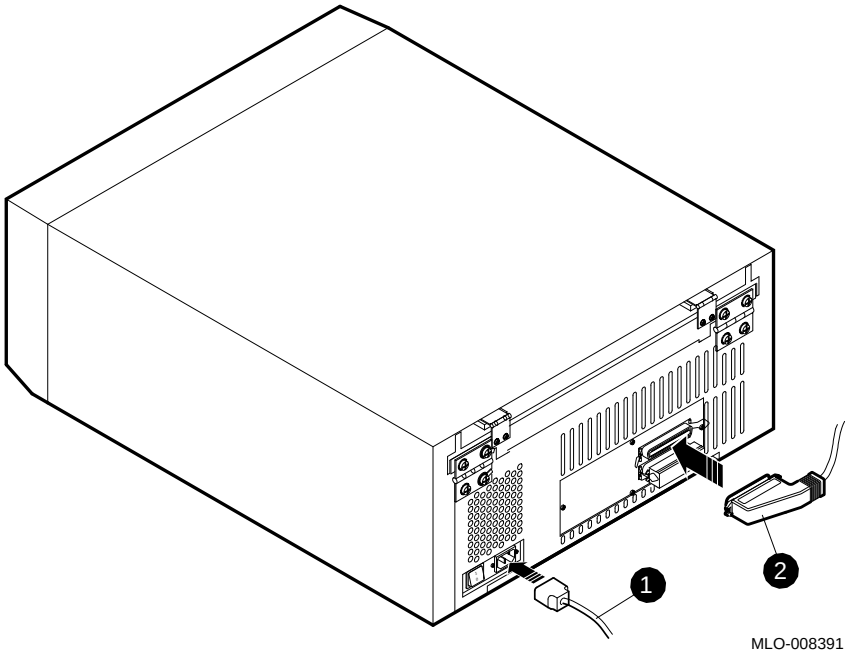
4.9.3.4 TSZ07

A TSZ07 is disconnected/connected via SCSI cable from one of the SCSI connectors on the TSZ07 (the other is where it is terminated) to the appropriate SCSI slot on the rear of the DECsystem 5900 CPU drawer (see Figure 4–62). Disconnect/connect the SCSI connector and the power cable connector when removing or installing a TSZ07.

The SCSI ID is known as a "unit address" on the TSZ07. To install a TSZ07 you must set the unit address of the device:

1. Refer to Section 4.8 to determine the SCSI ID (unit address) to assign to the device.
2. The TSZ07 is shipped from the factory with a default unit address of "4". Use the switches on the front of the TSZ07 to change the unit address, if necessary:
   a. Switch on the power switches.
   b. If the on-line indicator is on, press the ONLINE switch so the indicator goes off.
   c. Press the WRT EN/TEST switch.
   d. Press the DENSITY SELECT switch.
   e. Press the LOAD/REWIND switch.
   f. Press the WRT EN/TEST switch.
   g. Press the UNLOAD switch.
   h. Press the DENSITY SELECT switch; the alphanumeric display shows the message UNIT (unit address).
   i. Press the ONLINE switch to enter the change mode.
   j. Press either the LOAD/REWIND or the UNLOAD switch to step to the next parameter value.
   k. Press the ONLINE switch to enter the desired parameter value (unit address); the drive returns to the review mode.
   l. Press and hold the DENSITY SELECT switch and then press the WRT EN/TEST switch to save the new setting in nonvolatile memory and to exit the service aid. The message SAVING appears on the display.
3. Apply the appropriate SCSI ID label to the device.

Figure 4–62 Disconnecting/Connecting a TSZ07



❶ Power connector

❷ SCSI connector

4.9.3.5 TZ85

Note

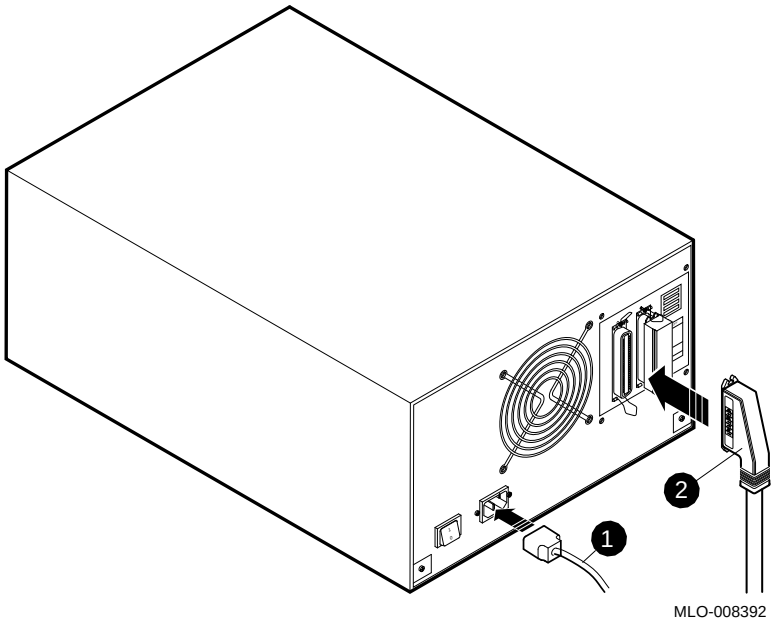
The TZ85 is either an internal (to the mass storage drawer) or an external tabletop unit on the DECsystem 5900 system. This section refers to the *external* model; for removal and replacement of the *internal* model, see Section 4.9.2.7.

An external TZ85 is disconnected/connected via SCSI cable from one of the SCSI connectors on the TZ85 (the other is where it is terminated) to the appropriate SCSI slot on the rear of the DECsystem 5900 CPU drawer (see Figure 4–63). Disconnect/connect the SCSI connector and the power cable connector when removing or installing an external TZ85.

To install a TZ85 you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches to that combination. An example of setting the device ID is shown in Figure 4–64 and Table 4–18.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–63 Disconnecting/Connecting an External TZ85



❶ Power connector

❷ SCSI connector

Figure 4–64 SCSI ID Switches on an External TZ85

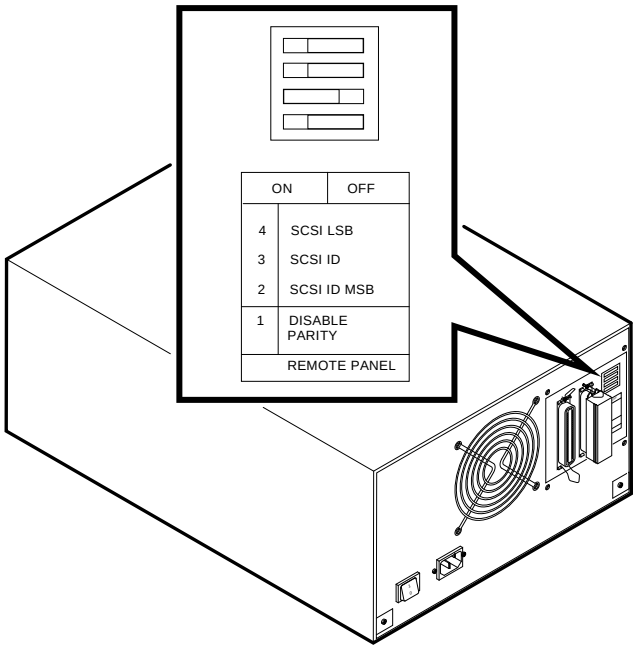


Figure 4–64 shows the SCSI ID set to “6” as an example.

Table 4–18 External TZ85 SCSI Device ID Settings

	Setting for Switch (Left = On)			
To set SCSI ID to:	**Parity/1**	**2**	**3**	**4**
0	Left	Right	Right	Right
1	Left	Left	Right	Right
2	Left	Right	Left	Right
3	Left	Left	Left	Right
4	Left	Right	Right	Left
5	Left	Left	Right	Left
6	Left	Right	Left	Left
7	Left	Left	Left	Left

4.9.3.6 TZ857

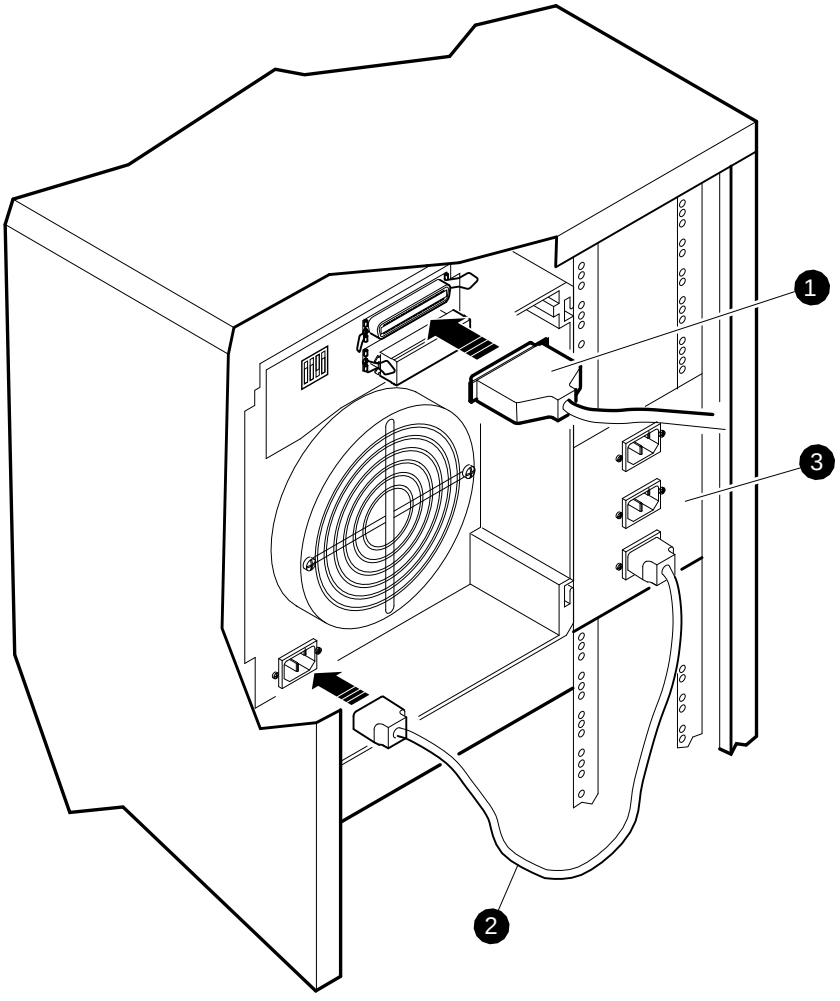
The TZ857 is an external tabletop unit on the DECsystem 5900 system.

A TZ857 is disconnected/connected via SCSI cable from one of the SCSI connectors on the TZ857 (the other is where it is terminated) to the appropriate SCSI slot on the rear of the DECsystem 5900 CPU drawer (see Figure 4–65). Disconnect/connect the SCSI connector and the power cable connector when removing or installing a TZ857.

To install a TZ857 you must set the SCSI ID address of the device:

1. If you are replacing one SCSI device with another one (in the same configuration), note the SCSI ID of the device you are removing, and skip to step 3.
2. If you are installing a new device or changing the configuration, refer to Section 4.8 to determine the SCSI ID to assign to the device.
3. Set the switches to that combination. An example of setting the device ID is shown in Figure 4–66 and Table 4–19.
4. Apply the appropriate SCSI ID label to the device.

Figure 4–65 Disconnecting/Connecting a TZ857



❶ SCSI connector

❷ Power connector

❸ Cabinet outlet

Figure 4–66 SCSI ID Switches on a TZ857

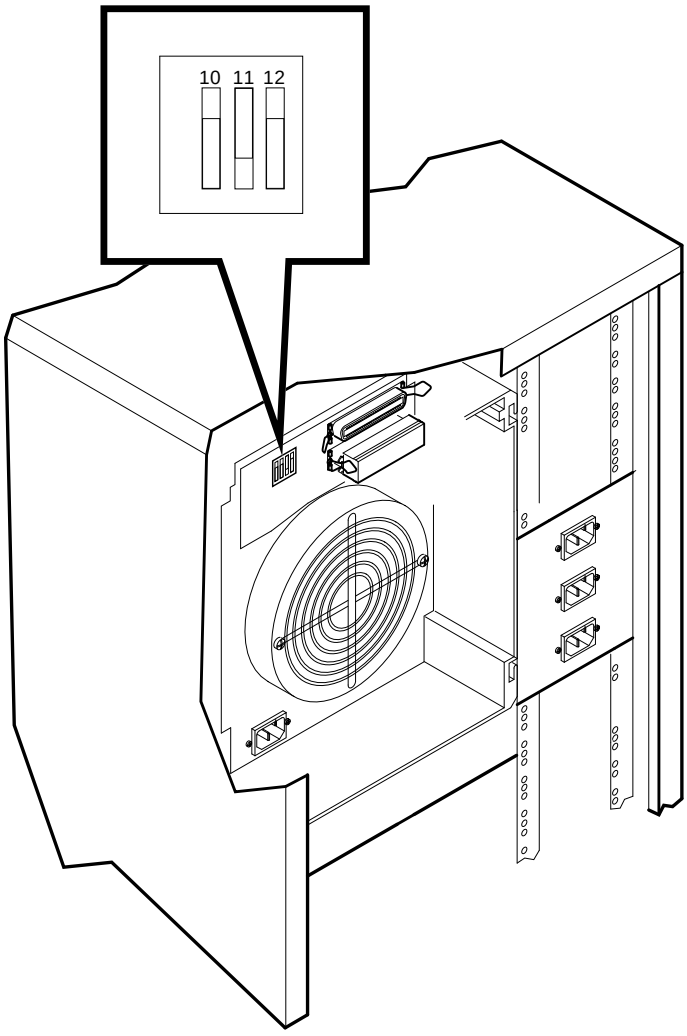


Figure 4–66 shows the SCSI ID set to “5” as an example.

Table 4–19 TZ857 SCSI Device ID Settings

	Setting for Switch (On = Up)			
To set SCSI ID to:	**Parity/9**	**10**	**11**	**12**
0	On	Off	Off	Off
1	On	On	Off	Off
2	On	Off	On	Off
3	On	On	On	Off
4	On	Off	Off	On
5	On	On	Off	On
6	On	Off	On	On
7	On	On	On	On

4.9.4 Removing/Installing Rackmounted Options

This section describes the removal and installation of rackmounted options.

4.9.4.1 StorageServer 100 (Rackmounted)

Note

The StorageServer 100 is either a rackmounted device which occupies a slot in the DECsystem 5900 enclosure, or an external standalone device. This section refers to the *rackmounted* model; for removal and replacement of the *external* model, see Section 4.9.3.1.

If you are installing a new rackmounted StorageServer 100, see the *DECsystem 5900 StorageServer 100 Installation Guide*, EK–D59SS–IN for complete installation instructions.

WARNING

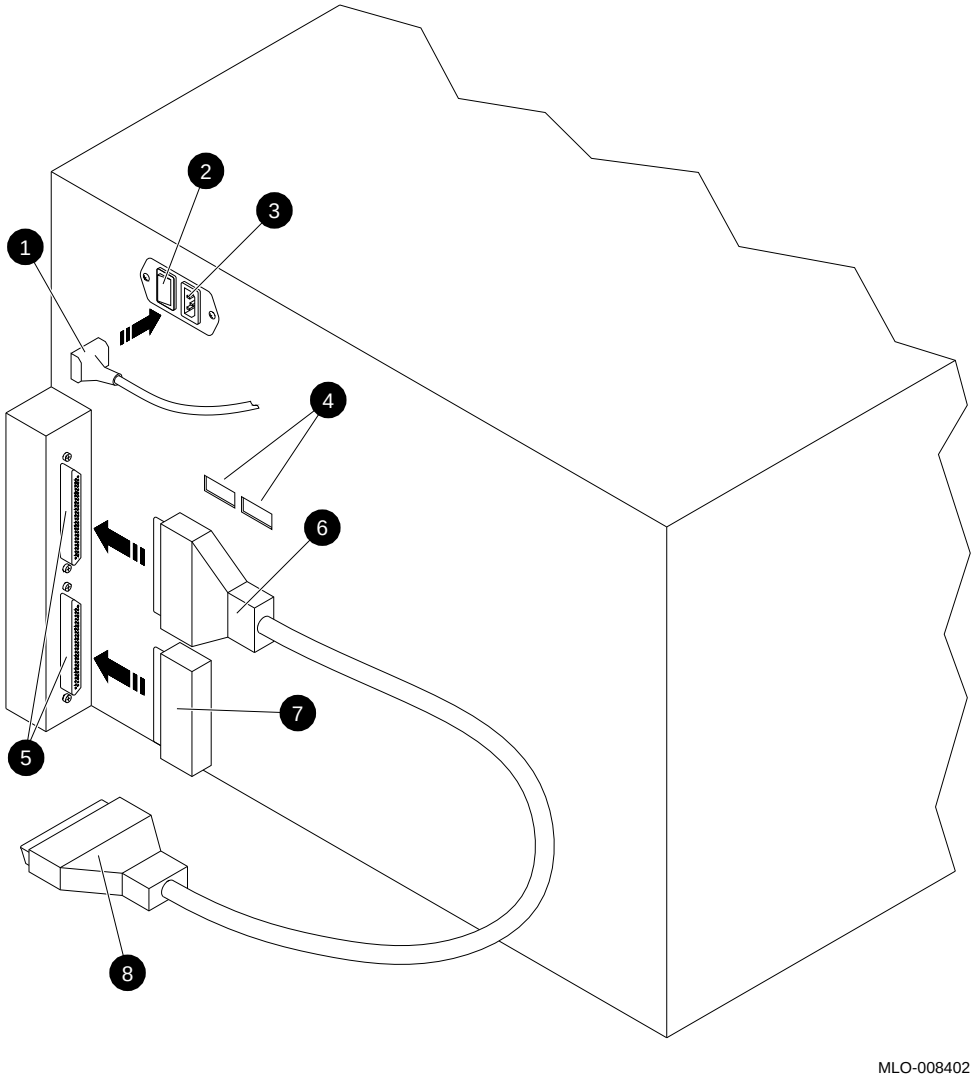
- **Two stepladders or stools are required to service the upper drawers in a DECsystem 5900 system (slots 5 and 6).**
- **Four people are needed to complete the installation or removal of the rackmounted StorageServer 100.**

This section describes the reinstallation or replacement of a rackmounted StorageServer 100 in the DECsystem 5900 system when the slides and cross bracket are already in the cabinet. (Procedures for the assembly and installation of the rackmount slides and cross bracket are found in Section 4.9.4.1.6.)

4.9.4.1.1 Connecting/Disconnecting a Rackmounted StorageServer 100

A rackmounted StorageServer 100 is disconnected/connected via SCSI cable from one of the SCSI connectors to the appropriate SCSI slot on the rear of the DECsystem 5900 CPU drawer (see Figure 4–67). Disconnect/connect the SCSI connector and the power cable connector when removing or installing the rackmounted StorageServer 100.

Figure 4–67 Disconnecting/Connecting a Rackmounted StorageServer 100



❶ Power cord from the power controller

❷ Power switch

❸ Power connector

❹ SCSI ID address select switches

❺ SCSI ports

❻ 50-pin connector to the SCSI port on StorageServer 100

❼ Terminator

❽ 68-pin connector to the SCSI port on the DECsystem 5900 system

4.9.4.1.2 Removing the Rackmounted StorageServer 100 This section describes the removal of the rackmounted StorageServer 100 from the rackmount slides and cross bracket. If it is also necessary to dissassemble and remove the rackmount slides and cross bracket, reverse the assembly and installation procedures found in Section 4.9.4.1.6.

Before removing a rackmounted StorageServer 100 from the DECsystem 5900 system for repair or replacement, the SCSI and power cables must be disconnected (see Section 4.9.4.1.1).

Removing the Dress Mid Panel

Before you remove the StorageServer 100 from slots 1 and 2, you must remove the dress mid panel (see Section 4.9.4.1.3) that is located immediately below slot 1 (it covers slot 0) by removing the four hex screws which attach it to the cabinet rails (see Figure 4–71).

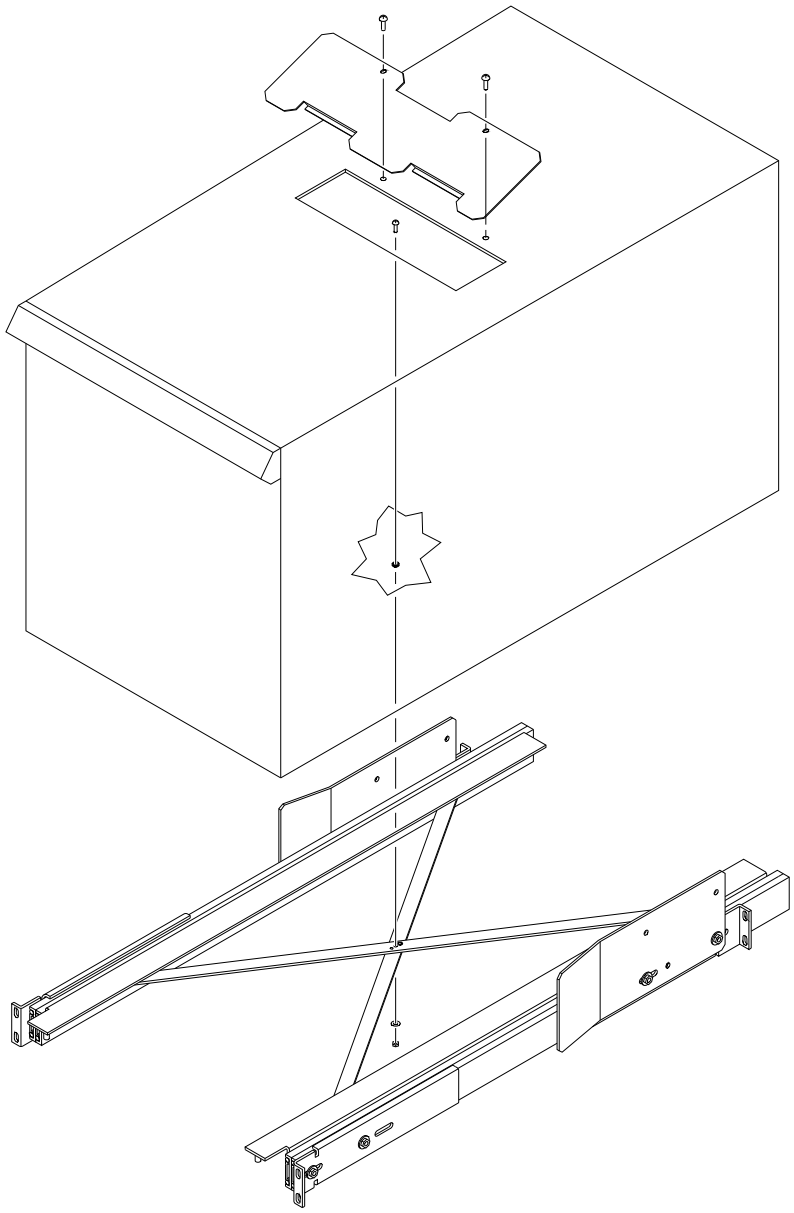
WARNING

- **Four people are needed to lift the rackmounted StorageServer 100 off its slides.**
- **The stabilizer bar must be properly extended whenever a rackmounted device is pulled out from the DECsystem 5900 cabinet.**

1. Clear a workspace for the StorageServer 100 before it is removed from the cabinet.
2. To release the StorageServer 100, remove the hex screws on the front of the bracket support.
3. Pull the StorageServer 100 out from the cabinet so that the top may be accessed.
4. Use a T-15 TORX to remove the two screws that secure the access latch to the top of the StorageServer 100 and remove the latch (see Figure 4–68).

5. Reaching down into the StorageServer 100 through the access latch, remove the screw which fastens the StorageServer 100 to the cross bracket underneath. Use a small wrench to hold the nut from the bottom.
6. With the assistance of three other persons, lift the StorageServer 100 off the slides and place it on the workspace.

Figure 4–68 Removing the StorageServer 100 from the Cabinet



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4.9.4.1.3 Installing the Dress Mid Panel

Before you install the StorageServer 100 in slots 1 and 2, you must remove the filler panel (see Section 3.1.3) that is located immediately below slot 1 (it covers slot 0). Replace it with the dress mid panel as follows (see Figure 4–71):

1. Counting up from the bottom, attach U-nuts to holes 3 and 9 on both cabinet rails.
2. Align the two holes on each side of the dress mid panel with hole 3 and hole 9 on the cabinet rails.
3. Use four hex screws to secure the panel to the cabinet rails.

With the rackmount slide assembly installed, you are now ready to install the StorageServer 100 in the drawer.

4.9.4.1.4 Installation in the DECsystem 5900 Cabinet

WARNING

- **A step ladder or stool is required to service the upper drawers in a DECsystem 5900 system (slots 5 and 6).**
- **The installation of the StorageServer 100 requires four people.**

Removing the Shipping Bracket

To remove the shipping bracket:

1. Locate the shipping bracket on the bottom of the device.
2. Use a T-15 TORX to remove the bracket screw.
3. Grasp the bracket at both ends and pull it straight out. Save the bracket and screw in case you have to move or replace the StorageServer 100.
4. Locate the machine screw, washer, and nut that you use to secure the StorageServer 100 to the cross bracket.

Removing the Access Latch

Remove the access latch located on the top of the StorageServer 100. When the latch is removed you can see the hole on the bottom of the StorageServer 100 that must be aligned with the hole in the center of the cross bracket (see Figure 4–68).

1. Set the StorageServer 100 upright so that you can see the access latch on the top of the device.

2. Use a T-15 TORX to remove the two screws that secure the latch to the top of the StorageServer 100 and remove the access latch. Put the latch aside.

Note

Look straight down into the StorageServer 100 and you can see the hole through which you put the screw that secures the device to the cross bracket.

Installing on the Slides

Complete the installation using the following procedures:

WARNING

The stabilizer bar must be properly extended.

1. Pull the slides approximately 12 inches out of the slot in which you are installing the StorageServer 100.
2. Place the StorageServer 100 on the slides so that the hole on the bottom of the server is aligned with the hole in the center of the cross bracket (see Figure 4–68).

   This may require that you adjust the position of the StorageServer 100 on the slides until the two holes are aligned.
3. Insert the screw through the holes by reaching into the StorageServer 100.
4. Place the washer and nut on the bottom of the screw. Use a small wrench to hold the nut, tighten the screw until approximately 1/8-inch of the thread protrudes out from the nut (see Figure 4–68).
5. Replace the access latch.
6. Push the device all the way into the cabinet.
7. To secure the device to the cabinet, tighten the hex screws on the front of the bracket support.

Note

The screws will be located at hole 12 if the StorageServer 100 occupies slots 1 and 2; at hole 25 if the StorageServer 100 occupies slots 5 and 6.

The StorageServer 100 is now mounted on the rack. To connect the cables and to set the SCSI IDs, see Section 4.9.4.1.1, and Section 4.9.4.1.5, respectively.

4.9.4.1.5 Setting the SCSI IDs

Note

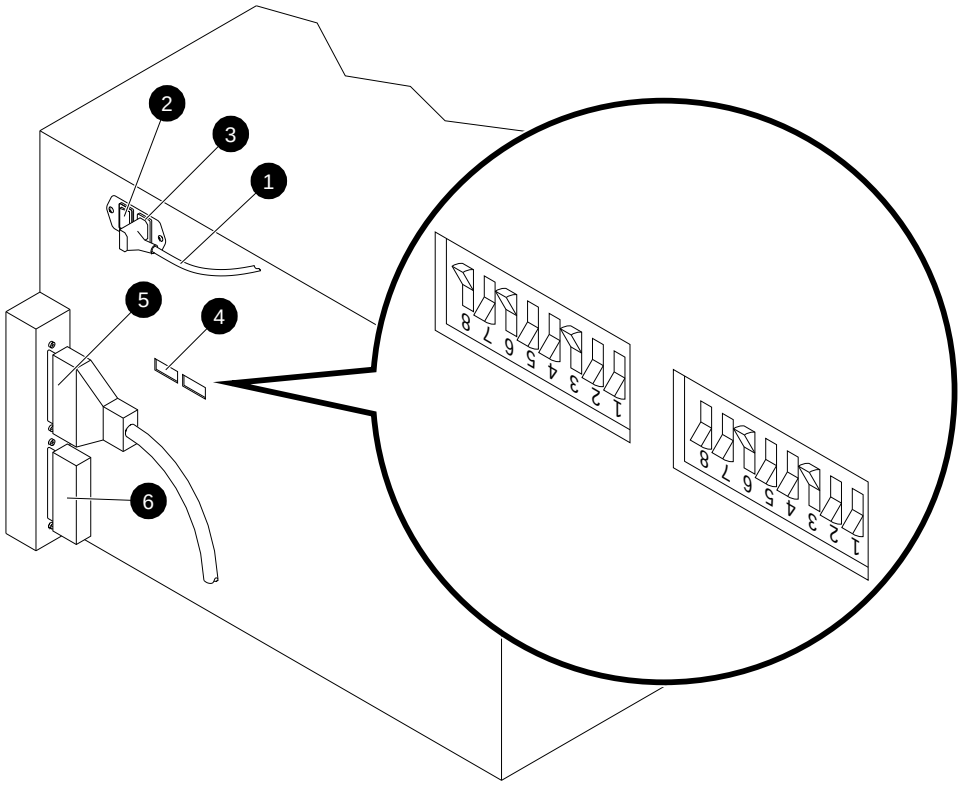
The StorageServer 100 has two optical disk drives enclosed in its cabinet; each must be assigned a SCSI ID. In addition, the autochanger controller must be assigned a third SCSI ID.

Set the SCSI IDs on the autochanger controller and the two optical disk drives:

1. If you are replacing one StorageServer 100 with another one (in the same configuration), note the optical disk SCSI ID settings of the device you are removing.
2. Set the optical disk switches to that combination. The default setting for optical disk drive one is 4; the default for drive two is 5. If a second StorageServer 100 is connected on the same SCSI bus, its optical disk settings are 1 and 2. An example of setting the device ID for optical disks is shown in Figure 4–69 and Table 4–16. The SCSI ID switches are six, seven, and eight. Drive one switches are on the left as you view the numbers; drive two switches are on the right.
3. Use the front panel to set the SCSI ID for the autochanger controller. The default setting is 3; if a second StorageServer 100 is connected on the same SCSI bus, its SCSI ID should be 0. Use the control panel to set the autochanger controller SCSI ID:
   a. Switch on the StorageServer 100 power.
   b. When the display shows READY, press the OPTION switch; TEST * is displayed.
   c. Press the NEXT switch; CONF * is displayed.
   d. Press the NEXT switch; INFO * is displayed.
   e. Press the NEXT switch; SCSI ID is displayed.
   f. Press the ENTER switch; SCSI ID 3 is displayed.
   g. Press the NEXT switch until the address you want is displayed.
   h. Press the ENTER switch.

4. Apply the appropriate SCSI ID labels to the device.

Figure 4–69 SCSI ID Switches on a Rackmounted StorageServer 100



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❶ Power cord
❷ Power switch
❸ Power connector
❹ SCSI address select switches for drives 1 and 2
❺ SCSI connector connected to SCSI port
❻ Terminator connected to SCSI port

Figure 4–69 shows the SCSI ID switches for optical drive one set to "4" as an example, and the switches for drive two set to "5" (the default settings). Table 4–16 shows the appropriate switch settings for either an external or a rackmounted StorageServer 100.

4.9.4.1.6 Assembling and Installing the Rackmount Slides and Cross Bracket

The procedures in this section are to be used only if it is necessary to assemble and install the slides and cross bracket used to rackmount the StorageServer 100 in the DECsystem 5900 system.

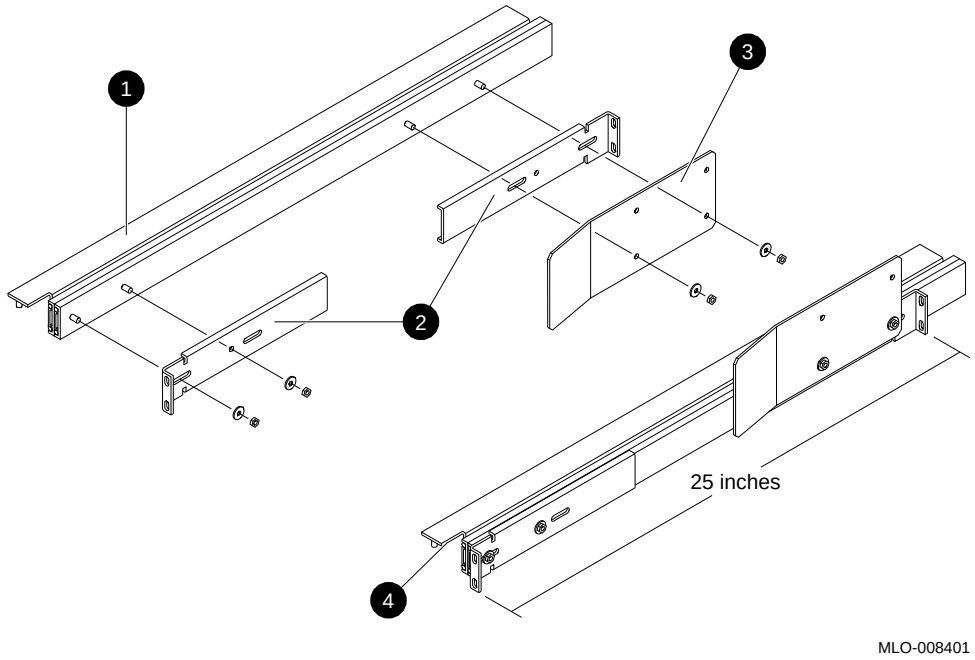
Assembling the Slides

To assemble the slides, complete the following steps:

1. Place a bracket slide mount on the front of the outside section of the slide assembly (Figure 4–70 depicts the right-hand slide assembly).
   a. Align the first stud on the outside section and the hole at the front of the bracket.
   b. Align the second stud of the outside section of the slide assembly with the second slot of the bracket.
2. Use two kep nuts and two washers to install the bracket on the slide as shown in Figure 4–70.
3. Place a bracket slide mount at the rear of the outside section of the slide assembly (see Figure 4–70).
   a. Align the two studs on the outside section with the two slots on the bracket.
   b. The bracket should move freely at this point. Do not put any nuts on the studs.
4. Place the guide at the rear of the outside section, just to the left of the rear bracket slide mount (see Figure 4–70). It covers most of the rear bracket slide mount.
   a. Align the two lower holes on the guide with the two studs on the outside section (you have already aligned the studs with the slots on the bracket slide mount).
   b. Use two kep nuts and two washers to secure the guide to the studs on the outside section of the slide assembly (see Figure 4–70).

   Figure 4–70 shows the components of a slide and a completed right slide.

Figure 4–70 Components of the Slide Assembly/Complete Slide Assembly



❶ Slide assembly

❷ Bracket slide mount

❸ Guide

❹ Completed slide

5. Repeat steps 1 through 3 to assemble the second (left) slide.

The two slides (right and left) are assembled.

Installing the Slides

Install the slides by completing the following steps:

1. *Top*/*Front* with an arrow pointing to the front of the slide is printed on the top of each inside section of the slide assembly. Position the slide so that the outside section is close to the wall of the cabinet when installing the rackmounted slide assembly.

Note

- Use hole 14 and hole 16 up from the bottom of the rails if slots 1 and 2 are to be used.
- Use hole 27 and hole 29 down from the top of the rails if slots 5 and 6 are to be used.

2. Attach two U-nuts to the appropriate holes on the rails at each end.
3. Align the two holes on the flanges at each end of the slide with the appropriate holes on the cabinet rails.
4. Position the slide so that the cabinet rails are between the two flanges of the slide.

Note

Both flanges should be resting firmly against the cabinet rails, with no space between the rails and the flanges.

5. Use two hex screws at each end of the slide to secure the slide to the cabinet rails.
6. Repeat steps 1 through 5 for the other slide.

Note

There are only 25 inches between the flange on the front bracket slide mount and the flange on the rear bracket slide mount. When the bracket slide mounts are secured to the rear rail of the cabinet, you may have to adjust the bracket so that the distance between the flanges is correct. To make the adjustment, loosen the nuts on the guide and then you can move the rear bracket slide mount as needed. Tighten the nuts after you have secured the bracket slide mounts to the cabinet rails.

Assembling the Cross Bracket

Complete the following steps to assemble the rackmounted slide assembly:

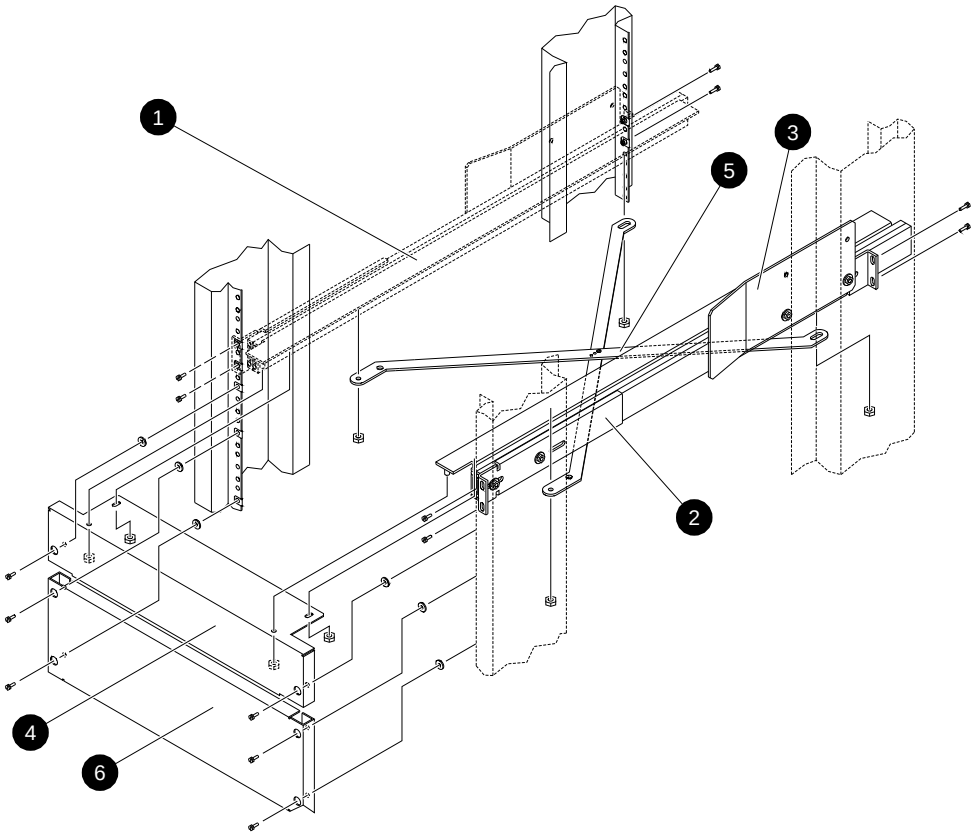
1. Assemble the cross bracket:
   a. Position the slats that make up the cross bracket, so that the three holes in the middle of both slats are aligned.
   b. Put the binder rivet in the large hole that is closest to the slotted end of the cross bracket. Push the plunger on the rivet down, so that the top of the rivet is smooth.

   The holes are all aligned and the cross bracket is assembled.
2. Install the cross bracket:
   a. Position the bracket so that the slotted end is toward the rear of the cabinet.
   b. Align the holes at the ends of the cross bracket with the third and fourth studs (counting from the front to the rear of the inside slide assembly) on the bottom of each of the two inside slide assemblies. Use four kep nuts to secure the bracket to the inside slide assemblies (see Figure 4–71).
3. Install the front bracket support.
   a. Counting up from the bottom of both front cabinet rails, attach U-nuts to hole 12 if slots 1 and 2 are being used; if slots 5 and 6 are being used, attach U-nuts to hole 25 counting down from the top on each front cabinet rail.
   b. Put a hex screw in each of the two holes at the front of the support and use a ring retainer to anchor the screw. Do not tighten the hex screws at this time.
   c. Align the two holes on the front bracket support with studs 1 and 2 (counting from the front to the rear of the slide) on the bottom of the slide assemblies (see Figure 4–71).

      The holes on the support and the studs on the slides are arranged so that there is only one way the support fits on the slides.
   d. Secure the support to the slide assemblies with four kep nuts.

Figure 4–71 shows how the rackmounted slide assembly is assembled. Note where the various components of the assembly are located.

Figure 4–71 Assembling and Installing the Rackmounted Slide Assembly



❶ Slide assembly

❷ Bracket slide mount

❸ Guide

❹ Front bracket support

❺ Cross bracket

❻ Dress mid panel

4.9.4.1.7 Diagnostic Tests Complete the following tests:

- Control Panel Diagnostic Test

  This will tell you if the StorageServer 100 is operational.

- The console command CNFG

  This will tell you if the DECsystem 5900 system recognizes that the StorageServer 100 is connected to the system.

4.9.4.1.8 Power-On Test The power-on test runs automatically when the StorageServer 100 operation switch is first switched on, and may also be initiated from the control panel. The power-on test initiates a controller test, a power supply test, and a motor connection test. It then initializes the mechanism by setting RAM variables to default values, and moves the picker to its home position. The control panel should display: READY.

If the control panel does not display READY, but displays a message such as FAIL, refer to the section on diagnostic tests in the *Optical Library User's Guide*, AA–PQ9RA–TE.

4.9.4.1.9 Using the Console Command CNFG Enter the following on the console:

```
>>CNFG X
```

where:

X	is the TURBOChannel slot that is connected to the StorageServer 100
X	equals 0, 1, or 2

The console display should be very similar to the following example:

```
1: PMAZ-AA  DEC    V5.3c    TCF0   (SCSI = 7)
   ------------------------------------------------
   DEV   PID              VID         REV    SCSI DEV
   ===== ================ =========== ====== ========
     3   C1701m           HP          5.34   MED
   rz4   5.25 MF Drv 000  HP          4.12   DIR
   rz5   5.25 MF Drv 000  HP       4.12   DIR
>>
```

If you *do not* see a similar display, refer to the section on diagnostic tests in the *Optical Library User's Guide*, AA–PQ9RA–TE.

4.10 Removing Mass Storage Drawers

WARNING

- **A mass storage drawer weighs 110 pounds when fully populated, 63 pounds with no storage devices (includes brackets). All storage devices should be removed from a mass storage drawer *before* either lifting it into or out of the enclosure.**
- **At least two people are required to remove or replace a drawer in the DECsystem 5900 system.**

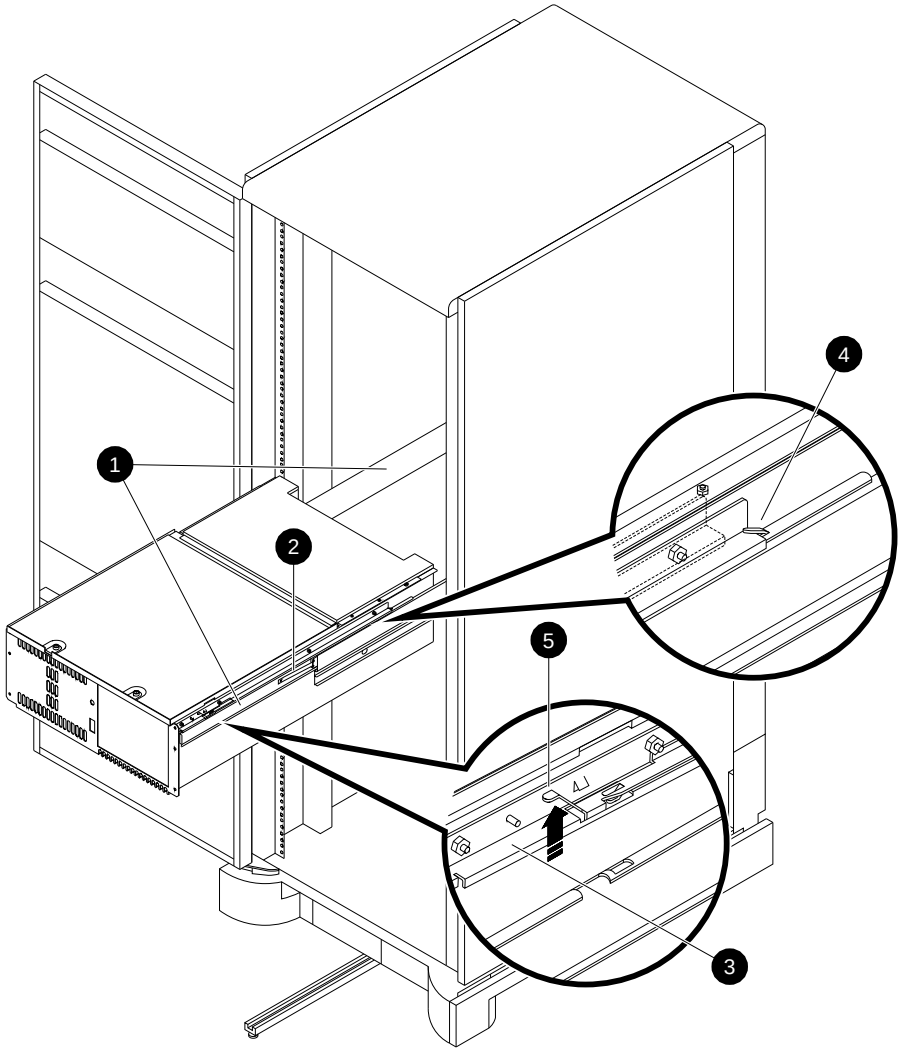
4.10.1 Mass Storage Drawer 1

Use the following procedures to remove and replace a mass storage drawer 1 (see Figure 4–72). To install the slides the mass storage drawer rides on, see Section 4.11.2.

1. Remove all storage devices from the drawer; see the appropriate section of this manual for specific instructions on removal and replacement of each particular device.
2. Clear a workspace for the unattached drawer.
3. Turn off the power to the mass storage drawer (using the switch on the front of the drawer).
4. Unplug all cables and buses from the back of the drawer, taking note of where each is attached for future reference.
5. Pull out the stabilizer bar (Figure 3–5).
6. Pull out the mass storage drawer as described in Section 4.2.
7. Recruit another person to help lift the drawer off the slides.
8. With your partner on one side of the drawer and you on the other, push the ends of the drawer slides toward the rear, while pushing up on the drawer release tab (located on the side of the drawer on the top front corner.
9. While holding the tabs up, lift up on the front of the drawer and slide the drawer forward out of the “notch” on the top of the slide, and lift it off the slide.
10. Place the drawer on the workspace.

11. Push in the spring tabs on the outside of the drawer slides and move them back into the cabinet for safety.

Figure 4–72 Removing a Mass Storage Drawer 1



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❶ Slides
❷ Spring tab
❸ Drawer lip
❹ Notch
❺ Drawer release tab

4.10.2 Mass Storage Drawer 2

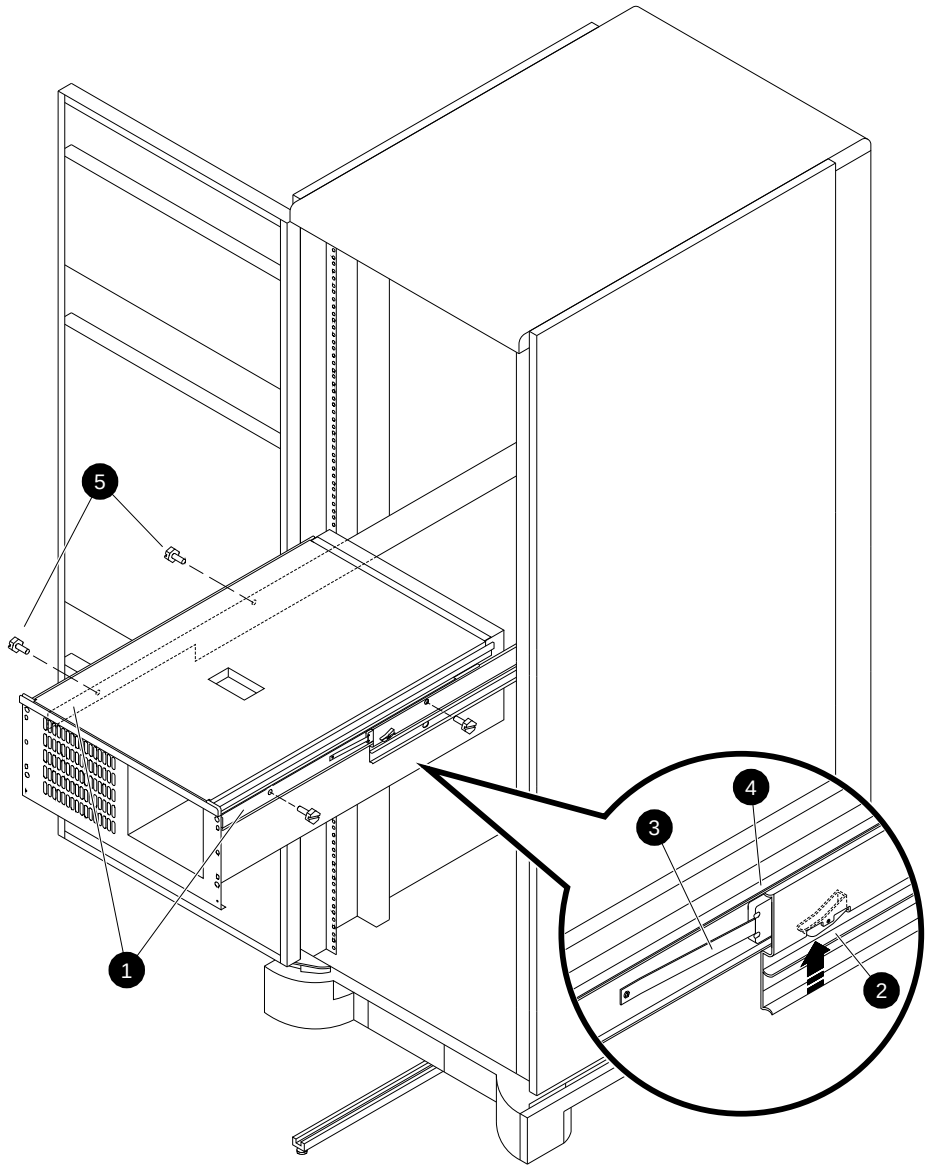
Use the following procedures to remove a mass storage drawer 2:

WARNING

At least two people are required to remove or replace a drawer in the DECsystem 5900 system.

1. Remove all storage devices from the drawer; see the appropriate section of this manual for specific instructions on removal and replacement of each particular device.
2. Clear a workspace for the unattached drawer.
3. Turn off the power to the mass storage drawer (using the switch on the front of the drawer).
4. Unplug all cables and buses from the back of the drawer, taking note of where each is attached for future reference.
5. Pull out the stabilizer bar (Figure 3–5).
6. Pull out the mass storage drawer as described in Section 4.2.
7. Reach under the front of the middle slide and trip the catch upward so that the slides may be fully extended (see Figure 4–73).
8. Press in on the slide tab and close the drawer slowly until the rear drawer slide hex screw is exposed (lined up with the hole in the slide).
9. Remove the rear drawer slide hex screw.
10. Trip the middle slide catch upward again, and while holding the catch up, extend the slides until they lock and the spring tabs are out.
11. Remove the front drawer slide hex screw.
12. Recruit another person to help lift the drawer off the slides and place it in the space you cleared.

Figure 4–73 Removing a Mass Storage Drawer 2



❶ Slides
❷ Slide catch
❸ Spring tab
❹ Drawer lip
❺ Hex screws

4.11 Installing Mass Storage Drawers and Slides

This section describes the installation of mass storage drawers and slides.

4.11.1 Assembling Slides

Use the following procedures to assemble mass storage drawer slides. (See Figure 4–74.) To become familiar with the slides and their assembly, observe the location of slides and angle brackets on an installed mass storage drawer before beginning.

1. Extend the slides until the spring tabs latch them open.
2. Place the slides on a worksurface with the *inside* (drawer side) facing down.
3. Assemble the slide angle brackets, one to the rear and one to the front of the bottom slide section. The screws attaching the slide to the front angle bracket are inserted by positioning the slide so that the screws may be inserted one by one through the access hole from the inside of the slide.

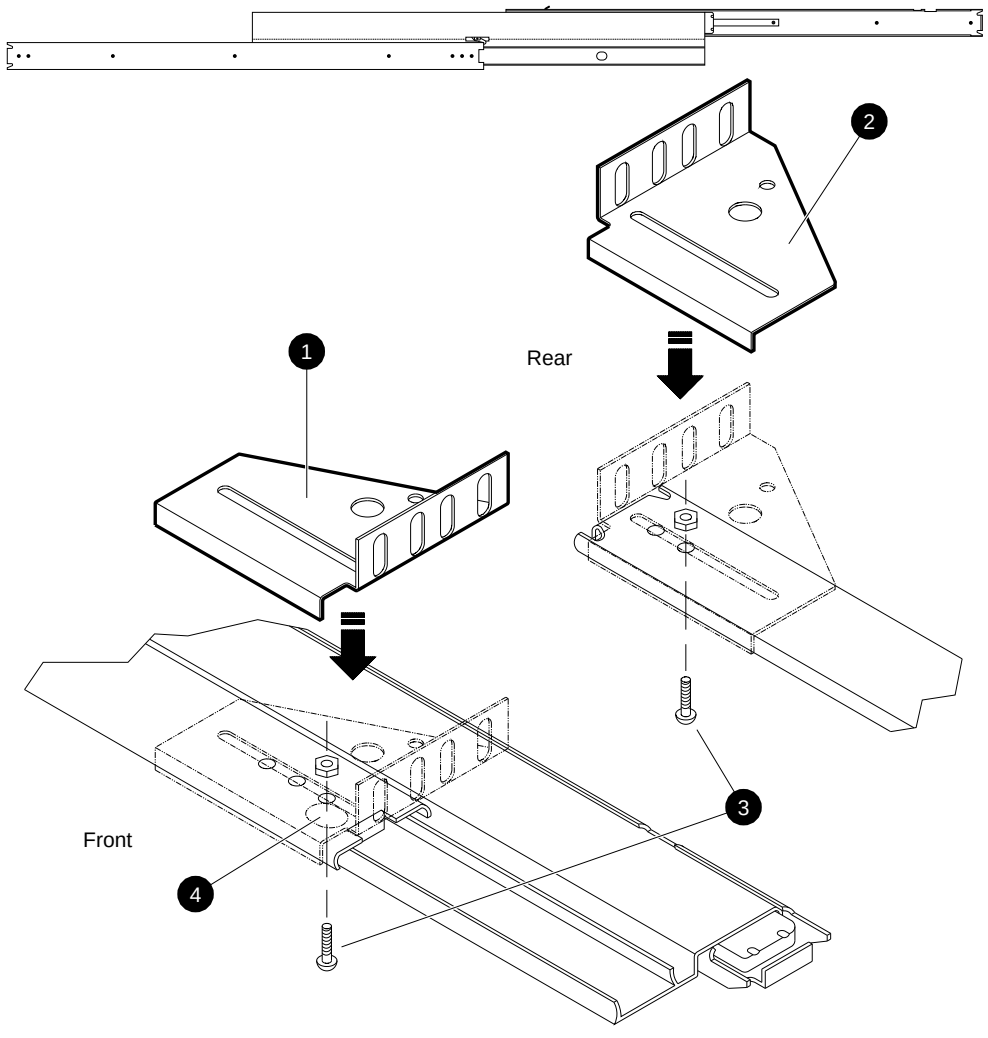
Note

Leave the angle brackets loosely assembled for ease of installation on the cabinet rails.

The small shelf on each angle bracket should engage the bottom of the slide, and the four slots on each angle bracket should extend upward and align with the extreme front and rear edges of the bottom slide section.

If slots do not extend upward while the shelf is engaged on the bottom of the slide *and* align with the ends, you have the wrong angle brackets for that location; check an installed mass storage drawer for reference.

Figure 4–74 Assembling Mass Storage Drawer Slides



❶ Front angle bracket

❷ Rear angle bracket

❸ Screws

❹ Access hole for inserting front angle bracket screws

4.11.2 Installing Assembled Slides in the Cabinet

The DECsystem 5900 system is shipped from the factory with U-nut clips in place on the cabinet rails at the proper position for all mass storage drawer slides. If these have been removed, or were not installed, the placement of drawers may be determined by counting the holes in the cabinet rails, beginning on the top and counting down.

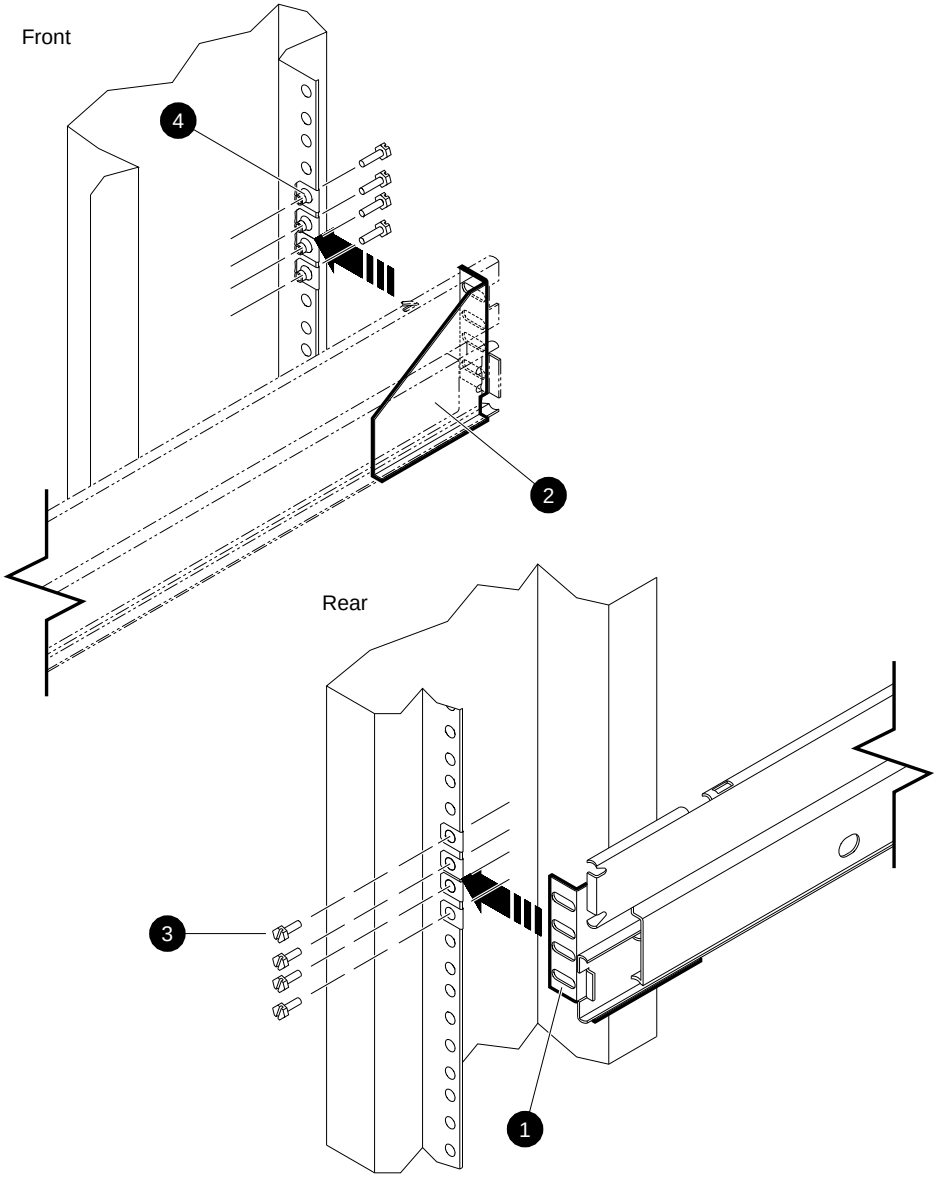
See Table 3–3 for the typical DECsystem 5900 system drawer/hole location pattern.

To install assembled slides, place the slides at the desired location for the mass storage drawer and attach them squarely and firmly to the cabinet, using the four screws and U-nuts for *each* angle bracket as depicted in Figure 4–75. Refer to an installed mass storage drawer for details.

Caution

Once the angle brackets and slides are aligned perfectly to the cabinet rails and set to the correct length, firmly tighten the screws holding the slides to the angle brackets.

Figure 4–75 Installing Mass Storage Drawer Slides



❶ Front angle bracket
❷ Rear angle bracket
❸ Screws
❹ U-nuts

4.11.3 Removing Devices from the Drawer

Due to the weight of a fully populated mass storage drawer, it is recommended that the SCSI devices be removed from the drawer prior to lifting or installing it. In order to do this, the cover must be removed.

Mass storage drawers are opened differently depending upon the version; the drawers may be identified by differing top covers as follows:

- To identify the mass storage drawer version, see Section 4.3.
- For information on mass storage drawer 1, see Section 4.4; for information on mass storage drawer 2, see Section 4.5.
- Information on removal of specific devices may be found in Section 4.9.

4.11.4 Installing the Drawer in the Cabinet

This section describes the installation of a mass storage drawer in the DECsystem 5900 system.

4.11.4.1 Mass Storage Drawer 1

Use the following procedures to install a mass storage drawer 1. To assemble and install the slides the mass storage drawer rides on, see Section 4.11.1 and Section 4.11.2.

WARNING

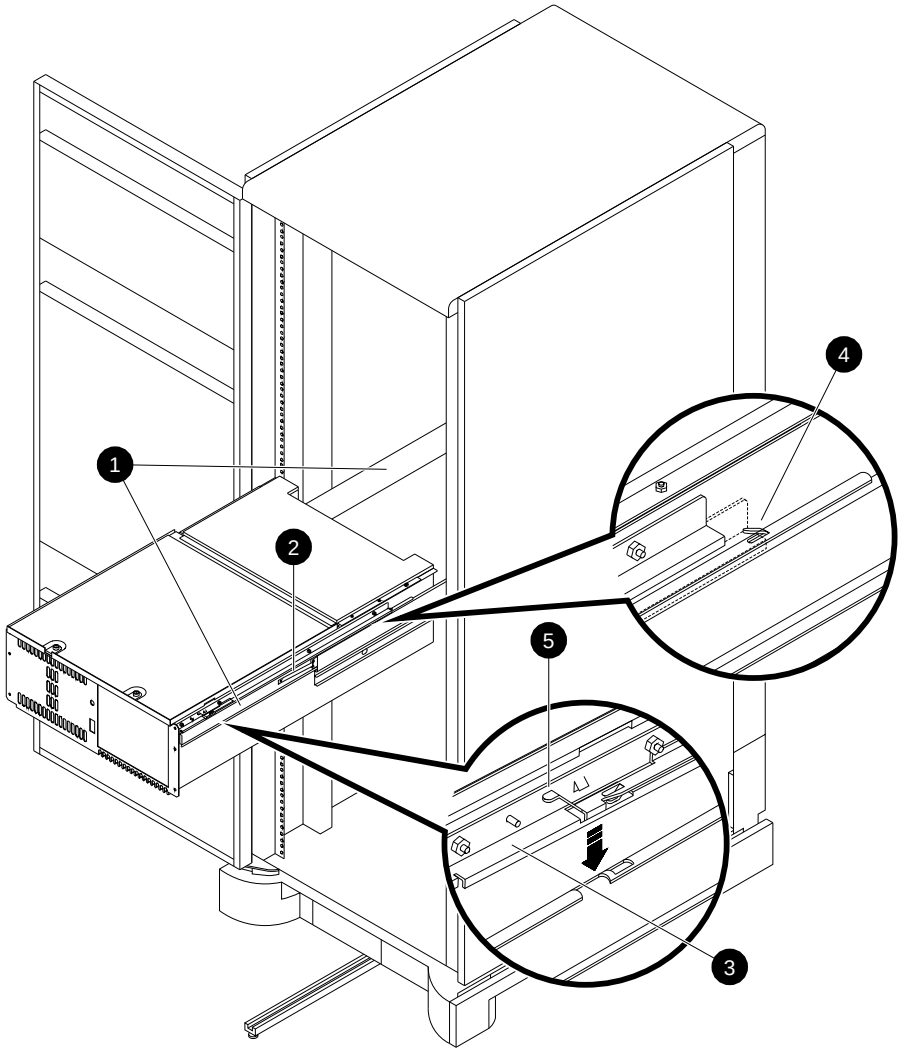
At least two people are required to remove or replace a drawer in the DECsystem 5900 system.

1. Pull out the stabilizer bar (see Figure 3–5).
2. Pull out the drawer slides from the cabinet until the slides lock and the spring tabs are out; you will be resting the entire drawer on these open slides, so be sure they are firmly locked in place.
3. With your partner on one side of the drawer and you on the other, lift the drawer up and place the “lip” on the side of the drawer on top of the slides; tilt the back down very slightly and move the drawer back into the “notch” (now locked in place near the front of the enclosure on the top of the slide). See Figure 4–76.

4. With your partner, push down on the drawer release tab (located on the side of the drawer on the top front corner) on your respective sides while gently maneuvering the tab into its corresponding hole in the slide.

   You will hear/feel a “click” when each release tab engages.

Figure 4–76 Installing a Mass Storage Drawer 1



❶ Slides
❷ Spring tab
❸ Drawer lip
❹ Notch
❺ Drawer release tab

4.11.4.2 Mass Storage Drawer 2

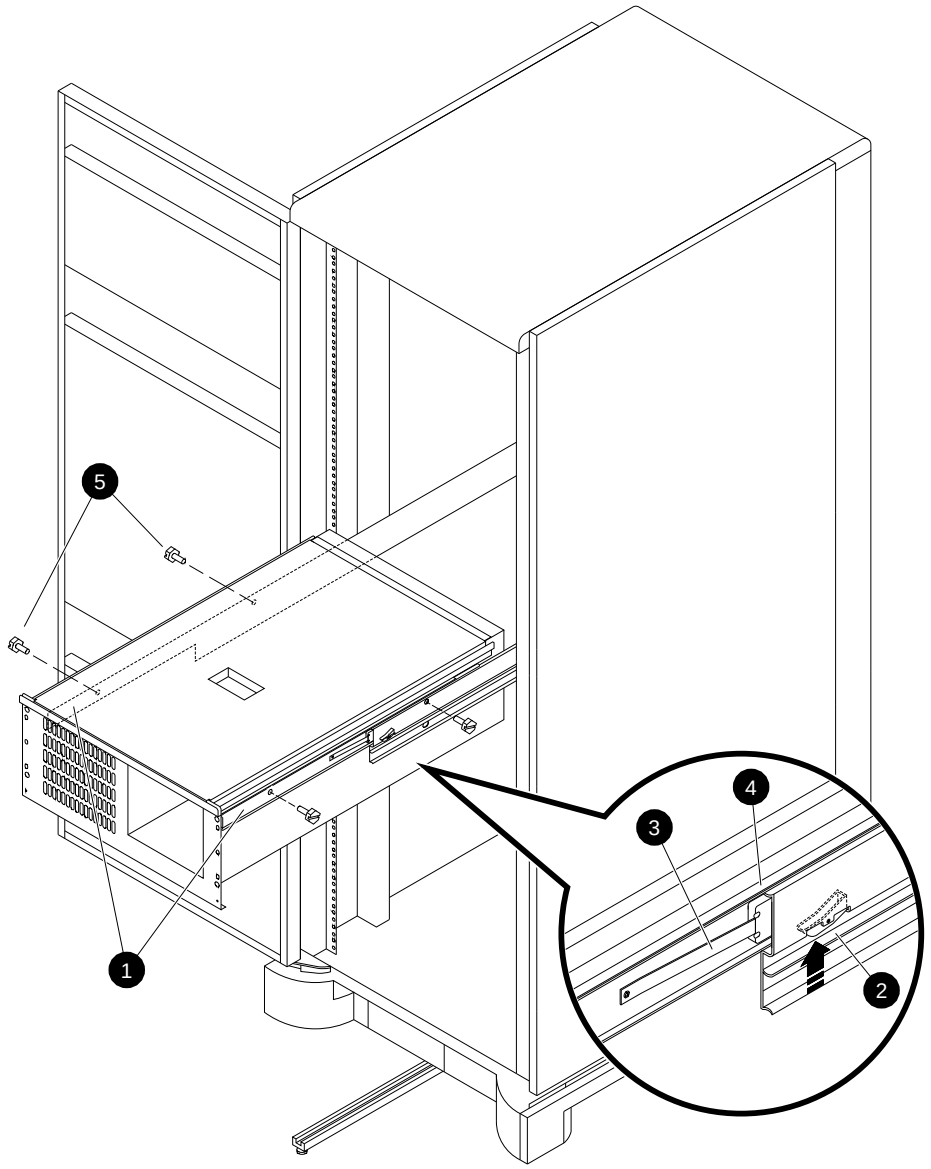
Use the following procedures to install the mass storage drawer 2. To install the slides the mass storage drawer rides on, see Section 4.11.2.

WARNING

At least two people are required to remove or replace a drawer in the DECsystem 5900 system.

1. Pull out the stabilizer bar (see Figure 3–5).
2. Pull out the drawer slides from the cabinet until they catch in the partially extended position.
3. Reach under the front of the middle slide and trip the catch upward so that the slides may be fully extended.
4. While holding the catch up, extend the slides until they lock and the spring tabs are out; you will be resting the entire drawer on these open slides, so be sure they are firmly locked in place.
5. With your partner on one side of the drawer and you on the other, lift the drawer up and place the "lip" on the side of the drawer on top of the slides. Line the holes in the side of the drawer up with those on the inner part of the slide (see Figure 4–77).
6. Attach the foremost hole on the extended portion of the slide to the front drawer hole with a hex screw.
7. Press in on the slide tab and close the drawer slowly until the rear slide hole is exposed (it should be lined up with the rear drawer hole at this point).
8. Attach the rear slide hole to the drawer with a hex screw.

Figure 4–77 Installing a Mass Storage Drawer 2



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❶ Slides
❷ Slide catch
❸ Spring tab
❹ Drawer lip
❺ Hex screws

4.11.5 Replacing the Devices in the Drawer

WARNING

A stable stepladder or stool is required to service the upper drawers in a DECsystem 5900 system.

1. Open the mass storage compartment cover.
2. Replace all brackets and devices in the exact location noted in Section 4.4 and/or Section 4.5.
3. Reconnect the power and SCSI cables (see Section 4.9).
4. Close the mass storage compartment cover.

4.11.6 Pushing In and Securing the Drawer

To push in the mass storage drawer, see Figure 4–4.

4.11.7 Connecting Power and SCSI Cables

After installing the drawer, reconnect the power and SCSI cables to the receptacles they were attached to previously, or if installing a new mass storage drawer, as instructed in the *DECsystem 5900 Mass Storage Drawer Installation Manual*, EK–DECMS–IN. A01.

A

Field-Replaceable Units and Part Numbers

Table A–1 lists the major DECsystem 5900 system field-replaceable units (FRUs) and part numbers; Table A–2 lists the major DECsystem 5900 system device descriptions and FRU part numbers.

Table A–1 DECsystem 5900 System FRUs and Part Numbers

FRU Type	Part Number	Description
Modules	70–28348–01	System module/stiffener
	54–20627–01	CPU/daughter card, (DECsystem 5900 system, R3000A)
	54–21812–02	CPU/daughter card, (DECsystem 5900/260 system, R4400)
	54–20623–01	TURBOchannel Extender Adapter module
	54–20625–01	TURBOchannel Extender module
	54–21333–01	Power distribution module
Memory options	MS02–CA	32 MB SAM memory
	54–20948–01	(MS02–NV) 1 MB NVRAM module for Prestoserve
Power supplies	30–32506–03	CPU power supply assembly, 244 W
and controllers	30–36340–01	Mass storage power supply (mass storage drawer 1), 400 W 12 V @23.1 A, +5.1 V @19.5 A
	H7886–AA	Mass storage power supply (mass storage drawer 2) @19.5 A

(continued on next page)

Table A–1 (Cont.) DECsystem 5900 System FRUs and Part Numbers

FRU Type	Part Number	Description
	30–35415–01	Power controller, 120 Vac, single-phase, up to 24 A to 6 outlets
	30–35415–02	Power controller, 240 Vac, single-phase, up to 16 A to 6 outlets
CPU drawer	17–03363–01	P.S. logic cable
cables	17–03335–01	Cable TCE interconnect
	17–03364–01	+5 V CPU power harness
	17–03365–01	TCE power harness
	17–03379–01	CPU remote switch cable
	17–03362–01	CPU ac input harness
	17–00931–02	Remote sense cable to power controller
Mass storage	17–03359–01	Harness, disk power
drawer 1	17–03380–01	SCSI jumper cable
cables and buses	17–03366–01	Internal SCSI bus
	17–03360–01	Power switch cable
Mass storage	17–03529-01	Harness, disk power with LED
drawer 2	17–03380–01	SCSI jumper cable
cables and buses	17–03528–01	Internal SCSI bus
Miscellaneous	17–03361–01	SCSI bus, drawer to drawer
cables and buses	17–00442–19	Drawer power cable
	17–02641–02	PMAZ SCSI bus
Loopbacks and	12–25083–01	MMJ loopback connector
connectors	12–22196–02	Standard Ethernet loopback connector
	29–24795–00	Communications modem loopback

(continued on next page)

Table A–1 (Cont.) DECsystem 5900 System FRUs and Part Numbers

FRU Type	Part Number	Description
	12–33190–01	Communications line to MMJ adapter
Miscellaneous	12–37121–01	Mass storage drawer switch, on/off
	12–24160–02	CPU drawer switch, on/off
	12–37483–01	Blower assembly
	12–23609–11	Fans, mass storage drawer 2, with harness
	12–37004–01	External single-ended SCSI terminator
	12–37004–02	External differential SCSI terminator
	12–36929–01	Internal single-ended SCSI terminator
	12–36929–02	Internal differential SCSI terminator
TURBOchannel	54–19874–01	PMAD standard Ethernet
options	54–19876–01	PMAZ/SCSI
	70–26944–01	DEFZA–AA FDDI
	70–22710–01	DEFZA–CA FDDI
	54–20253–01	CITCA
	DWTVX–AB	VME
	70–29654–01	DEC WANcontroller 720

Table A–2 DECsystem 5900 System Device Options

Option	Part Number	Location	Description
Mass Storage Options			
RZ57	29–28158–01	Mass storage drawer	1 Gbyte hard disk
RZ57	29–28159–01	Mass storage drawer	1 Gbyte hard disk drive module
RZ58	RZ58–E	Mass storage drawer	1.3 Gbyte 5400 rpm 5.25" hard drive
StorageServer 100	See service documentation	External pedestal	Optical disk (juke box)
StorageServer 100	See service documentation	Rackmounted	Optical disk (juke box)
Removable Media Options			
RX26	RX26–AA	Mass storage drawer	2.8 Mbyte 3.5" internal floppy disk
RX26	54–20764–02	Mass storage drawer	RX26 FDI module
RX26	17–00285–00	Mass storage drawer	RX26 internal cable
RX26	17–03400–01	Mass storage drawer	RX26 power cable
RRD42	RRD42–AA	Mass storage drawer	600 Mbyte CD reader, 5.25" device
TZK10	TZK10–AA	Mass storage drawer	320 Mbyte QIC tape drive
TZ30	TZ30–AX	Mass storage drawer	95 Mbyte 1/2" tape, 5.25" drive
TLZ04	TLZ04–AA	Mass storage drawer	1.2 Gbyte DAT (4 mm)
TLZ04	TLZ04–DA	External tabletop	1.2 Gbyte DAT (4 mm)
TLZ06	TLZ06–BA	Mass storage drawer	4.0 Gbyte tape (4 mm)
TKZ09	TKZ09–AF	Mass storage drawer	5.0 Gbyte 8 mm internal
TKZ09	TKZ09–BA	External tabletop	5.0 Gbyte 8 mm external tabletop tape
TZ85	TZ85–BX	Mass storage drawer	2.6 Gbyte 1/2" tape
TZ85	TZ85–TA	External tabletop	2.6 Gbyte 1/2" tape

(continued on next page)

Table A–2 (Cont.) DECsystem 5900 System Device Options

Option	Part Number	Location	Description
TZ857	SZ100–AA/AB	External pedestal	Automatic loader 18.2 Gbyte 1/2" tape, 7 cartridges
TSZ07	See spare parts list	External tabletop	140-Mbyte 6400-bpi 9-track tape drive
TKZ08	See spare parts list	External tabletop	2.0-Gbyte 8 mm EXABYTE external

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