

R400X Expander Installation and Maintenance

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Preface

This manual provides installation, maintenance, and reference information for the R400X mass storage expander.

NOTE: *If the R400X expander is to be used with systems using BA200-series enclosures or earlier, such as MicroVAX 3000-series or MicroVAX II systems, you will need the H4010-AA hardware kit with supplemental installation procedures.*

The R400X storage expander holds up to seven integrated storage elements (ISEs), or up to six ISEs plus a TLZ04 tape drive.

The R400X expander supports both Digital Storage System Interconnect (DSSI) and Small Computer System Interface (SCSI) mass storage devices.

Intended Audience

This document is intended only for Digital Customer Services personnel and qualified self-maintenance customers.

Organization

This guide has three chapters and two appendixes.

Chapter 1 provides an overview of the expansion enclosure, its sub-components, and bus configurations.

Chapter 2 describes how to install the expander.

Chapter 3 describes how to remove and replace R400X field-replaceable units (FRUs). Table 3-1 lists the FRUs.

Appendix A provides illustrations of expanded systems that require the H4010-AA hardware kit.

Appendix B provides instructions for programming internal parameters for RF-series ISEs.

Appendix C provides a list of related documentation.

Warnings, Cautions, and Notes

Warnings, cautions, and notes appear throughout this guide. They have the following meanings:

WARNING	Provides information to prevent personal injury.
CAUTION	Provides information to prevent damage to equipment or software.
NOTE	Provides general information about the current topic.
BOLD	This bold type indicates user input.

The following symbols appear on the expander power supply. Please review their definitions below:



This warning symbol indicates risk of electric shock.



WARNING. *To reduce the risk of injury, do not remove modules, Integrated Storage Elements (ISEs), or the power supply. No user-serviceable parts are inside. Refer servicing questions to your Digital Customer Services representative or to your qualified self-maintenance personnel.*

This equipment has not been designed for connection to an IT power system (a power system without a directly grounded neutral conductor).

This equipment should be plugged into a properly grounded receptacle only.

This system contains an automatic voltage select power supply. Voltage selection is not required prior to installation.

Chapter 1

R400X Expander Description

This chapter describes the R400X expander, which is a member of the BA400-series of enclosures. The R400X expander is shown in Figure 1–1.

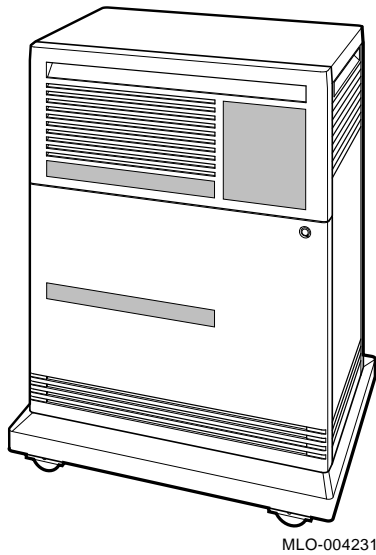
The R400X expander provides space for up to seven integrated storage elements (ISEs), or up to six ISEs plus a TLZ04 tape drive, for VAX 4000, DECsystem, and Q-bus MicroVAX systems.

NOTE: *If the R400X expander is to be used with systems using BA200-series enclosures or earlier systems, such as MicroVAX 3000-series or MicroVAX II, you will need the H4010-AA hardware kit with supplemental installation procedures.*

The R400X expander connects to the system by a Digital Storage System Interconnect (DSSI) cable or by a Small Computer System Interface (SCSI) cable, or both. RF-series ISEs are DSSI devices; RZ-series ISEs and the TLZ04 tape drive are SCSI devices.

NOTE: *VAX 4000 systems do not support RZ-series ISEs.*

Figure 1–1: R400X Expander

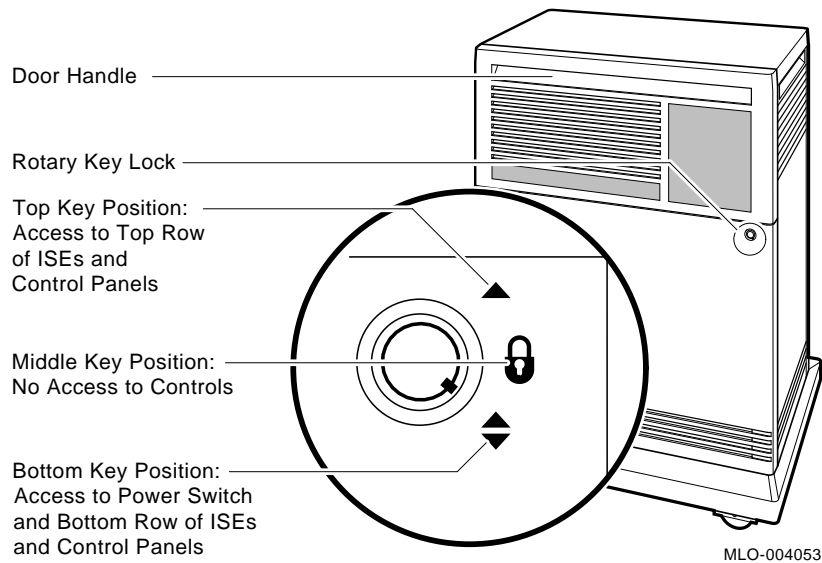


1.1 Opening the Front Door

The front of the expander has a divided door that can be locked to prohibit or restrict access to ISE, tape drive, and expander controls. A three-position rotary lock allows you to lock both the upper and lower doors or to lock just the lower door. Opening the upper door allows access to storage device controls in the upper mass storage area. Opening the entire door allows you to access all expander and storage device controls.

Figure 1–2 shows the three key positions and the controls accessible in each position. Windows on the door allow you to see the storage device indicators.

Figure 1–2: Key Positions



Opening and Closing the Divided Door

Open and close the door as follows:

1. Insert the key in the lock on the front door. Turn the key to the top position to open the upper door only, or to the bottom position to open the entire door.

With the key in the bottom position, the upper and lower doors will open together.

2. Swing the door open.
3. To close the door, simply reverse the procedure. When pushing the doors closed, push gently at the top right of the upper door and the bottom right of the lower door.

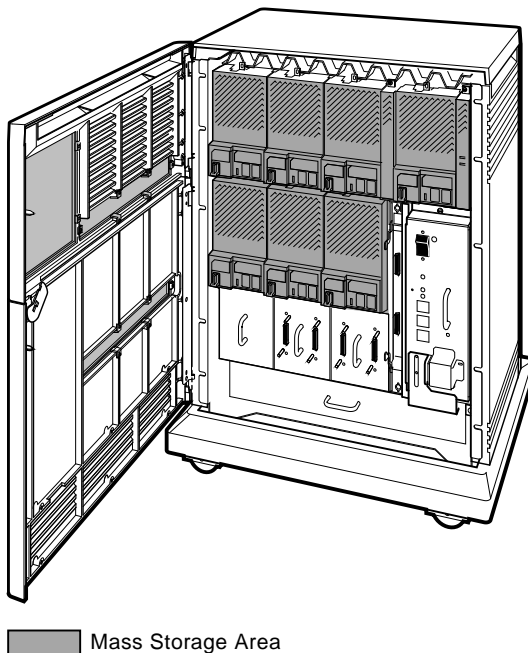
1.2 Mass Storage

The R400X expander provides room for up to seven ISEs, or up to six ISEs plus a TLZ04 tape drive. The ISEs may be either DSSI-based RF-series ISEs or SCSI-based RZ-series ISEs. Each ISE has its own controller, and special mounting hardware to allow the devices to plug into the BA400-series backplane.

NOTE: *VAX 4000 systems do not support RZ-series ISEs.*

The R400X expander has upper and lower mass storage areas (Figure 1–3). The upper storage area has room for four ISEs, or three ISEs plus a TLZ04 tape drive; the lower mass storage area has room for three ISEs.

Figure 1–3: R400X Mass Storage Areas



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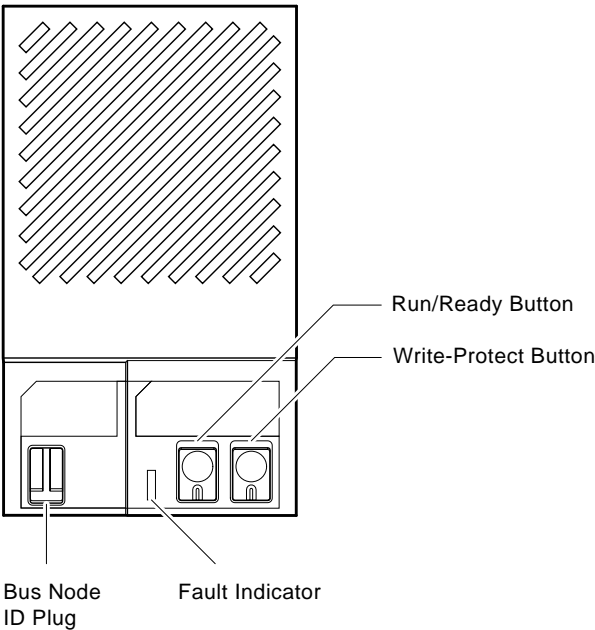
Each RF-series ISE has its own front panel with controls and indicators (Figure 1–4). Front panels for RZ-series ISEs have no controls or indicators, only a SCSI bus node ID plug (Figure 1–5). Figure 1–6 shows the controls and indicators for the TLZ04 tape drive.

1–4 R400X Expander Installation and Maintenance

NOTE: All R400X expanders have panels for seven ISEs. If the expander has less than seven ISEs, the ISE cavity is covered by a blank panel with no controls or indicators. The front panels are required to meet international regulatory standards and to maintain proper airflow.

Chapter 3 provides instruction for installing, removing, and replacing ISEs.

Figure 1–4: RF-Series ISE Front Panel



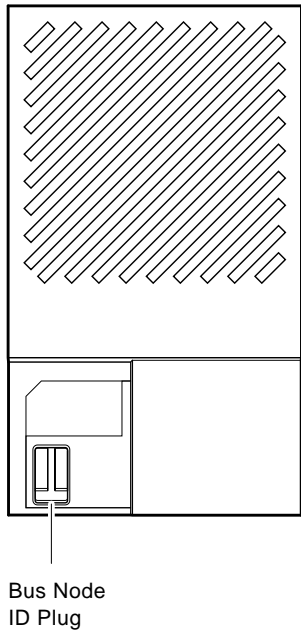
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Table 1–1 describes the functions of each control switch and indicator for RF-series ISEs.

Table 1–1: RF-Series ISE: Controls and Indicators

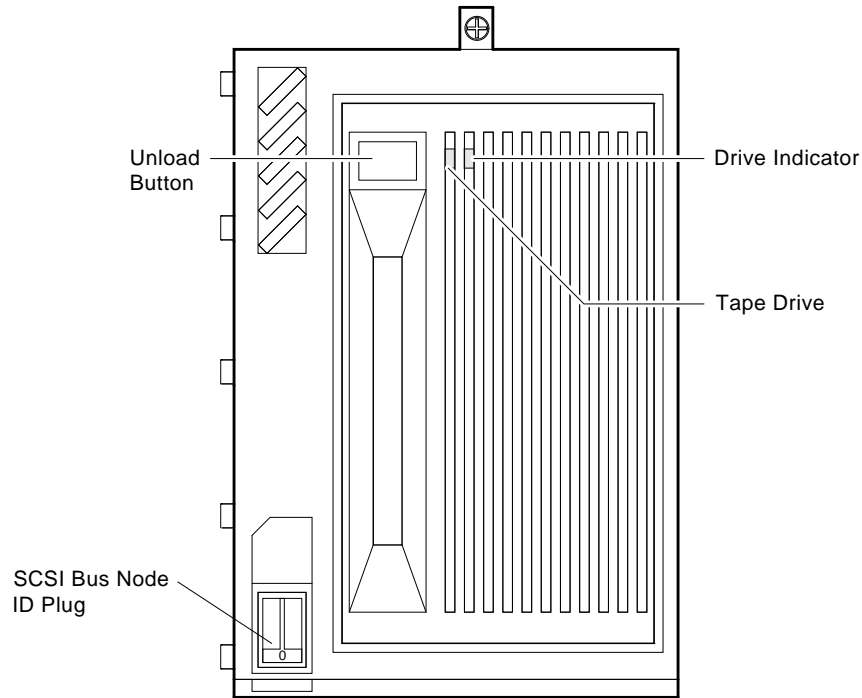
OCP Description	Control or Indicator	Setting	Function
Bus Node ID	Bus Node ID plug	Installed	Identifies the bus node number of the ISE to the system as well as the unit number by default. ISEs are usually provided bus node numbers 0 through 6.
		Removed	DSSI address undefined. If drive is present, drive-fault LED lights.
Fault	Red LED	On	Indicates a faulty drive or an undefined DSSI address.
		Off	Drive functioning correctly and DSSI address defined (normal operating condition).
		Flashing (5 Hz)	Module-to-host calibrations being performed.
		Flashing (10 Hz)	Front panel failure or bus node ID plug is missing.
Run/Ready	Switch LED	In LED on	ISE is on line (normal operating condition). System can read from and write to the ISE. Under normal operation the green LED flashes as seek operations are performed.
		Out LED off	ISE is off line. System cannot read from or write to the ISE.
Write Protect	Switch LED	Out LED off	System can read from and write to the ISE (normal operating condition).
		In LED on	System cannot write to the ISE but can read from the ISE.

Figure 1–5: RZ-Series ISE Front Panel



RZ-series ISEs have a SCSI bus node ID plug that identifies the bus node number of the ISE to the system. ISEs are usually provided bus node numbers 0 through 6.

Figure 1–6: TLZ04 Tape Drive



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Table 1–2 describes the TLZ04 drive indicators as they apply to normal operating conditions. Table 1–3 describes the TLZ04 drive indicators as they apply to abnormal operating conditions.

Table 1–2: TLZ04 Drive Indicators (Normal Conditions)

Indicator	Color(s)	Meaning
Tape		Indicates status of cassette tape as follows:
	Solid green	Tape loaded.
	Solid yellow	Tape loaded and write protected.
Drive		Indicates status of TLZ04 drive as follows:
	Solid green	Drive ready/power on.
	Flashing green	Drive active.
	Flashing yellow	Power-up self-test in progress.

Table 1–3: TLZ04 Drive Indicators (Abnormal Conditions)

Indicator	Color(s)	Meaning
Tape	Slow flashing green or yellow	Excessive tape errors. Use the head cleaning cassette. If failure repeats itself, use another cassette tape.
Tape and Drive	Solid yellow	High humidity. Adjust operating environment.
Tape	Flashing yellow 1-3 times	Power-up self-test failed.
Drive	Solid yellow	Power-up self-test failed.

1.3 Backplane

The backplane for the R400X expander consists of four layers: two signal layers, a power layer, and a ground layer. The etch for the DSSI and SCSI busses distributes power and signals to the ISE through high-density connectors on the backplane. Two power connectors allow the power supply to plug into the backplane. The backplane distributes +5.1 V and +12.1 V to all the mass storage connectors and SCSI connection panel.

The backplane provides a single SCSI bus and two separate DSSI busses. A DSSI jumper assembly, which plugs into the backplane, allows you to configure the DSSI bus in one of two possible configurations. In one configuration the DSSI bus extends as a single bus to all seven ISE cavities. A second configuration has two separate busses: the first bus connects the four ISE cavities in the upper mass storage area; the second bus connects

the three ISE cavities in the lower mass storage area. When the expander is shared between two systems, you can designate storage devices to a specific system by using the two separate DSSI busses.

Configuring the DSSI bus is achieved by arranging the DSSI connector assemblies and the DSSI jumper assembly as described in the next section.

1.4 DSSI Connection and Bus Configuration Area

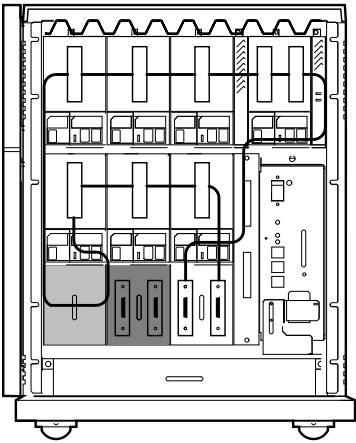
Below the mass storage area is the DSSI connection and configuration area. This area provides positions for two DSSI connector assemblies as well as a DSSI jumper assembly.

External connections to and from the R400X DSSI busses are made at the DSSI connector assemblies. Each of the connector assemblies consists of two M7574 modules with two DSSI connectors at one end and gold contact fingers on the other end. The DSSI connectors protrude through a cutout in a metal bulkhead. Two quarter-turn fasteners on the bulkhead hold the assembly in position. These two connector assemblies can be arranged with a third assembly, the DSSI jumper assembly, to configure the DSSI backplane into the two separate busses.

The DSSI jumper assembly plugs into one of two positions in the DSSI connection and configuration area. The jumper assembly consists of an M7575-YA and M7575-YB module. The modules are attached to a metal bulkhead. Like the connector assemblies, two quarter-turn fasteners hold the assembly in position. A handle on the bulkhead helps to remove and insert the assembly.

The position of the DSSI jumper assembly determines the configuration of the DSSI bus. In one position, the DSSI bus extends as a single bus to all seven mass storage cavities. With the DSSI jumper assembly in a second position, the DSSI bus is split into two separate busses with one bus connecting the four devices in the upper mass storage area, and a second bus connecting three devices in the lower mass storage area. Figures 1-7 and 1-8 show the position of the DSSI jumper relative to the paths of the DSSI bus.

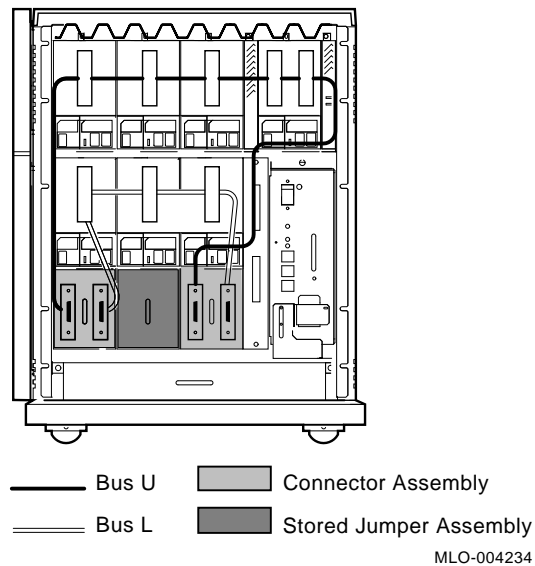
Figure 1–7: R400X Single DSSI Bus Configuration



- DSSI Bus
- Jumper Assembly
- Stored Connector Assembly

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Figure 1–8: R400X Double DSSI Bus Configuration



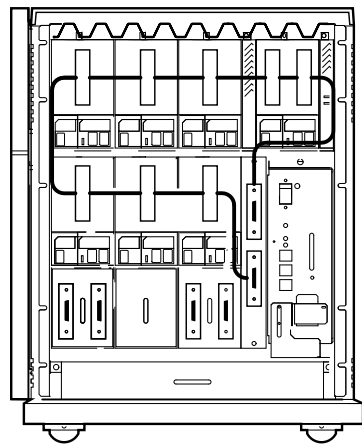
1.5 SCSI Connection Panel

To the right of the DSSI connection and configuration area is the SCSI connection panel (Figure 1–9). Two SCSI connectors on this panel allow you to extend the system's SCSI bus to the expander, and from the expander to an external SCSI device, such as a tabletop RRD40 or TLZ04 subsystem.

The SCSI connection panel is connected to the SCSI connector module (M7493–PA) that provides terminator power for the SCSI and DSSI busses, as well as relay circuitry that sequences the power up of the expander's RF-series ISEs. The top row of RF-series ISEs powers up a few seconds before the bottom row.

The SCSI bus is a single continuous bus (Figure 1–9). The mixing of supported SCSI devices and DSSI devices in adjacent storage cavities is allowed.

Figure 1–9: R400X SCSI Bus Configuration



— SCSI Bus

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1.6 Power Supply

The R400X expander uses the H7874 power supply.

1.6.1 General Description

The H7874 power supply has two mechanically floating connectors that plug directly into the backplane. All power supply control signals and dc power connections to the power supply are made through these connections. The power supply contains auto voltage circuitry that senses input voltage ranges and will automatically configure itself to operate over 100–120 Vac or 220–240 Vac. The power supply is a complete power unit that contains the IEC input connector and the EMI filter.

The power supply is capable of delivering approximately 600 watts of dc power split among +5.1, +12.1, -12.1, and +3.3 volts (the -12.1 and +3.3 volt outputs are not used in the R400X expander).

To prevent damage due to overheating, the power supply monitors the internal temperature of the enclosure and the speed of the fans. If the power supply detects overheating or a fan failure, the power supply will shut down the system.

When the system shuts down due to overheating, the Over Temperature Condition indicator on the power supply remains lit. To recover from a shutdown, set the power switch to off (0) and wait five minutes before turning on the system.

To prevent an over temperature condition, use the following precautions:

- Make sure your system is away from heat sources.
- Check that the system's air vents are not blocked.
- Check that the room temperature is within acceptable limits as specified in the system *Site Preparation* manual contained in the customer hardware information binder.

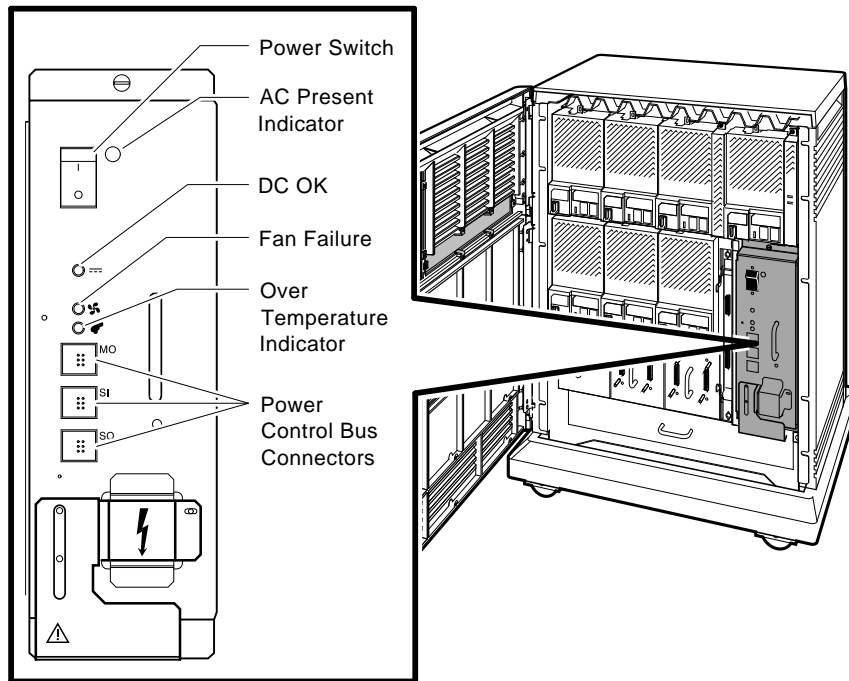
1.6.2 Shutdown Sequence

The power supply enters and completes a shutdown sequence whenever the BPOK H signal is negated. The following conditions negate BPOK H:

- Temperature sensor triggered
- An overcurrent condition on the supply dc voltage outputs
- An overvoltage condition on the supply dc voltage outputs
- Input voltage greater than 264 Vrms or less than 176 Vrms (240 Vac)
- Input voltage greater than 132 Vrms or less than 88 Vrms (120 Vac)
- Fan failure
- Loss of ac input

Figure 1–10 shows the controls and indicators on the power supply. Table 1–4 describes the functions of the power supply controls and indicators.

Figure 1–10: Power Supply



MLO-004070

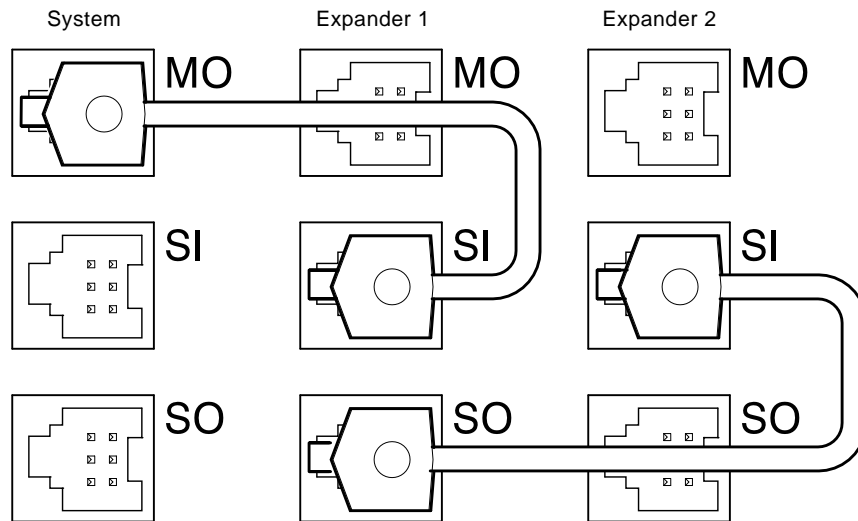
Table 1–4: R400X Power Supply Controls and Indicators

Control/Indicator	Function
AC Present Indicator (orange)	Lights when the power switch is set to on (1) and the ac voltage is present at the input of the power supply.
Power switch	<p>The power switch is used to turn system power on and off. The off position is indicated by a 0; the on position is indicated by a 1.</p> <p>The power switch also functions as the expander circuit breaker. In the event of a power surge, the breaker will trip, causing the power switch to return to the off position (0). Turning the system on resets the circuit breaker. If the circuit breaker trips, wait one minute before turning the expander back on.</p>

Table 1–4 (Cont.): R400X Power Supply Controls and Indicators

Control/Indicator	Function
DC OK indicator (green)	When the DC OK indicator is lit, the voltages are within the correct operating range. An unlit DC OK indicator shows a problem with the power supply.
Fan Failure indicator (amber)	The Fan Failure indicator lights if either of the two cooling fans stop working. The power supply will automatically shut down the system as a precautionary measure when a fan failure is detected.
Over Temperature Condition indicator (amber)	The Over Temperature indicator lights if the expander has shut down due to an over temperature condition.
Power bus connectors	<p>Three power bus connectors allow you to configure a power bus for systems expanded with the R400X expander. The power bus allows you to turn power on and off for the system and expander through one power supply designated as the main power supply: this way, one power switch can control power for an expanded system. Figure 1–11 illustrates a possible power bus configuration.</p> <p>When using a power bus, the R400X expander power switch should always remain in the on position (1). The system's power switch will control power up for the entire expanded system.</p>
MO	The main out connector sends the power control bus signal to the expander. One end of a power bus cable is connected here, the other end is connected to the SI (secondary in) connector of the expander power supply.
SI	The secondary in connector receives the power bus control signal from the main power supply. In a power bus with more than one expander, the power bus signal is passed along using the secondary in and out connectors as shown in Figure 1–11.
SO	The secondary out connector sends the signal down the power bus for configurations of more than one expander. Figure 1–11 shows a power bus for an expanded system.

Figure 1–11: Sample Power Bus Configuration



MLO-004041

NOTE: *Dual-host systems should not be configured with a power bus. Inadvertently shutting off a host system defeats the added reliability of a dual-host system.*

1.7 Fan Tray

The fan tray at the bottom of the enclosure houses two 15.0 cm (6 in) dc fans. The fans draw air through the top of the enclosure and exhaust the air through the bottom of the enclosure.

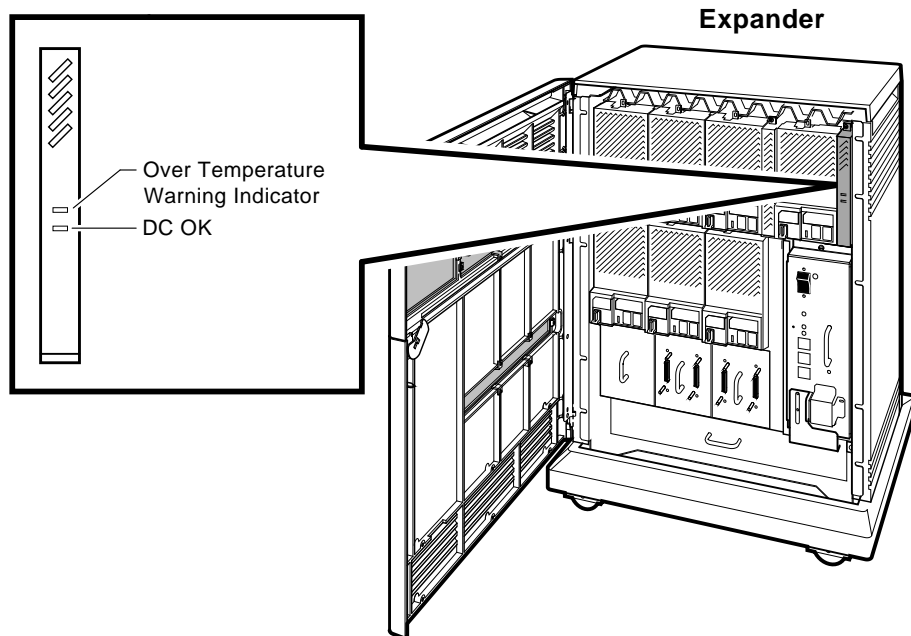
A temperature sensor located in the power supply adjusts the fan speed by varying the fan voltage based on the air temperature in the expander. Power for the fans is provided through a connector that plugs into the backplane at the rear of the fan tray. If either fan fails, the system shuts down and the fan failure indicator on the power supply remains lit.

1.8 Status Panel

A status panel in the upper right corner of the enclosure provides two indicator lights (Figure 1–12). A red Over Temperature Warning indicator flashes to indicate that the expander's internal temperature is approaching a level that may cause components to overheat. In addition to the flashing Over Temperature Warning indicator, an audible alarm also provides warning of a possible over temperature condition. If the components continue to heat, the system will automatically shut down.

A green DC OK indicator shows that voltages are within the correct operating range.

Figure 1–12: Status Panel



MLO-004126

Chapter 2

Installation

This chapter explains how to install the R400X expander on VAX 4000, DECsystem, MicroVAX 3000-series, and MicroVAX II systems.

NOTE: *If the R400X expander is to be used with systems using BA200-series enclosures or earlier systems, such as MicroVAX 3000-series or MicroVAX II, you will need the H4010-AA hardware kit with supplemental installation procedures.*

To install the expander, you must complete the following steps. Some of the steps vary, depending on whether the system is factory configured for the expander, or if you are installing the expander for a previously installed system.

1. Verify site preparation.
2. Unpack the shipment.
3. Position the expander.
4. Configure the DSSI bus.
5. Install the storage devices, if not factory configured.
6. Install the KFQSA adapter and its cabinet kit, if those tasks are required.
7. Connect the DSSI cable.
8. Connect the SCSI cable.
9. Connect power bus cables.
10. Connect the ground cables.
11. Connect the power cables.
12. Turn on the system.
13. Configure the KFQSA storage adapter (for KFQSA-based DSSI).
14. Program unit numbers for ISEs if necessary.

15. Close the door.
16. Satisfy any postinstallation requirements.

2.1 Verifying Site Preparation

Before unpacking the shipment:

- For an existing system, make sure the customer has backed up the software and shut down the operating system.
- All site environmental requirements for the expander, such as cooling, airflow, temperature, humidity, and so on, should conform to those of the system being expanded. These should be verified as part of your site preparation for the expander. You can find the site preparation guide in the system *Customer Hardware Information* binder.
- Use a dedicated ac circuit and receptacle for the expander. In the United States and Canada, the expander will be shipped with a power cable requiring a dedicated 120-volt, 15-amp receptacle. In other countries, the expander will be shipped with a country-specific power cable. This requires a dedicated power circuit and receptacle of comparable current capability, based on the country-specific power distribution regulations and power outlet designs.
- If the expander is being installed as an add-on, run the MicroVAX Diagnostic Monitor on the system before installing the expander. The MicroVAX Diagnostic Monitor is described in the system's *Troubleshooting and Diagnostics* manual. You can find the *Troubleshooting and Diagnostics* manual in the system *Customer Hardware Information* binder.
- Make sure the system power is turned off.

CAUTION: *Turning off the system without following the shutdown procedure described in the operating system software manuals may result in loss of data.*

2.1.1 Tools Needed

The following tools are needed to install the expander:

- Flat blade screwdriver
- Phillips (cross point) screwdriver
- Adjustable wrench

2.2 Unpacking the Shipment

Keep all shipping and delivery receipts and save all packing materials until the expander is up and running properly and you are sure you will not reship it.

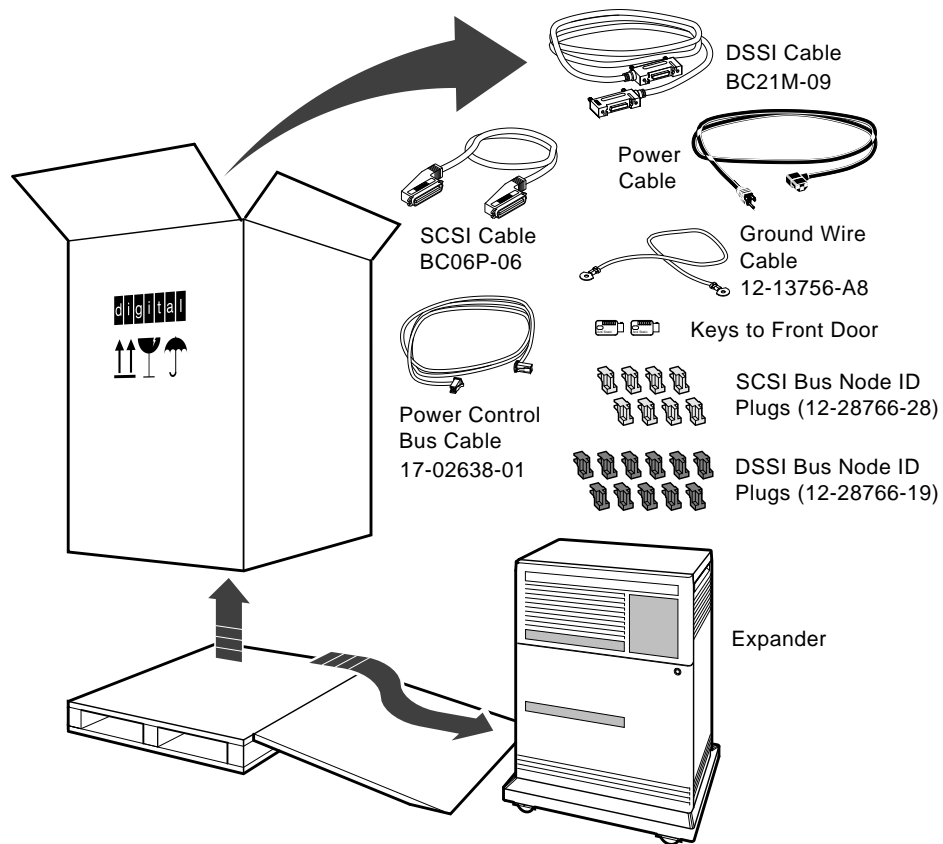
Save all packing materials until you are sure you will not move the expander to another location.

1. Before unpacking the shipping carton, check for external shipping damage.

Report any damage to the customer's sales representative and the customer's delivery agent.

2. Unpack the shipping carton according to the instructions on that carton. Figure 2–1 shows the shipping carton contents for the R400X expander.

Figure 2–1: R400X Expander Shipping Carton Contents



MLO-004051

3. Check the contents against the shipping list to ensure you received everything that was ordered.

If any item is missing or damaged, contact the customer's sales representative and the customer's delivery agent.

2–4 R400X Expander Installation and Maintenance

2.3 Positioning the Expander

After unpacking the expander, you can move it into position in two ways as shown in Figure 2–2:

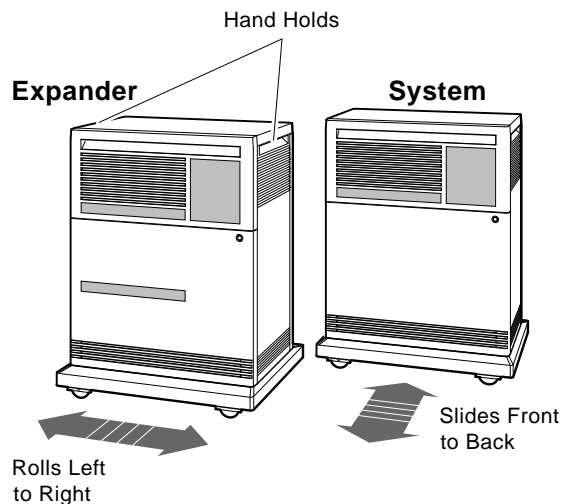
- Roll it sideways.
- Gently slide or walk it backward or forward by gripping the handholds on the sides of the enclosure.

Position the expander next to the system (on either side).

WARNING: *The R400X expander weighs between 50 kg (110 lb) and 68 kg (150 lb), depending on the number of ISEs installed. Two or more people are needed to maneuver the system.*

During installation, leave a few inches of space behind the R400X enclosure and the system enclosure for routing cables underneath. Once installation is complete, you can place the base of the enclosures against a wall.

Figure 2–2: Moving the Expander into Place

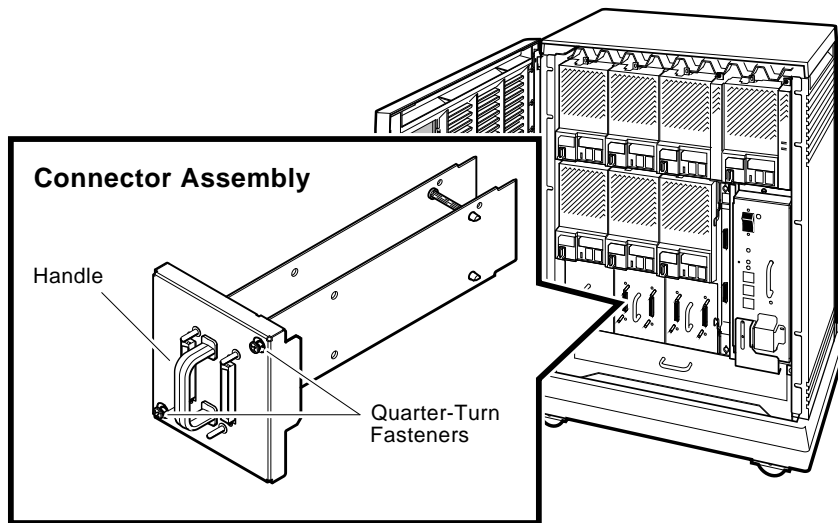


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2.4 Configuring the DSSI Bus

As described in Sections 1.3 and 1.4, the DSSI bus can be configured in two ways, as one continuous bus or as two separate DSSI busses. The position of the DSSI jumper assembly and DSSI connection assemblies in the lower portion of the enclosure determines the configuration of the DSSI bus. Two quarter-turn fasteners on the bulkhead of the assemblies allow you to remove and reconfigure the DSSI bus. The assembly modules slide into guide rails and plug into connectors on the backplane. Figure 2-3 shows how to remove or install a DSSI jumper or connector assembly.

Figure 2-3: Removing and Installing a DSSI Jumper or Connector Assembly



MLO-004235

2.5 Installing Storage Devices

Installing an expander on to a previously installed system requires that you install mass storage devices according to the customer's specifications. The expander has the capacity for a maximum of up to six ISEs for a dual-host configuration and up to seven ISEs for a single-host system. A TLZ04 tape drive can be installed in the upper rightmost storage cavity in place of an RF-series or RZ-series ISE.

NOTE: *VAX 4000 systems do not support RZ-series ISEs.*

You should first fill the available mass storage potential in the expander before installing ISEs in a system enclosure. If you need to move ISEs from the system enclosure to the expander, refer to Chapter 3 for instructions on removing ISEs. Instructions for installing RF- and RZ-series ISEs are provided in Section 2.5.1. Instructions for installing the TLZ04 tape drive are provided in Section 2.5.2.

2.5.1 Installing RF- and RZ-Series ISEs

NOTE: *Expanded systems configured at the factory already have ISEs properly installed. If you are installing a factory-configured system, proceed to Section 2.6.*

CAUTION: *Static electricity can damage integrated circuits. Use the wrist strap and antistatic mat found in the Antistatic Kit (PN 29-26246-00) when you work with the internal parts of a computer system.*

Handle ISEs with care. Dropping or bumping the ISE can damage the disk surface. Carry or hold an ISE from underneath the lower metal bracket to avoid damaging the drive module or stressing the screws on the upper metal bracket.

Install an ISE as follows:

1. Unpack the ISE.
2. Remove the blank ISE front panel from the expander. The front panels are each secured with one captive Phillips screw.
3. With the ISE controller module facing the right, slide the ISE along the guide rails into a mass storage cavity (Figure 2–4A). For single bus configurations, install ISEs in the upper mass storage area first; then install ISEs in the lower mass storage area. Always install ISEs working from right to left.

NOTE: *The first or rightmost mass storage cavity in the upper mass storage area is wider than the rest to accommodate a larger device. A small filler panel is used to fill the gap space when an RF- or RZ-series ISE is installed in this first cavity.*

4. Using the upper and lower finger cutouts on the ISE bracketry, firmly push the ISE brackets until the interface card at the rear of the ISE plugs into its backplane connector (Figure 2–4A). The guide tabs on the upper and lower bracket should line up with the cutouts in the expander chassis. Tighten the two captive screws.

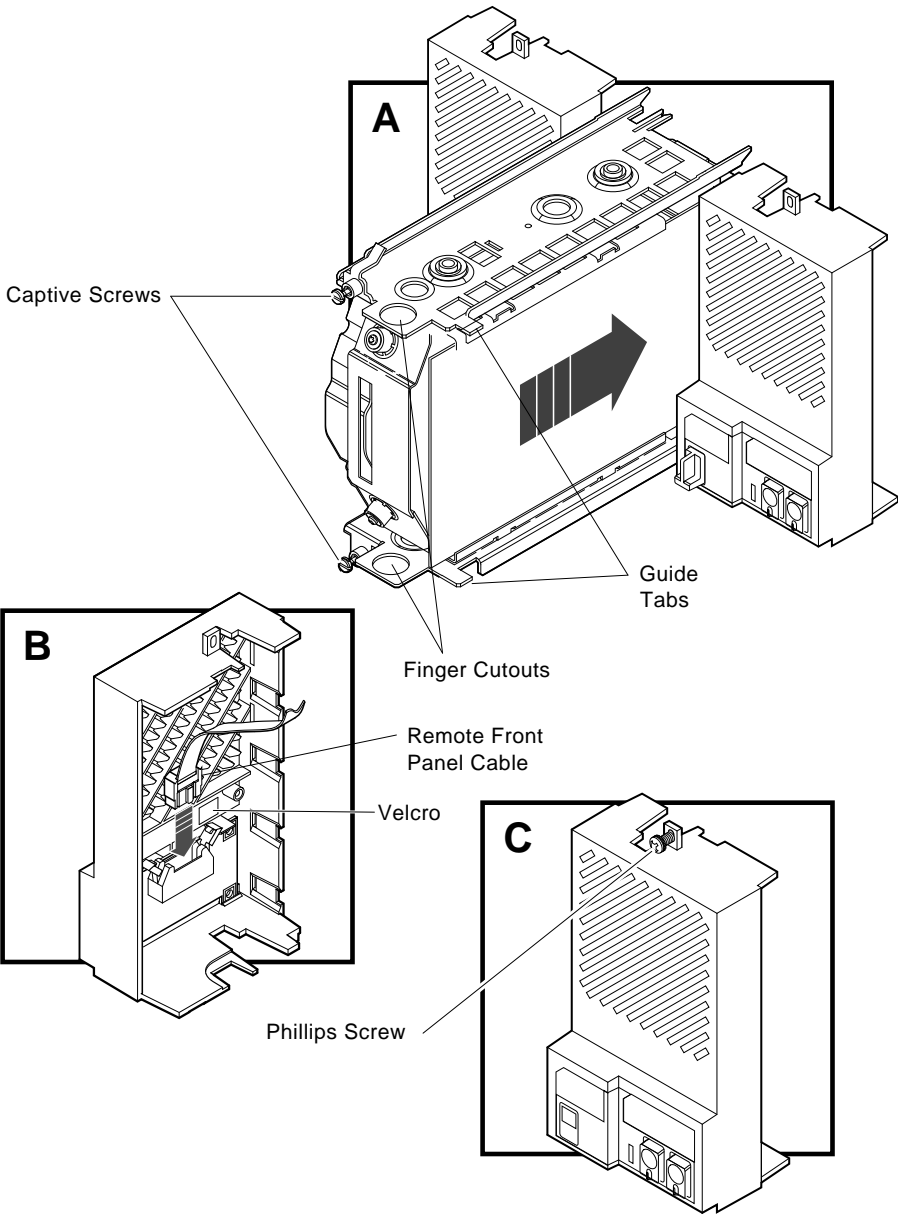
CAUTION: *A small gap between the ISE mounting bracket tabs and the R400X frame is normal. Tighten the captive screws only until they are securely fastened. Do not try to force the tabs to fit flush against the frame.*

5. Plug the ISE's remote front panel cable into the module inside the ISE front panel (Figure 2–4B). Use the Velcro on the cable and the inside of the ISE front panel to secure the remote front panel cable.

NOTE: *The ISE front panel for RZ-series ISEs, unlike the RF-series front panel, has no buttons or indicators.*

6. Attach the ISE front panel to the enclosure by first fitting the panel's lower tabs and then fitting the panel into position. Secure the panel with its single screw (Figure 2–4C).

Figure 2-4: Installing an RF- or RZ-Series ISE



MLO-004236

2.5.1.1 Inserting Bus Node ID Plugs

Spare bus node ID plugs are supplied with your expander. The DSSI plugs for RF-series ISEs are dark gray (PN 12-28766-19). The SCSI plugs for RZ-series ISEs are lighter gray (PN 12-28766-28).

Bus node ID plugs have prongs on the back that identify the bus node number (and by default, the unit number) of the ISEs to the system. Bus node ID plugs are shipped with the system and expander.

To insert a bus node ID plug, align the two center prongs with the two center slots on the ISE front panel as shown in Figure 2-5. To remove a bus node ID plug, grasp it firmly and pull it straight out.

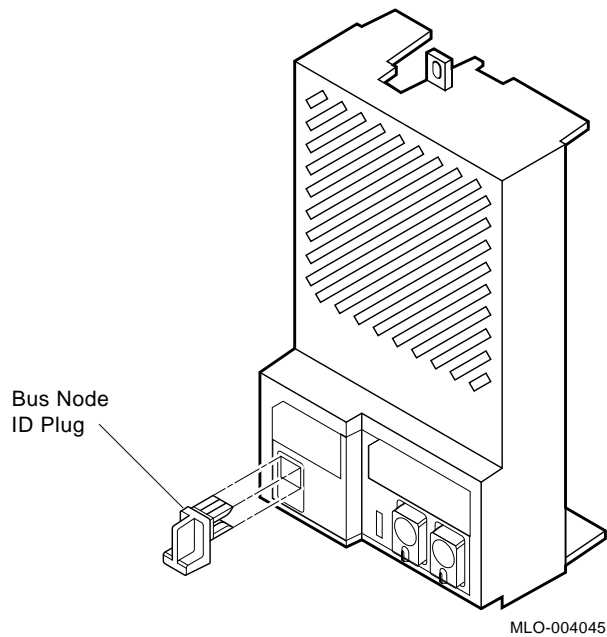
Use the rules below for numbering bus node IDs for ISEs:

- For each DSSI or SCSI bus, do not duplicate bus node numbers for storage elements. You can have only one storage element on bus 0 identified as bus node 0, one storage element as bus node 1, and so on; you can have only one storage element on bus 1 identified as bus node 0, one storage element as bus node 1, and so on.
- By convention, the ISEs are numbered in increasing order from right to left starting with 0, and working from upper mass storage area to lower.

Bus nodes 0-6 are typically used for storage devices, while node 7 is reserved for the adapter, and is the default bus node ID for the KZQSA and KFQSA adapters.

NOTE: *DSSI bus node ID plugs are also used to supply node numbers for the two embedded DSSI host adapters on VAX 4000 Model 300 systems.*

Figure 2–5: Inserting Bus Node ID Plugs



NOTE: *If you change the bus node ID plugs while the system is operating, you must turn off the system and then turn it back on for the new plug positions to take effect.*

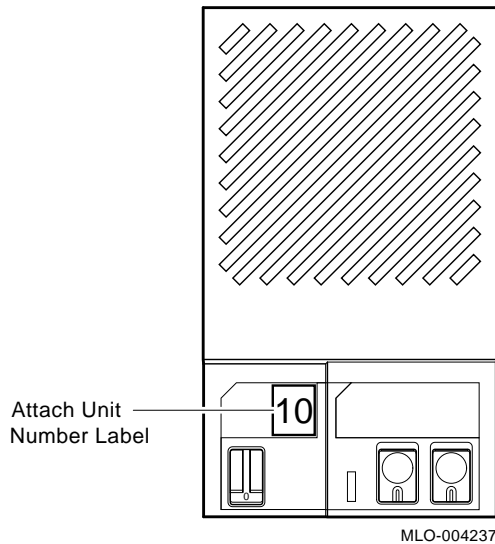
2.5.1.2 Labeling RF-Series ISEs for Systems with Multiple DSSI Busses

VAX 4000 Model 300 systems have two separate DSSI adapters built into the CPU. Other systems may have more than one DSSI bus using the KFQSA storage adapter. Using R400X expanders you can fill up to four DSSI busses for a total of 28 RF-series ISEs. Each bus can have up to seven ISEs (bus nodes 0–6). When there are devices on more than one bus and the system's allocation class is not zero, you need to program new unit numbers for ISEs, as the unit numbers for ISEs throughout the system must be unique. Instructions provided in Appendix B describe programming new unit numbers and overriding default values.

With devices on two or more busses and a nonzero system allocation class, the ISE unit numbers will not match the bus node numbers on the bus node ID plugs. Unit number labels are provided with each ISE to identify

unit numbers for the user. The labels stick onto the recessed label area on the ISE front panel as shown in Figure 2–6.

Figure 2–6: Attaching a Unit Label to the ISE Front Panel



2.5.2 Installing a TLZ04 Tape Drive

NOTE: *Expanded systems configured at the factory already have storage devices properly installed. If you are installing a factory-configured system, proceed to Section 2.6.*

CAUTION: *Static electricity can damage integrated circuits. Use the wrist strap and antistatic mat found in the Antistatic Kit (PN 29–26246–00) when you work with the internal parts of a computer system.*

Handle the TLZ04 tape drive with care. Dropping or bumping the drive can damage the product. Carry or hold the drive from underneath the lower metal bracket to avoid stressing the screws on the upper metal bracket.

Install the TLZ04 Tape Drive as follows:

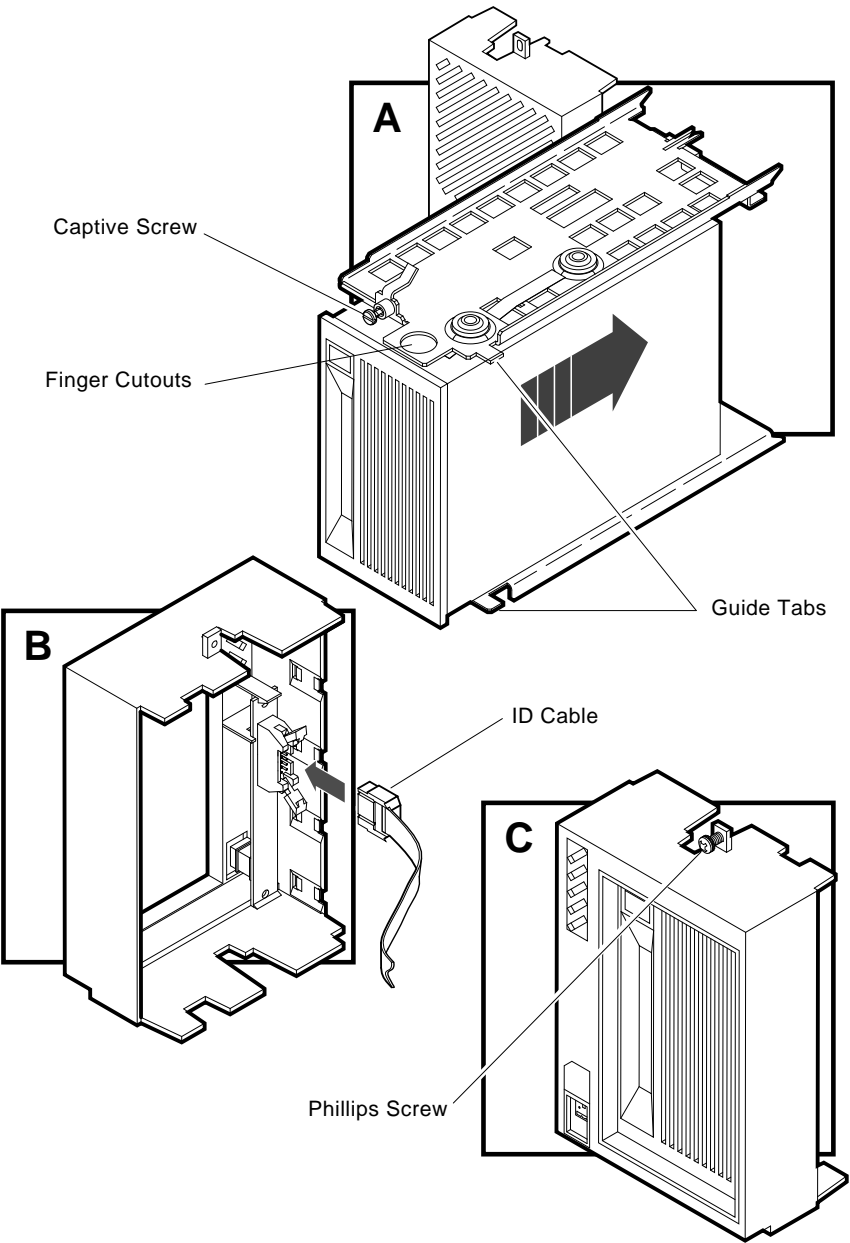
1. Unpack the tape drive.

2. Remove the blank front panel and filler panel from the upper rightmost storage cavity of the expander. The front panel is secured with one captive Phillips screw.
3. With the drive positioned so that the Unload button and indicators are up, slide the drive along the guide rails into the upper rightmost mass storage cavity (Figure 2–7A).
4. Using the upper and lower finger cutouts on the brackets, firmly push the drive brackets until the interface card at the rear of the drive plugs into its backplane connector (Figure 2–7A). The guide tabs on the upper and lower bracket should line up with the cut outs in the expander chassis. Tighten the two captive screws.

CAUTION: *It is normal for there to be a small gap between the drive mounting bracket tabs and the R400X frame. Tighten the captive screws only until they are securely fastened. Do not try to force the tabs to fit flush against the frame.*

5. Plug the tape drive's ID cable into the connector inside the drive front panel (Figure 2–7B).
6. Attach the drive front panel to the enclosure by first fitting the panel's lower tabs and then fitting the panel into position. Secure the panel with its single screw (Figure 2–7C).

Figure 2-7: Installing the TLZ04 Tape Drive



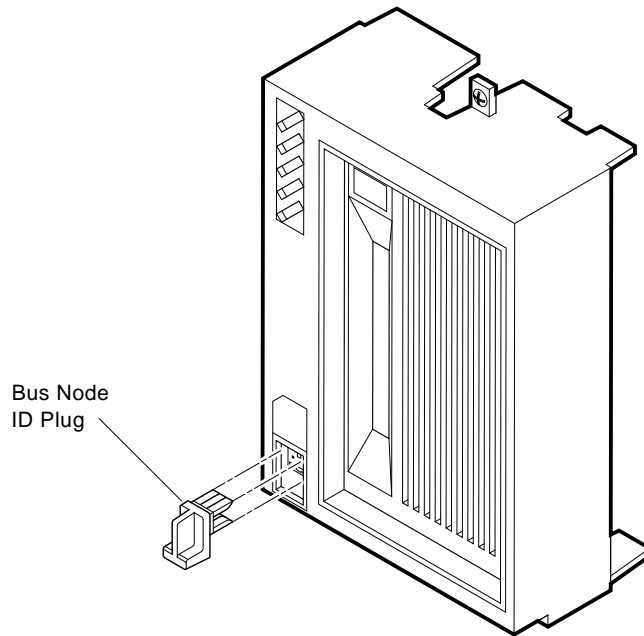
MLO-005788

2.5.2.1 Inserting the TLZ04 Bus Node ID Plug

The TLZ04 tape drive uses a SCSI bus node ID plug to identify the drive's node number to the system. Spare bus node ID plugs are supplied with your system and expander. SCSI plugs are light gray (PN 12-28766-28).

To insert a bus node ID plug, align the two center prongs with the two center slots on the drive front panel as shown in Figure 2-8. To remove a bus node ID plug, grasp it firmly and pull it straight out.

Figure 2-8: Inserting Bus Node ID Plug for TLZ04 Tape Drive



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Use the rules below for selecting an appropriate SCSI bus node ID for the TLZ04:

- For each SCSI bus, do not duplicate bus node numbers. If you are installing multiple TLZ04 or RZ-series ISEs, the SCSI bus node ID for each SCSI device must be unique.

- By convention, the devices are numbered in increasing order from right to left starting with 0, and working from upper mass storage area to lower.

Bus nodes 0–6 are typically used for storage devices, while node 7 is reserved for the SCSI adapter and is the default bus node ID for the KZQSA adapter.

NOTE: *If you change the bus node ID plugs while the system is operating, you must turn off the system and then turn it back on for the new plug positions to take effect.*

2.6 Installing Additional Components

Some MicroVAX systems do not have a DSSI bus and require additional components, such as the KFQSA storage adapter, before you can expand a DSSI bus. Other installations may require the KFQSA storage adapter to provide additional DSSI busses. Up to two KFQSA storage adapters can be added to any system to provide additional DSSI busses.

For an SDI-based MicroVAX 3900 and DECsystem 5400 Cabinet system (which uses RA-series fixed disks), install the following:

- KFQSA adapter in the MicroVAX system as described in the *KFQ Storage Adapter Installation and User Manual*

For an SDI-based MicroVAX 3500/3600 system (which uses RA-series fixed disks), install the following:

- KFQSA adapter in the MicroVAX system as described in the *KFQ Storage Adapter Installation and User Manual*

For a MicroVAX II system (which uses RD-series fixed disks), install the following:

- KFQSA adapter in the MicroVAX system as described in the *KFQ Storage Adapter Installation and User Manual*
- Cabinet kit in the MicroVAX system as described in the document that is packaged with the kit

NOTE: *MicroVAX II systems cannot boot from RF-series ISEs. The system disk must remain in the MicroVAX II enclosure.*

2.6.1 Installing the KFQSA Adapter

If a KFQSA is not factory configured, before installing the KFQSA adapter, set the switchpack on the KFQSA module as described in the *KFQSA Installation and User Manual*.

After completing the applicable procedures above, continue with the following section.

2.7 Connecting DSSI Cables

CAUTION: *Make sure the power switches on the system and the expander are set to off (0).*

DSSI cables are used to extend the DSSI bus to RF-series ISEs in the R400X expander. If the expander contains no DSSI devices, proceed to Section 2.8.

DSSI cable connections are determined by the system and configuration you are installing.

- Figures 2–12 through 2–18 show DSSI cable connections for supported systems and configurations using the R400X expander and VAX 4000 Model 300 (BA440 enclosure).
- Figure 2–19 shows the DSSI cable connections for the R400X expander and VAX 4000 Model 200 (BA430 enclosure) and DECsystem 5500. Additional R400X expanders could be supported by adding KFQSA storage adapters to the system.
- Figure 2–20 shows the DSSI cable connections for the R400X expander and dual-host VAX 4000 Model 200 (BA430).
- Appendix A provides cabling illustrations for systems using BA200-series enclosures or earlier enclosures. These system require the H4010-AA hardware kit.

Before connecting DSSI cables, you may need to remove or transfer a DSSI terminator. Refer to the appropriate configuration figure to determine the correct placement of terminators. To transfer or attach a DSSI terminator, refer to the instructions in the following sections.

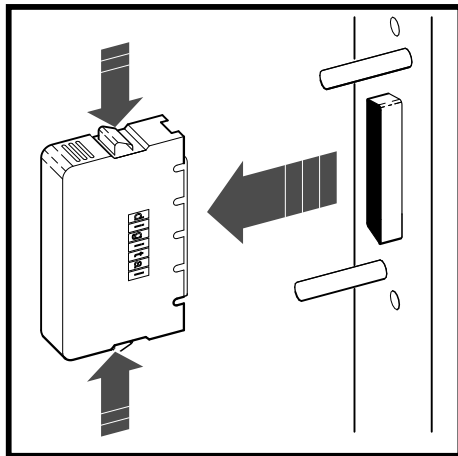
NOTE: *Before connecting DSSI cables or terminators, you may need to remove covers from the DSSI connectors. Small plastic covers protect the connector from dust and electrostatic discharge.*

2.7.1 Transferring or Attaching the DSSI Terminator

To remove the DSSI terminator, squeeze the spring clips at the bottom and top of the terminator as you pull it straight out of the connector (Figure 2–9).

CAUTION: *You must pull the terminator straight out of the connector to prevent damage to the pins.*

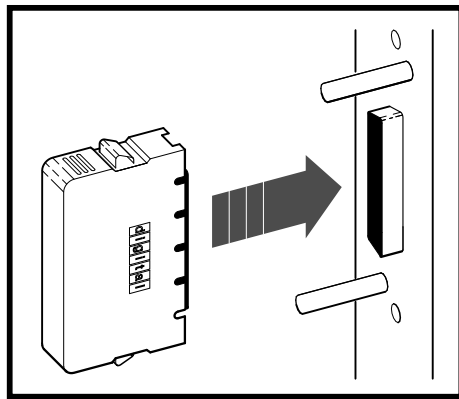
Figure 2–9: Removing a DSSI Terminator



MLO-004238

To attach a DSSI terminator, check that the terminator is oriented properly (the terminator is designed to fit on the DSSI connector in one way only). Then, push the terminator onto the connector. The spring clips should lock the terminator in place (Figure 2–10).

Figure 2–10: Attaching a DSSI Terminator



MLO-004239

2.7.2 Connecting a DSSI Cable

Use the following procedure to connect a DSSI cable. Refer to the appropriate figure (Figures 2–12 through 2–19, or A–1 through A–6) to determine where to make the cable connections.

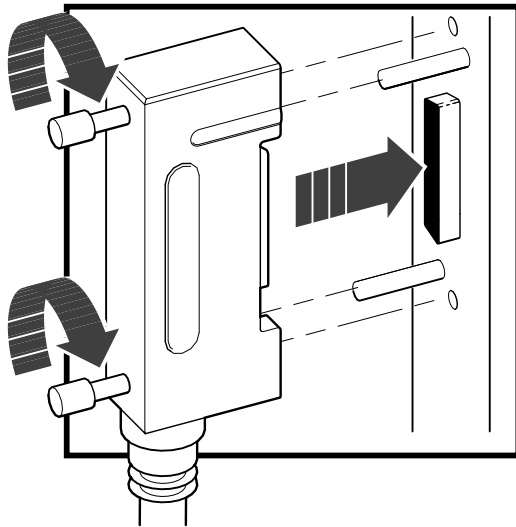
1. Find the 2.74 m (9 ft) DSSI cable labeled BC21M–09 that was shipped with the expander.
2. Feed either end of the DSSI cable under the system enclosure from the back or side and then to the DSSI connector as shown in the appropriate configuration figure.
3. Plug the cable into the DSSI connector by fitting the cable connector over the two pins on the DSSI connector as shown in Figure 2–11.

First tighten the screws by hand, then use a screwdriver to secure the connection firmly.

4. Feed the opposite end of the DSSI cable under the R400X enclosure from the back or side.
5. Plug the cable into the appropriate DSSI port on the expander, as shown in Figures 2–12 through 2–19 or A–1 through A–6, by fitting the cable connector over the two pins on the DSSI port.

First tighten the screws by hand, then use a screwdriver to secure the connection firmly.

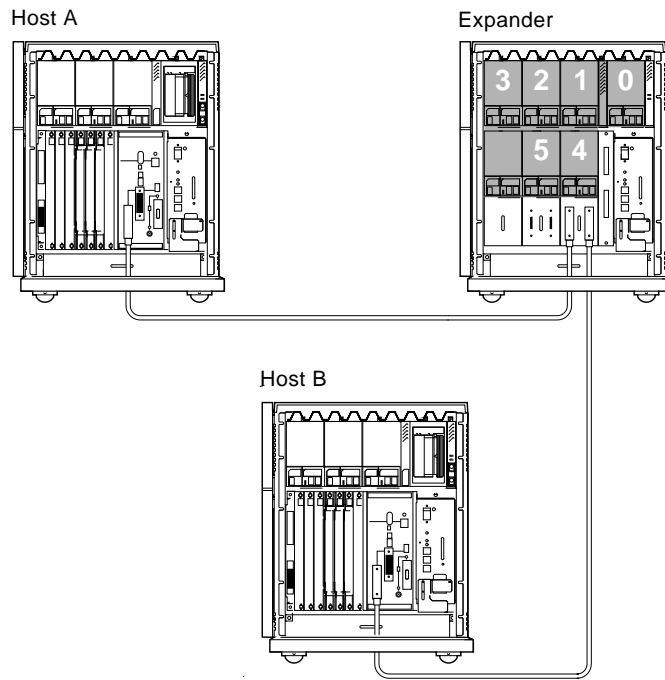
Figure 2–11: Connecting a DSSI Cable



MLO-004240

NOTE: *If you need to remove a DSSI cable, loosen the screws at the connector and then pull the connector straight off by pulling the two screw heads simultaneously.*

Figure 2–12: Expanded Dual-Host VAX 4000 Model 300 System with One R400X Expander and No ISEs in the Host Enclosures (Bus 0)

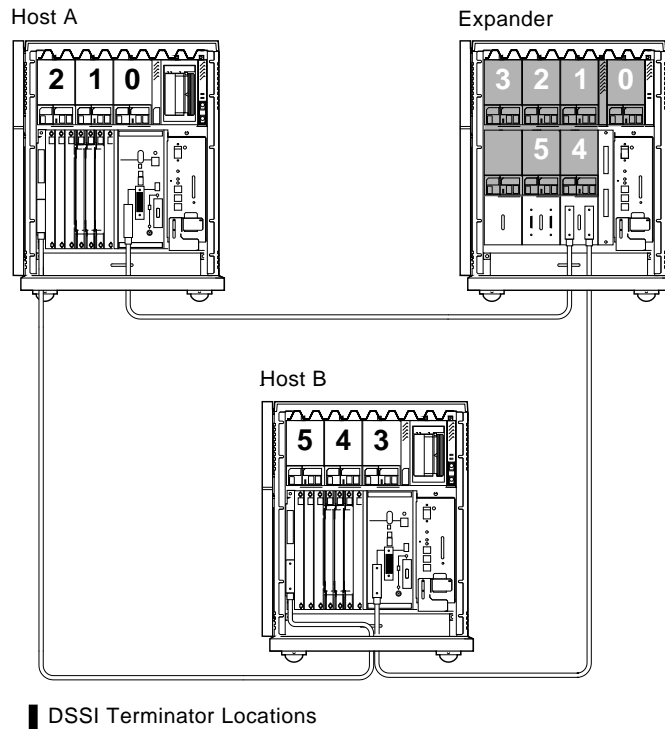


■ DSSI Terminator Locations

MLO-004241

NOTE: For dual-host systems, the first host's (Host A) DSSI busses on the console module (Bus 0 and Bus 1) should both be configured with a number 7 bus node ID plug. Both busses on the second host (Host B) should be configured with a number 6 bus node ID plug.

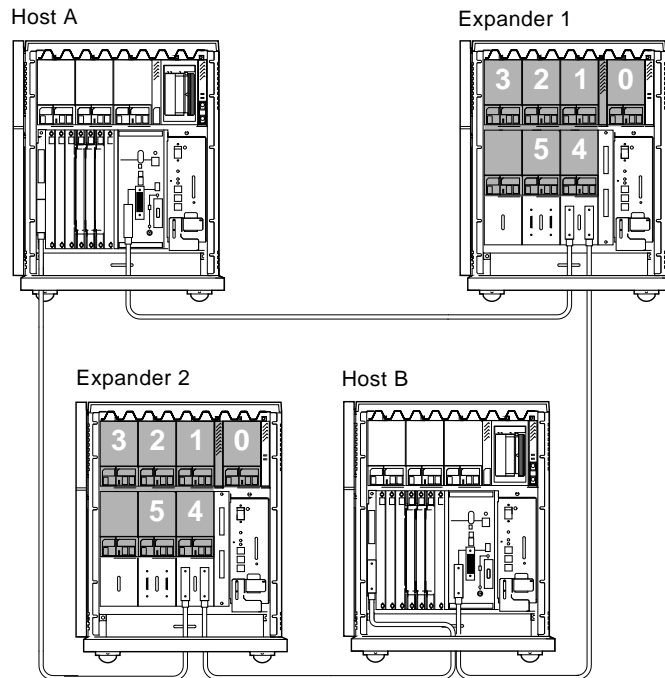
Figure 2–13: Expanded Dual-Host VAX 4000 Model 300 System with One R400X Expander and ISEs in the Host Enclosures (Bus 0)



MLO-004242

NOTE: For dual-host systems, the first host's (Host A) DSSI busses on the console module (Bus 0 and Bus 1) should both be configured with a number 7 bus node ID plug. Both busses on the second host (Host B) should be configured with a number 6 bus node ID plug.

Figure 2-14: Expanded Dual-Host VAX 4000 Model 300 System with Two R400X Expanders

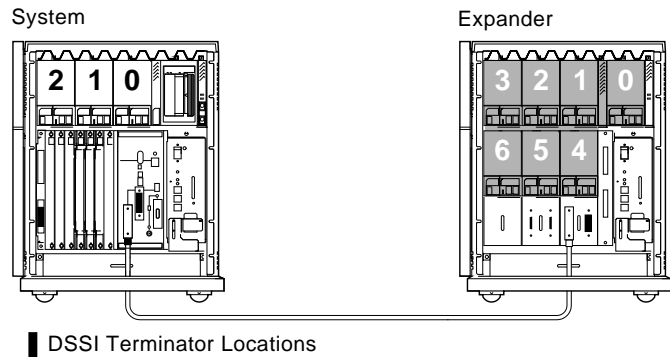


■ DSSI Terminator Locations

MLO-004243

NOTE: For dual-host systems, the first host's (Host A) DSSI busses on the console module (Bus 0 and Bus 1) should both be configured with a number 7 bus node ID plug. Both busses on the second host (Host B) should be configured with a number 6 bus node ID plug.

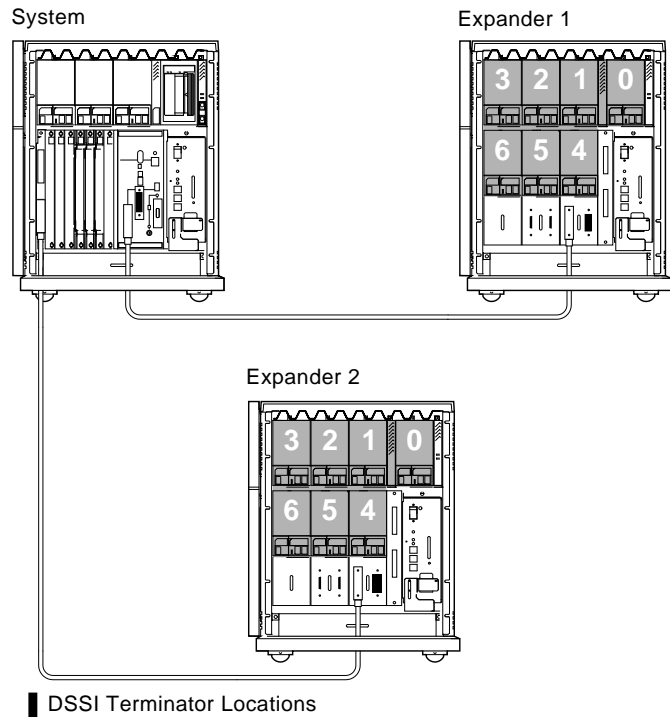
Figure 2–15: Expanded Single-Host VAX 4000 Model 300 System with One R400X Expander



MLO-004244

NOTE: *For single-host systems, both DSSI busses on the console module (Bus 0 and Bus 1) should be configured with a number 7 bus node ID plug.*

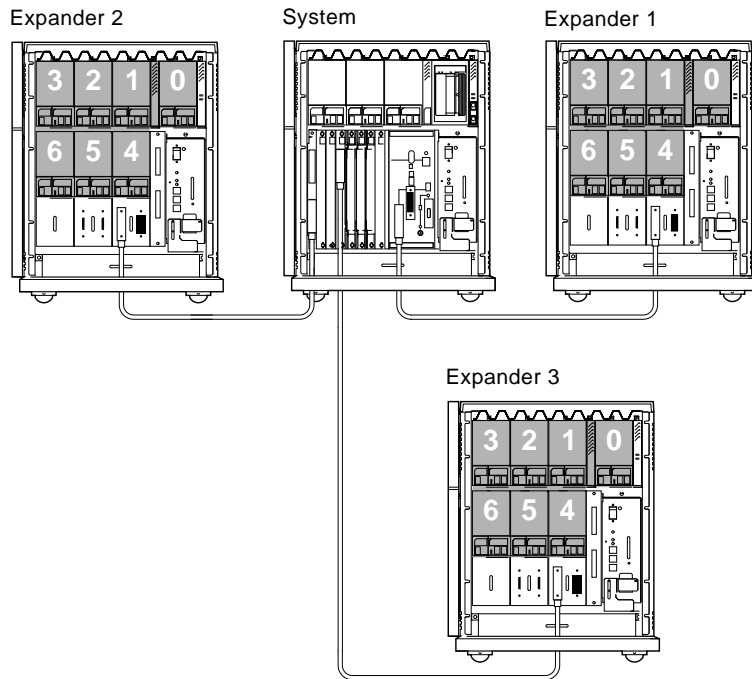
Figure 2–16: Expanded Single-Host VAX 4000 Model 300 System with Two R400X Expanders



MLO-004245

NOTE: For single-host systems, both DSSI busses on the console module (Bus 0 and Bus 1) should be configured with a number 7 bus node ID plug.

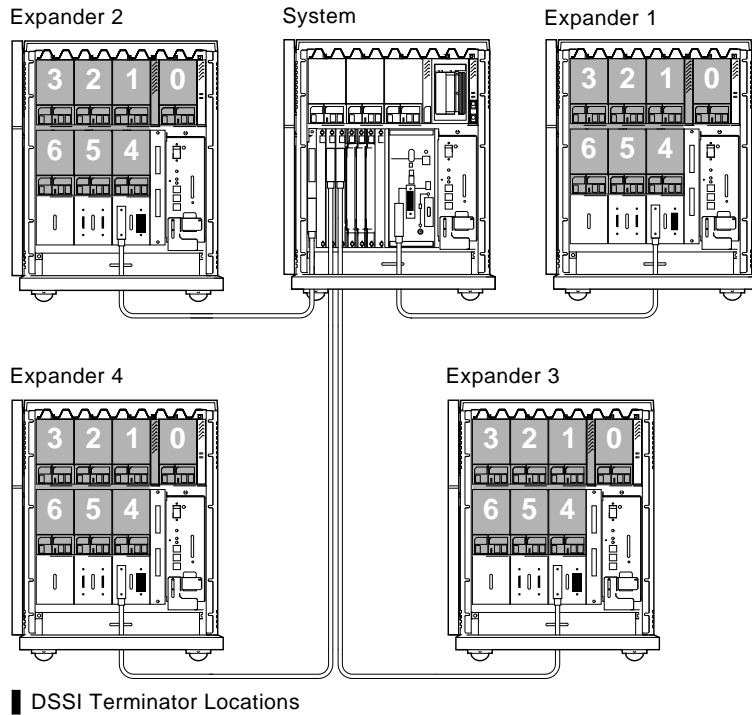
Figure 2–17: Expanded Single-Host VAX 4000 Model 300 System with Three R400X Expanders



MLO-004246

NOTE: For single-host systems, both DSSI busses on the console module (Bus 0 and Bus 1) should be configured with a number 7 bus node ID plug. The KFQSA storage adapter should also be programmed to have a bus node of 7.

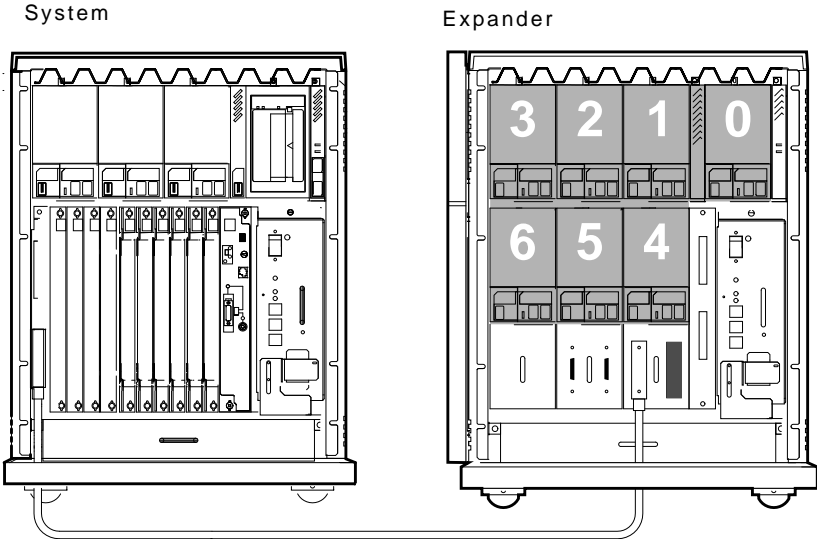
Figure 2–18: Expanded Single-Host VAX 4000 Model 300 System with Four R400X Expanders



MLO-004247

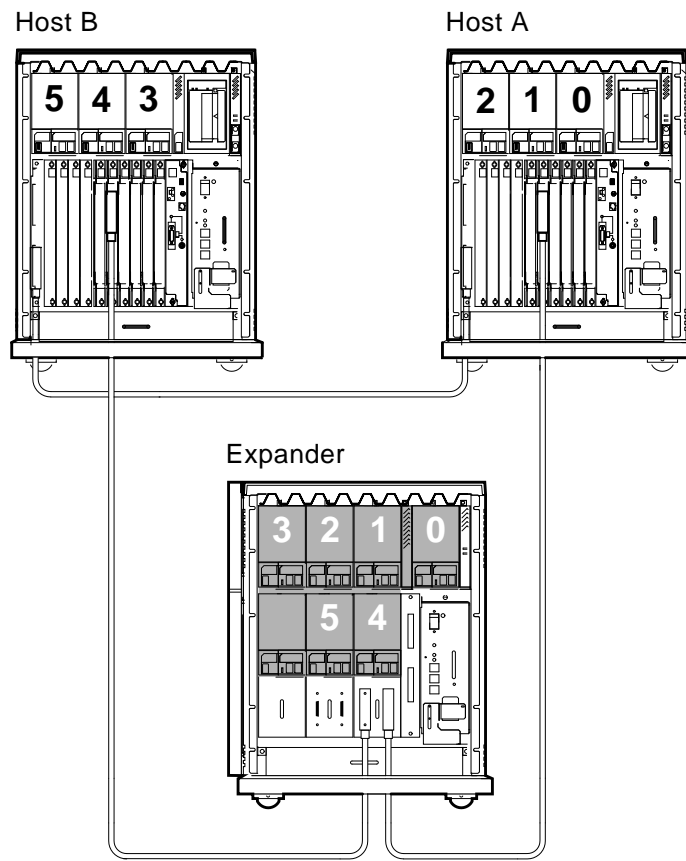
NOTE: For single-host systems, both DSSI busses on the console module (Bus 0 and Bus 1) should be configured with a number 7 bus node ID plug. The KFQSA storage adapters should also be programmed to have a bus node of 7.

Figure 2–19: Expanded VAX 4000 Model 200 (BA430) or DECsystem 5500 System



MLO-005798

Figure 2–20: Expanded Dual-Host VAX 4000 Model 200 (BA430)



MLO-005790

2.8 Connecting SCSI Cables

CAUTION: *Make sure the power switches on the system and the expander are set to off (0).*

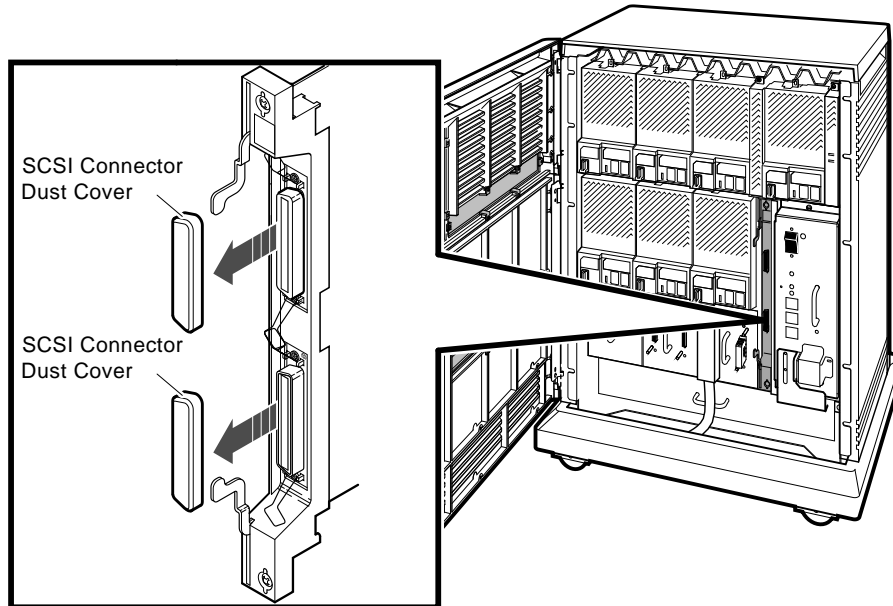
SCSI cables are used to extend the SCSI bus to SCSI devices (RZ-series ISEs or TLZ04 tape drive) in the R400X expander. If the expander contains no SCSI devices, proceed to Section 2.9.

NOTE: *VAX 4000 systems do not support RZ-series ISEs.*

Use the following instructions to connect the SCSI cable:

1. Find the 1.8-meter (6-foot) SCSI cable labeled BC06P-06 that was shipped with the expander.
2. Remove the SCSI connector covers from the two SCSI connectors on the expander (Figure 2-21).

Figure 2-21: Removing the SCSI Connector Covers



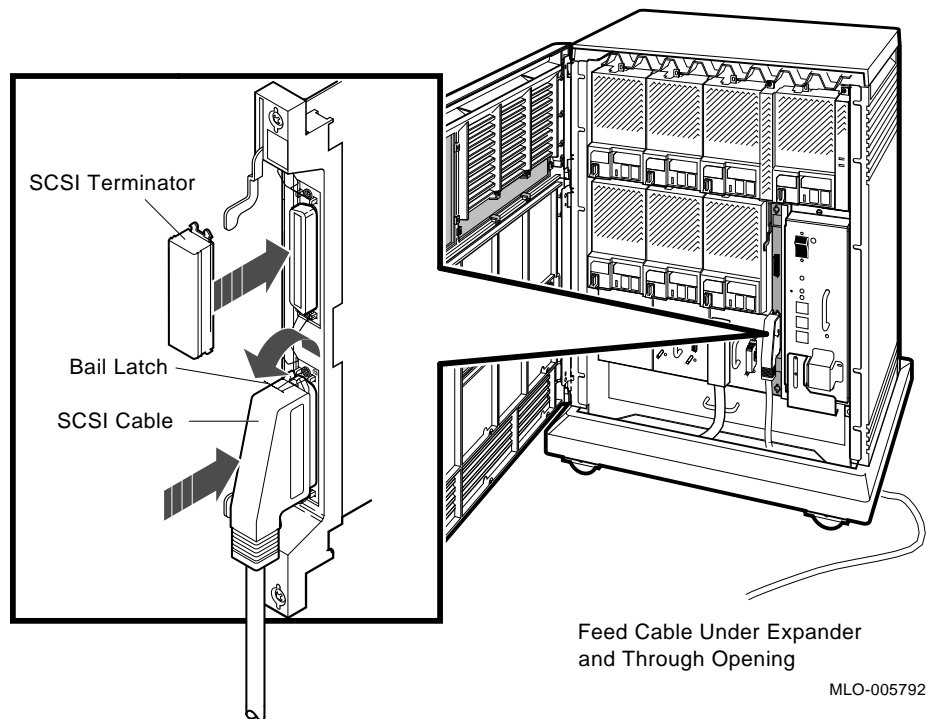
MLO-005791

3. Remove the SCSI terminator from the lower SCSI connector on the system (KZQSA adapter or SCSI panel) and attach it to the upper SCSI connector on the expander (Figure 2-22). SCSI terminators use bail latches to secure the connection.

NOTE: *Do not remove the SCSI terminator from the upper SCSI connector on the system.*

4. Feed either end of the SCSI cable under the expander from the back or side. Then feed the cable into the lower SCSI connector. Secure the cable connection by pressing the bail latches into place on either side of the connector (Figure 2-22).

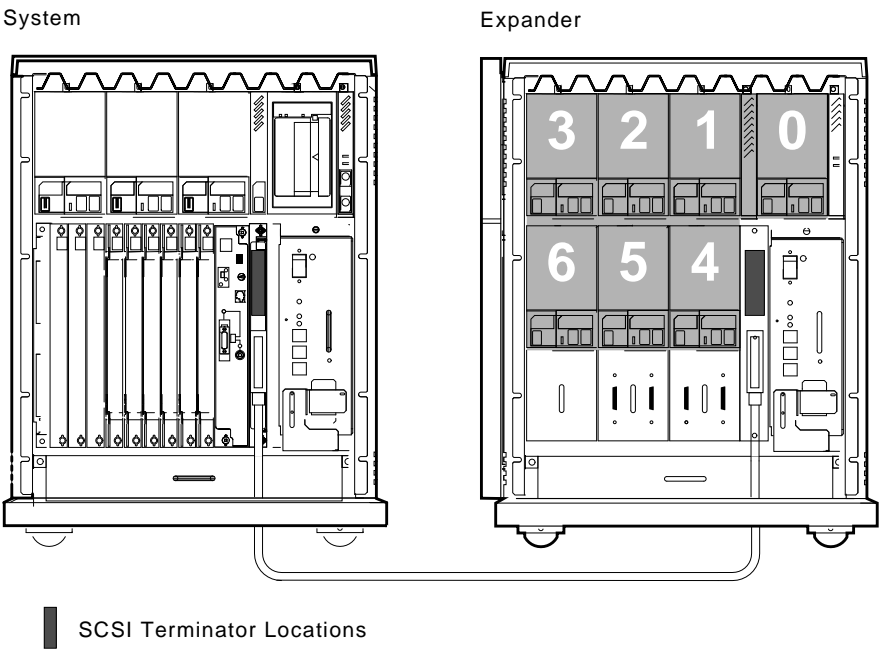
Figure 2-22: Connecting the SCSI Terminator and Cable



5. Feed the other end of the SCSI cable under the system from the back or side. Feed the cable into the appropriate SCSI connector. Secure the cable connection by pressing the bail latches into place on either side of the connector.

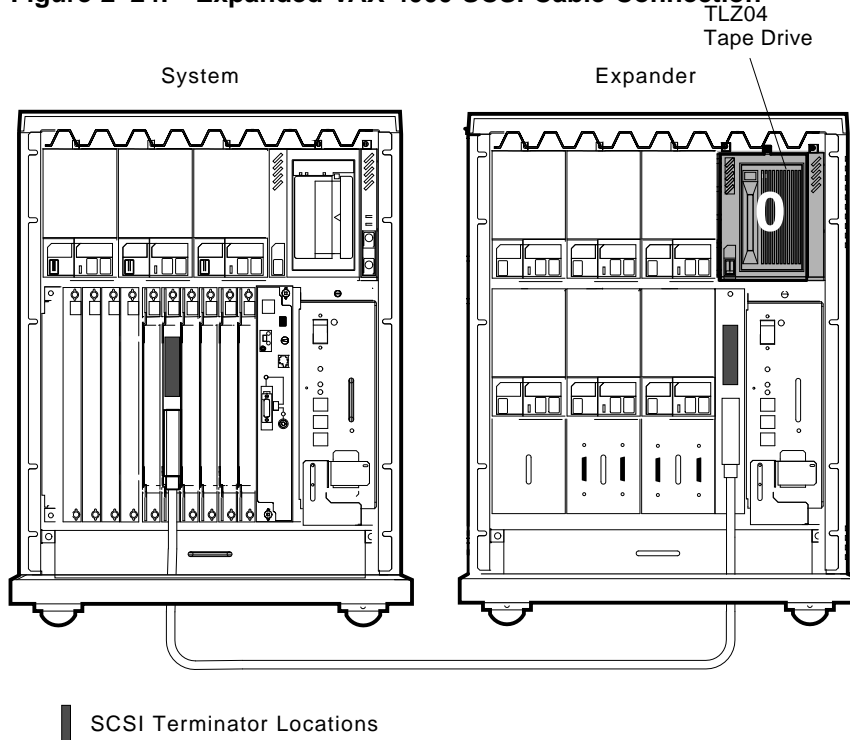
Figures 2-23 and 2-24 show possible SCSI cable configurations.

Figure 2–23: Expanded DECsystem 5500



MLO-005793

Figure 2–24: Expanded VAX 4000 SCSI Cable Connection



MLO_005794

2.9 Connecting Power Bus Cables

The power bus cable (order no. BC09F–10) allows you to configure a power bus for expanded systems. The power bus allows you to turn the power on and off for the entire expanded system at one main power supply on the system.

NOTE: *Expanders configured in a dual-host system should not be configured with a power bus. Inadvertently shutting down the expander when shutting down a host system nullifies the greater availability provided by a dual-host configuration.*

NOTE: *Expanders used with systems using BA200-series enclosures or earlier, such as VAX 4000 Model 200 (BA215), MicroVAX 3000-series or MicroVAX II systems, require a special power bus and ground cables*

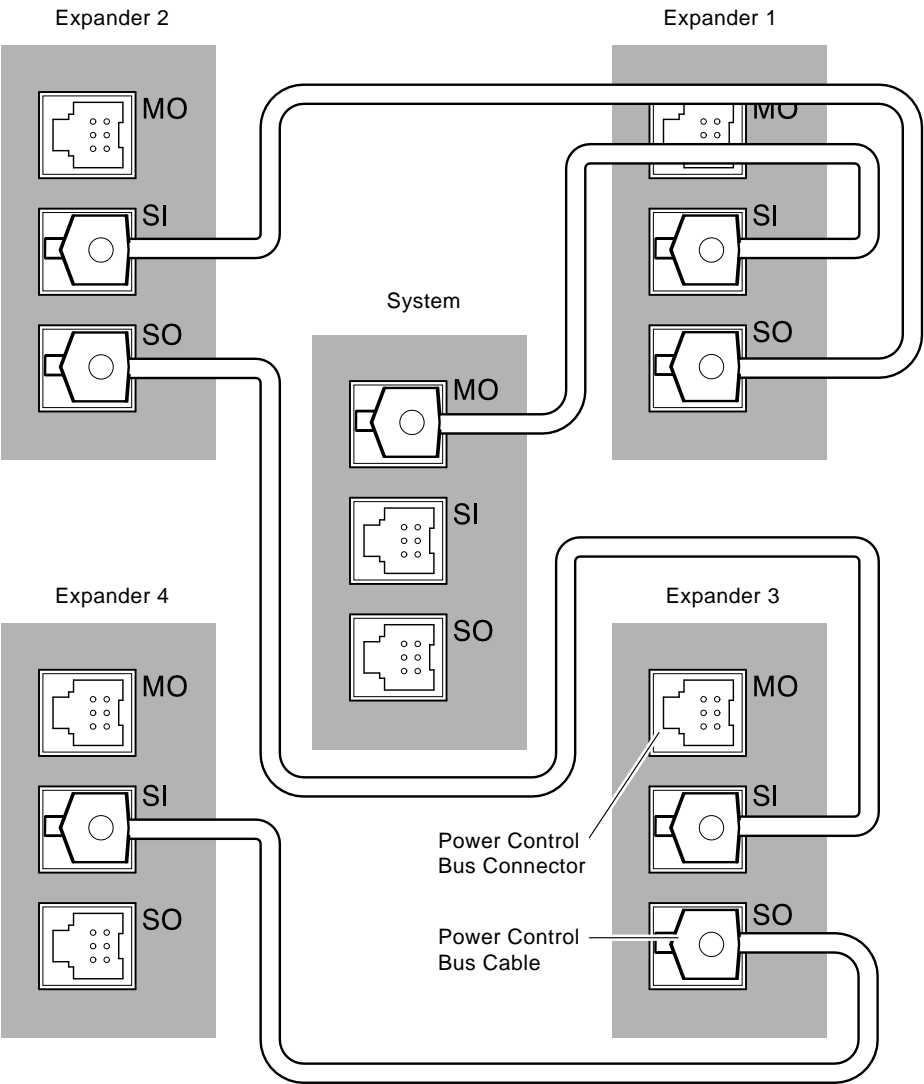
provided in the H4010-AA hardware kit. Use the cables and instructions provided in the H4010-AA kit.

To set up a power bus, complete the following instructions. Figure 2–25 shows a sample power bus.

1. Find the power bus cable (order no. BC09F–10, PN 17–02638–01) shipped with the expander.
2. To attach the first power bus cable, feed the ends of the cable under the system and expander from the back or side. Plug one end of the cable into the system power supply receptacle labeled MO (main out). This power supply will supply the power bus signal to the expander(s). Plug the other end of the cable into the expander power supply receptacle labeled SI (secondary in).
3. To extend the power bus to a second expander, plug one end of a power bus cable into the power supply receptacle labeled SO (secondary out) on the first expander. Plug the other end of the power bus cable into power supply receptacle SI in the second expander. The power bus can be extended in this way to several expanders.

If the power switch on the expander(s) is set to on, the entire expanded system will power up when you set the power switch on the system power supply to on (1).

Figure 2–25: Sample BA400-Series Power Bus Configuration



Enlarged View of Power Supplies

MLO-004124

2.10 Connecting Ground Cables

The ground cable (PN 12-13756-A8) provides a common ground for systems with two or more enclosures. Ground cables are daisy-chained for systems with multiple enclosures. Connect a ground cable as follows:

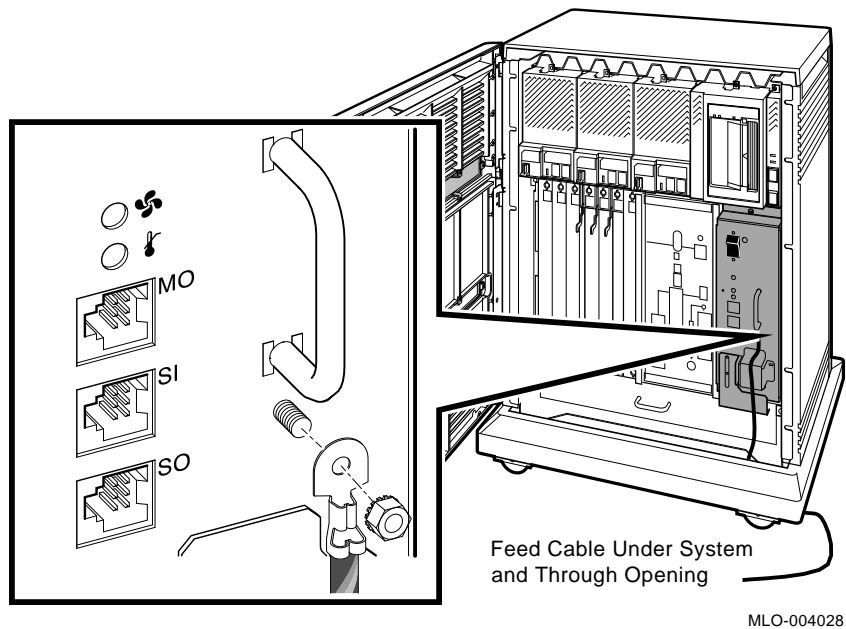
NOTE: *Expanders used with systems using BA200-series enclosures or earlier, such as MicroVAX 3000-series or MicroVAX II systems, require a special power bus and ground cables provided in the H4010-AA hardware kit. Use the cables and instructions provided in the H4010-AA kit.*

1. Find the ground cable, a gray wire with ground lugs on each end (PN 12-13756-A8).
2. Remove the nut on the ground terminal of the system and expander power supplies.
3. Slide the lug over the terminal and replace the nut.

Figure 2-26 shows how to connect a ground cable.

NOTE: *No more than two ground cables should be attached per ground terminal.*

Figure 2–26: Connecting a Ground Cable

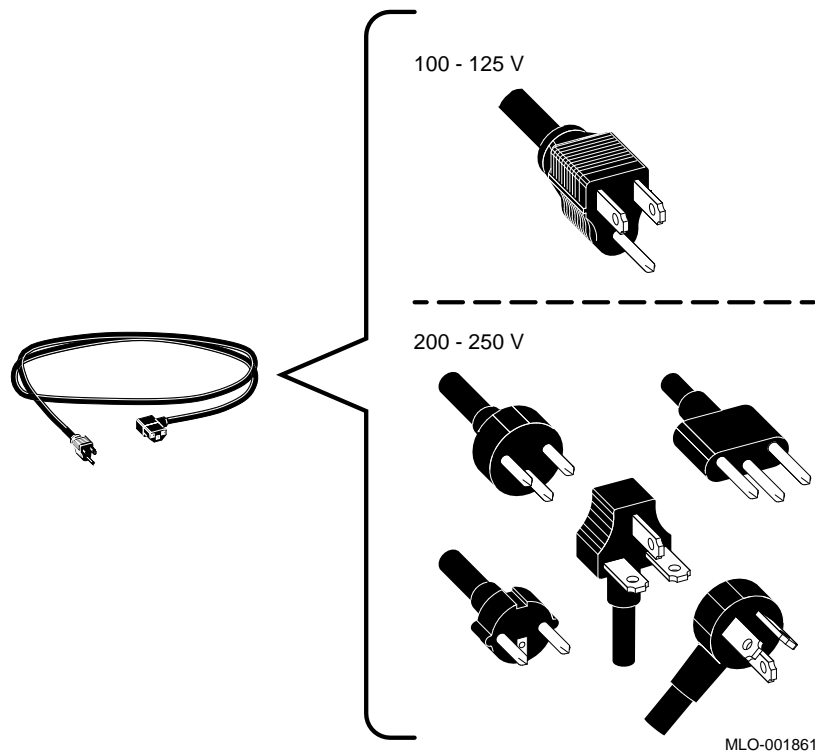


2.11 Connecting Power Cables

Use the following procedure to connect power cables:

1. Make sure that the power (I/O) switches on the system and the expander are set to off (0) and that all devices connected to the system are turned off.
2. Find the appropriate country-specific power cables for the system and the expander.
3. Make sure the plug end of each power cable matches its receptacle. Several types of power cables are shown in Figure 2–27.

Figure 2–27: Power Cables

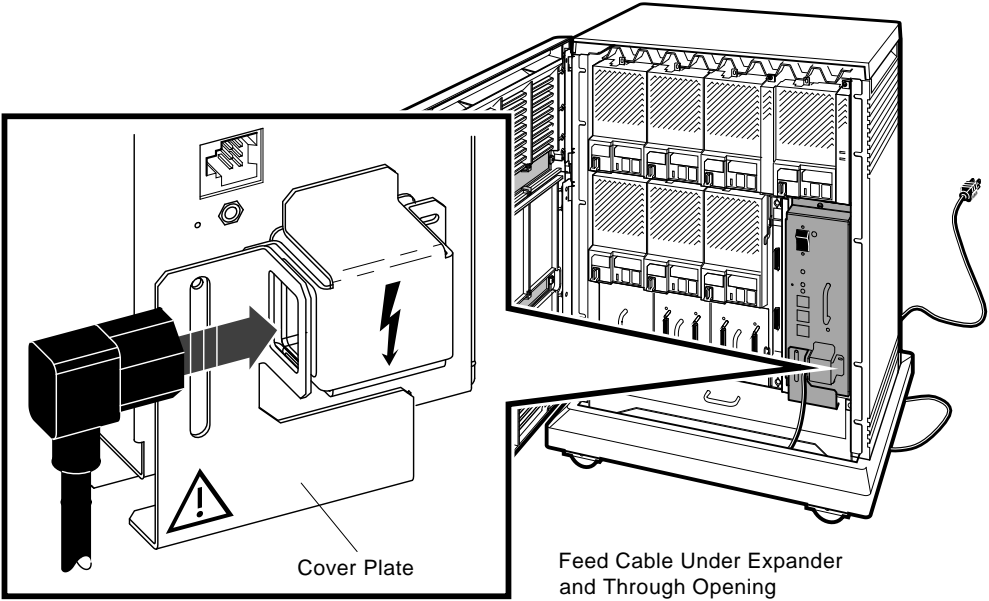


4. Feed the socket end of the R400X power cable under the expander enclosure from the back or side and connect the cable as shown in Figure 2–28.

NOTE: *The cover plate on the BA400-series power supply must be in the down position before you can connect the power cable.*

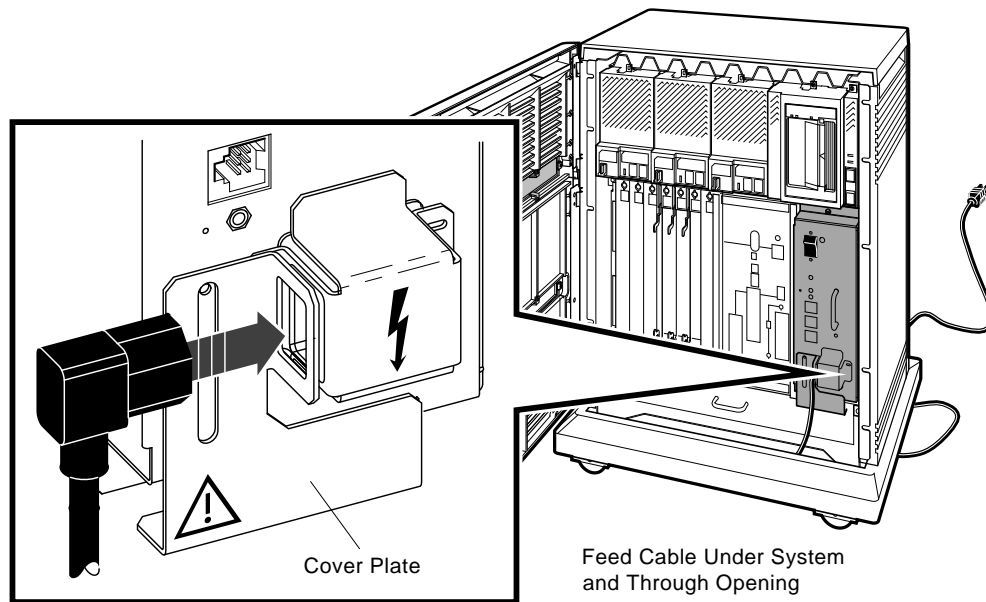
For BA400-series enclosure based, feed the socket end of the system power cable under the system enclosure from the back or side and connect the cable as shown in Figure 2–29.

Figure 2–28: Connecting the Power Cable to the R400X Expander



MLO-004123

Figure 2–29: Connecting the Power Cable to the System



MLO-004029

5. Insert the plug end of each power cable into its receptacle.

2.12 Turning On the System

You are now ready to turn on the expanded system and to select a language if the system is new.

1. Make sure the system and console baud rates are the same.
2. Turn on the console terminal and wait until it performs its self-tests successfully.
3. Set the power switches on the expander(s) to on (1).

The orange AC indicators on the expanders should light.

NOTE: For expanded BA400-based systems linked by a power bus cable, the power switch on the R400X expander(s) should always remain in the on position (1). Setting the power switch to 1 on the system will cause the expanders to power up as well.

4. Set the power switch on the system to on (1).

The orange AC indicators on the system should light, the expanders and system should power up. If the system is being powered up for the first time, within a few moments of turning on the system, the console terminal should display the language selection menu as shown in the system installation manual. You can find that manual in the system *Customer Hardware Information* binder.

NOTE: *On some older terminals that do not support multiple languages, the language selection menu does not appear and the system defaults to English and runs its power-up self-tests.*

5. If the language selection menu is displayed, select a language by typing the number corresponding to your choice and pressing Return.

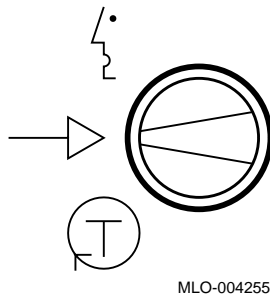
After you select a language, the system runs its power-up self-tests.

Within a few moments, the console terminal should display a series of numbers as the system tests itself. The system operation manual shows the display after a successful power-up test.

6. If the self-tests do not start or fail to complete successfully the system may have a problem. Refer to the system troubleshooting manual for instructions. You can find the troubleshooting manual in the system *Customer Hardware Information* binder.

If the self-tests run successfully and you have selected a language, set the power-up mode or operation switch to the Run position (Figure 2–30). That setting allows you to power up without having to select a language each time.

Figure 2–30: Setting the Power-Up Mode or Operation Switch



2.13 Configuring the KFQSA Adapter and the Expanded System

If the system is supported by the KFQSA storage adapter, you may need to complete the procedures listed below:

- If the system is factory configured and is not part of a cluster, proceed to Section 2.14.
- If the system is not factory configured, configure the KFQSA adapter for the devices that are included in the expanded system as described in the *KFQ Storage Adapter Installation and User Manual*.
- Then, if the system is part of a cluster, change the ISE default allocation class as described in the *KFQ Storage Adapter Installation and User Manual*.

After completing the applicable procedures described above, continue with the following section.

2.14 Programming ISE Unit Numbers for Systems with Multiple DSSI Busses

When a system uses more than one DSSI bus and a nonzero system allocation class, you need to assign new unit numbers for ISEs on one or more of the busses, as unit numbers for ISEs throughout the system must be unique.

If you are adding the expander to a system with ISEs on more than one DSSI bus and the system uses a nonzero allocation class, refer to Appendix B for instructions on programming ISE unit numbers and overriding default values.

2.15 Closing the Door

The final steps of the installation are:

- Attaching the panel or closing the door on the system enclosure
- Closing the door on the expander

Attach the panel or close the door on the system enclosure as described in the system operation manual. You can find that manual in the system *Customer Hardware Information* binder.

Close the front doors of the R400X expander by setting the door key to the lowest position and closing the upper and lower doors. When pushing the doors closed, push gently at the top right of the upper door and the bottom right of the lower door. To lock the doors, turn the key to the middle position.

2.16 Postinstallation Requirements

You should run MicroVAX Diagnostic Monitor (MDM) before installing system software or running the start-up procedure for factory-installed VMS.

Refer to Appendix A in the system *Installation* manual for instructions on the start-up procedures for factory-installed VMS.

Chapter 3

FRU Removal and Replacement

This chapter describes how to remove the major field-replaceable units (FRUs) for the R400X expander.

3.1 List of R400X Expander FRUs

Table 3–1 lists the part numbers for each R400X expander FRU and the section of this manual that describes its removal procedure. Table 3–2 lists the expander power cables.

Table 3–1: R400X Expander FRUs

Part Number	FRU Description	Section
00–RF72E–AA/AF	RF72 integrated storage element	Section 3.3.1
00–RF71E–AA/AF	RF71 integrated storage element	Section 3.3.1
00–RF31E–AA/AF	RF31 integrated storage element	Section 3.3.1
00–RZ57E–AA/AF	RZ57 integrated storage element	Section 3.3.1
00–RZ56E–AA/AF	RZ56 integrated storage element	Section 3.3.1
70–25972–01	RF72 head-disk assembly	Section 3.3.1
70–23557–01	RF71 head-disk assembly	Section 3.3.1
70–24697–01	RF31 head-disk assembly	Section 3.3.1
29–28158–01	RZ57 head-disk assembly	Section 3.3.1
29–27890–01	RZ56 head-disk assembly	Section 3.3.1
54–19091–01	RF72 electronic control module	Section 3.3.1
54–18316–01	RF71 electronic control module	Section 3.3.1
54–18329–01	RF31 electronic control module	Section 3.3.1
29–28159–01	RZ57 electronic control module	Section 3.3.1
29–27889–01	RZ56 electronic control module	Section 3.3.1
54–19787–01	RF-series ISE interface card	Section 3.3.1.3
54–20136–01	RZ-series ISE interface card	Section 3.3.1.3
54–19791–01	RF-series ISE remote front panel module	Section 3.3.1.2
54–20400–01	RZ-series ISE remote front panel module	Section 3.3.1.2
17–02706–01	RF-series ISE remote front panel cable	Section 3.3.1.4
17–02887–01	RZ-series ISE remote front panel cable	Section 3.3.1.4
70–27049–01	RF-series ISE front panel	Section 3.3.1

Table 3–1 (Cont.): R400X Expander FRUs

Part Number	FRU Description	Section
70–27049–03	RZ-series ISE front panel	Section 3.3.1
70–27414–01	Drive filler panel	Section 2.5.1
00–TLZ04–JA/JF	TLZ04 Tape Drive	Section 3.3.2
54–20438–01	TLZO4 tape drive front panel module	Section 3.3.2
54–20136–03	TLZO4 tape drive interface card	Section 3.3.2
17–01936–02	TLZO4 tape drive ID cable	Section 3.3.2
70–27044–02	Status panel	Section 3.3.3
17–02493–01	Status panel cable	Section 3.3.3
M7493–PA	SCSI connector module	Section 3.3.4
70–27406–01	DSSI jumper assembly	Section 3.3.5
70–27406–02	DSSI connector assembly	Section 3.3.5
12–31500–01	Fan, 6" 24 Vdc	Section 3.3.6
00–H7874–00	Power supply	Section 3.3.7
70–27047–01	Upper door	Section 3.3.8
70–27048–02	Lower door	Section 3.3.8
54–19859–01	R400X backplane	Section 3.3.8
12–30552–01	SCSI Terminator	
12–29258–01	DSSI Terminator	
12–17119–01	Plastic Key	
17–02638–01	BC09F–10 (BA400-series power bus cable)	
17–02637–01	BC09G–10 (BA200-series-to-BA400-series Power Bus Cable)	

Table 3–2: R400X Expander Power Cables

Part Number	Voltage	Countries
BN20A–2E	120 Vac	USA and Canada
BN20B–2E	250 Vac	USA and Japan
BN22E–2E	240 Vac	UK and Ireland
BN22D–2E	240 Vac	Austria, Belgium, Czechoslovakia, Finland, France, Germany, Hungary, Netherlands, Norway, Poland, Portugal, Spain, Sweden
BN22F–2E	220 Vac	Switzerland
BN22C–2E	240 Vac	Australia and New Zealand
BN22H–2E	220 Vac	Denmark
BN22J–2E	250 Vac	Italy
BN22K–2E	240 Vac	India
BN22L–2E	240 Vac	Israel

3–2 R400X Expander Installation and Maintenance

3.2 Initial Procedure to Access FRUs

CAUTION:

- *Only qualified service personnel should remove or replace FRUs.*
- *Before you remove or replace FRUs, always set the power switch to off (0) and unplug the ac power cord from the wall outlet.*
- *Static electricity can damage integrated circuits. Use the grounded wrist strap and antistatic mat found in the Antistatic Kit (PN 29-26246) when you work with the internal parts of this expander.*

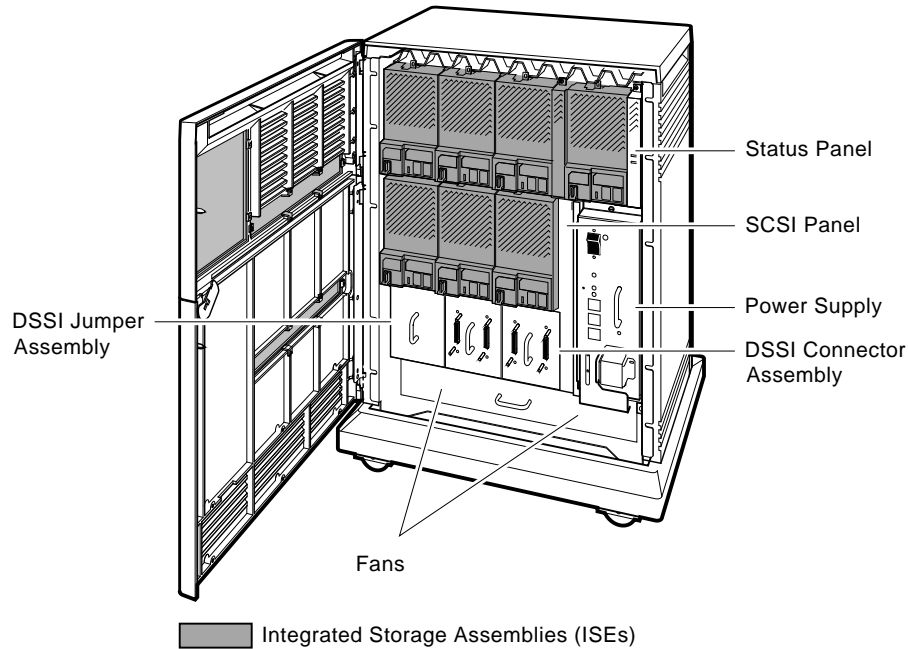
Before you can remove FRUs from the R400X expander, you must open the front door as described in Chapter 1.

3.3 Removal Procedures for R400X FRUs

The following sections describe the removal procedure for a specified field-replaceable unit (FRU). Unless otherwise indicated, you can replace an FRU by reversing the steps in the removal procedure.

The major FRU locations are shown in Figure 3-1.

Figure 3-1: Locations of Field-Replaceable Units (FRUs)



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3-4 R400X Expander Installation and Maintenance

3.3.1 Replacing RF-/RZ- Series ISEs

This section describes how to replace RF- or RZ-series ISEs. In addition, procedures are provided to replace the following individual FRUs that make up the mounting hardware for the integrated storage element:

- ISE front panel module
- Interface card assembly
- Remote front panel cable

For information on troubleshooting strategy, error analysis, and diagnostics, as well as information on removal and replacement of the drive module and head-disk assembly (HDA), refer to the appropriate service manual for the device. Replacing the drive module on RF-series ISEs does not require removal of the ISE bracketry.

3.3.1.1 Removing an ISE

Use the following instructions to remove an RF-/RZ-series ISE. Refer to Figure 3-2.

NOTE: *The ISE figures throughout this chapter show the RF-series variety.*

CAUTION: *Static electricity can damage integrated circuits. Use the wrist strap and antistatic mat found in the Antistatic Kit (PN 29-26246) when you work with the internal parts of a computer system.*

Handle ISEs with care. Dropping or bumping the ISE can damage the disk surface. Carry or hold the ISEs by their metal brackets to avoid damaging the drive module.

1. Loosen the single captive Phillips screw that secures the ISE front panel (Figure 3–2A).
2. Separate the ISE front panel from the enclosure, being careful of the remote front panel cable, which is connected to the ISE front panel.

NOTE: *If the cause of the ISE failure is undetermined, inspect the connection of the remote front panel cable and the ISE front panel module. The cable may not be connected securely, or the cable or connector is defective.*

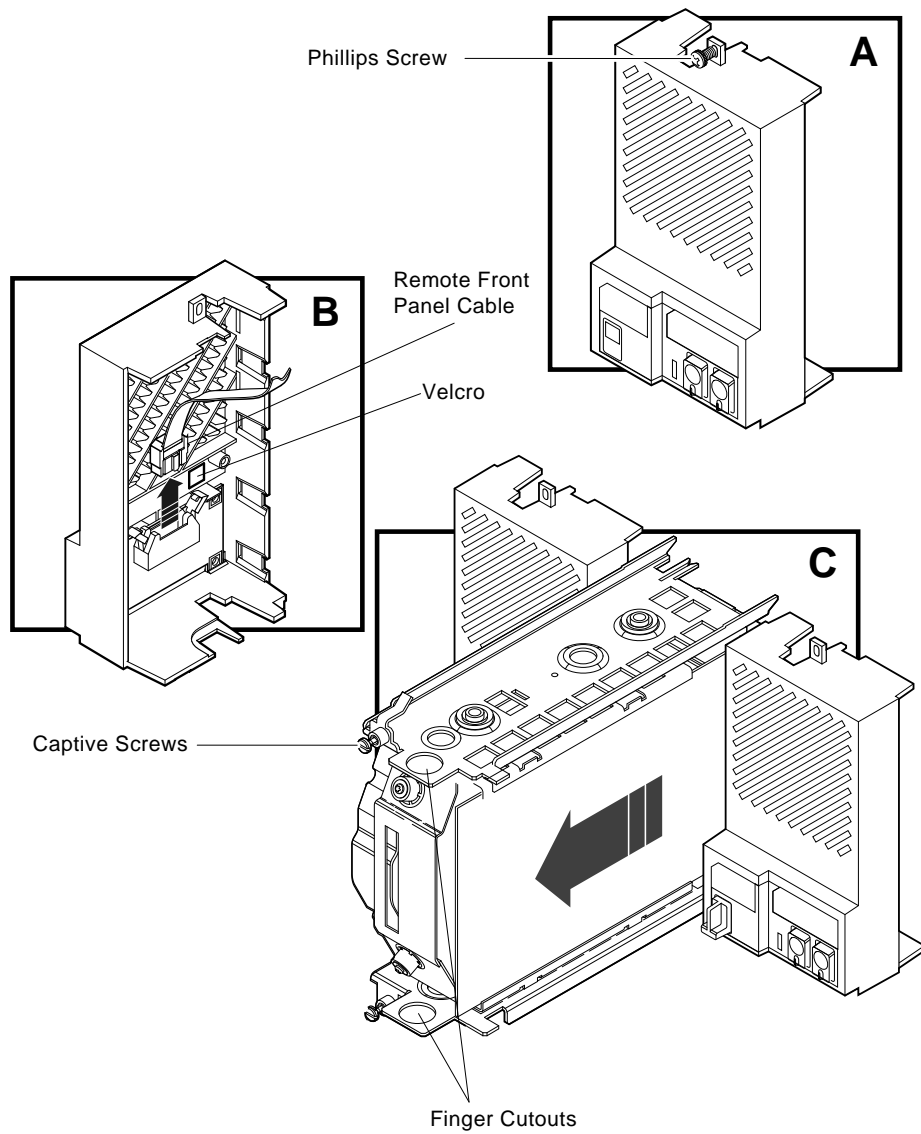
If the front panel module appears to be the problem, refer to Section 3.3.1.2 for instructions on replacing the ISE front panel module (PN 54–19791–01 RF-series, PN 54–20400–01 RZ-series). To replace the remote front panel cable, continue removing the ISE and then refer to Section 3.3.1.4 for instructions on replacing the remote front panel cable (PN 17–01936–02 RF-series, PN 17–02887–01 RZ-series).

3. Unplug the remote front panel cable from the module inside the ISE front panel and set the front panel aside (Figure 3–2B).
4. Loosen the upper and lower captive screws that hold the ISE in place (Figure 3–2C).
5. Using the upper and lower finger cutouts on the ISE bracketry, carefully pull the ISE out of its backplane connector and slide the drive out of the enclosure. Support the weight of the ISE at the lower bracket as the ISE clears the enclosure (Figure 3–2C).

CAUTION: *Do not touch the drive module. The drive module contains sensitive electronic circuitry.*

NOTE: *If the cause of the ISE failure is undetermined, inspect the condition of the interface card and its associated cables and cable connections. Refer to Section 3.3.1.3 for instructions on replacing the interface card assembly (PN 54–19787–01 RF-series, PN 54–20136–01 RZ-series).*

Figure 3–2: Removing an ISE



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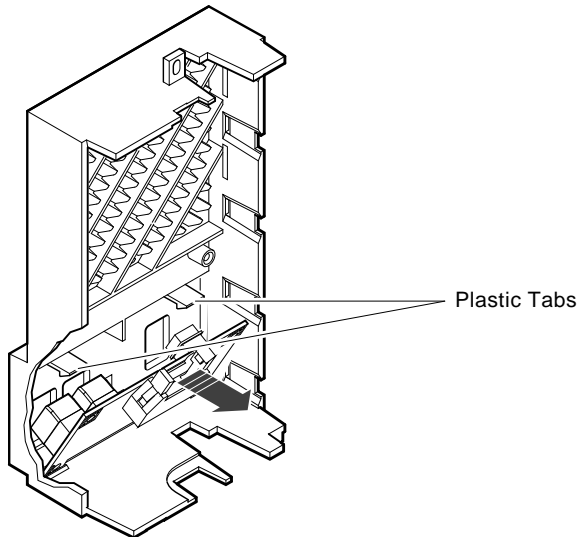
To install a new or replacement ISE, refer to Section 2.5.1.

3.3.1.2 Replacing the ISE Front Panel Module

This procedure assumes you have completed steps one and two in Section 3.3.1.1. Use the following instructions to remove the ISE front panel module (PN 54-19791-01 RF-series, PN 54-20400-00 RZ-series) and refer to Figure 3-3.

1. Unplug the remote front panel cable from its connector on the remote front panel module.
2. Remove the bus node ID plug on the ISE front panel by pulling it straight out.
3. Lift the two plastic tabs that hold the front panel module in place and remove the module.
4. Reverse the procedure to install a module.

Figure 3-3: Removing an ISE Front Panel Module



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3.3.1.3 Replacing the Interface Card Assembly

Use the following instructions to replace the interface card assembly (PN 54-19787-01 RF-series, PN 54-20136-01 RZ-series). To remove the interface card assembly, first remove the ISE upper bracket.

3.3.1.3.1 Removing the ISE Upper Bracket

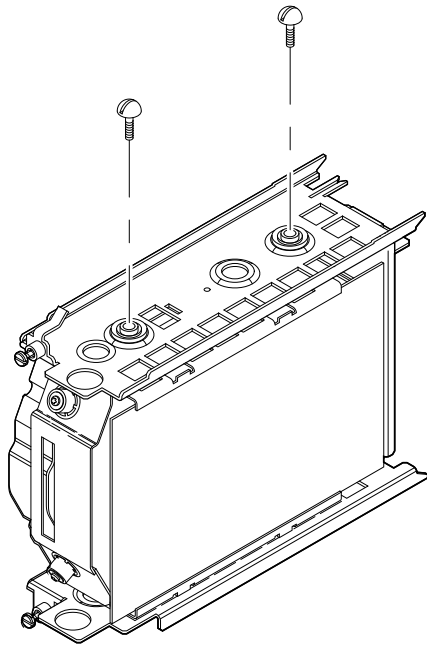
This procedure assumes you have removed the ISE as described in Section 3.3.1.1. Remove the ISE upper bracket as follows:

1. Place the ISE on an antistatic mat.
2. Remove the two Phillips screws at the rubber shock bushings that secure the upper bracket to the head-disk assembly (Figure 3-4).

NOTE: *RF72s and RF71s are secured to the brackets using the outer bushing positions. RF31s are secured at the second and fourth (from the front) bushing positions.*

CAUTION: *Early models of the RF-series ISEs use four screws of two different lengths to secure the upper and lower brackets. The two longer screws (by one-eighth of an inch) must only be used in the shock bushing toward the back of the drive.*

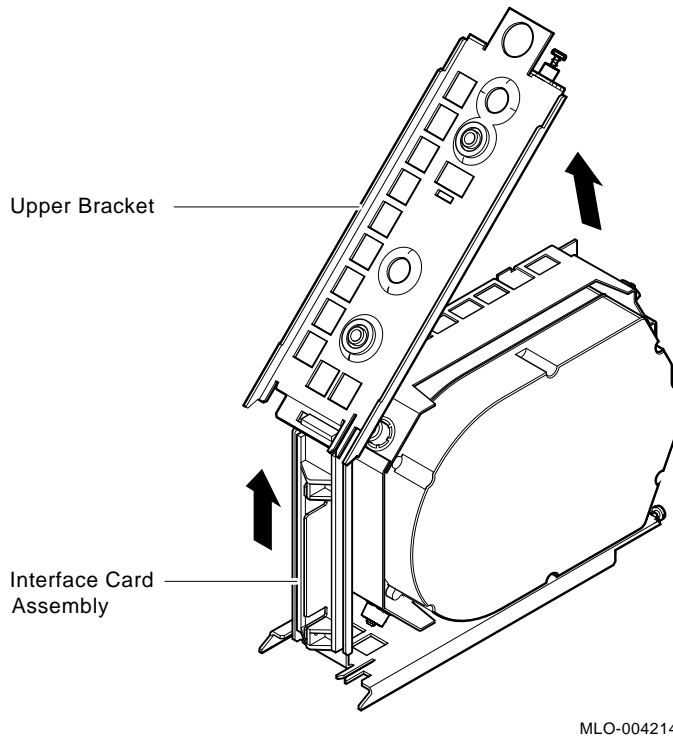
Figure 3-4: Removing Bracket Screws



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3. Slide the interface card assembly up and lift off the upper bracket (Figure 3-5).

Figure 3–5: Removing the ISE Upper Bracket



3.3.1.3.2 Removing the Interface Card Assembly

Remove the interface card assembly as follows:

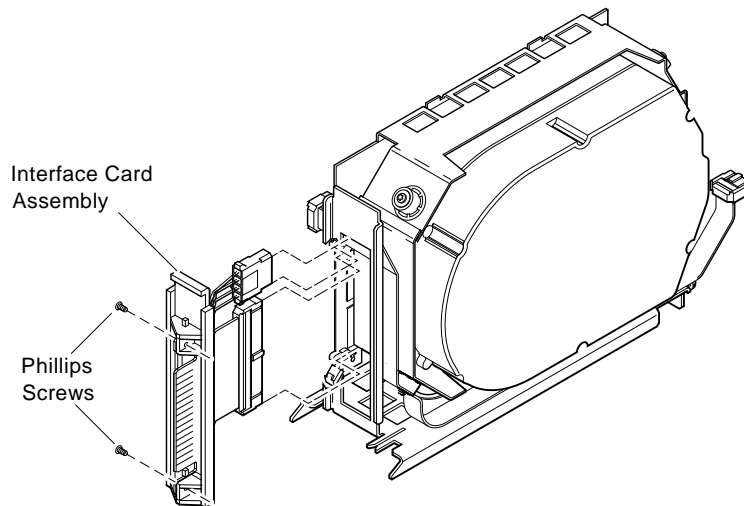
1. Unplug the 5-pin (RF-series) or 4-pin (RZ-series) power cable, the 50-pin signal cable, and the remote front panel cable from their connectors on the controller module.

NOTE: *Observe cable routing to ensure that you route the cables properly when reassembling.*

2. Lift and remove the plastic interface card assembly being careful to guide the cables through the cutout in the metal bracket (Figure 3–6).
3. To remove the plastic assembly from the interface card, remove the two Phillips screws that hold it in place (Figure 3–6).

4. Reverse the procedure to install the interface card assembly.

Figure 3–6: Removing the Interface Card Assembly



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3.3.1.4 Replacing the Remote Front Panel Cable

To remove the remote front panel cable, you first remove the ISE as described in Section 3.3.1.1 and the ISE upper bracket as described in Section 3.3.1.3.1. After completing those steps, remove the ISE lower bracket and remote front panel cable. See the following sections.

3.3.1.4.1 Removing the ISE Lower Bracket

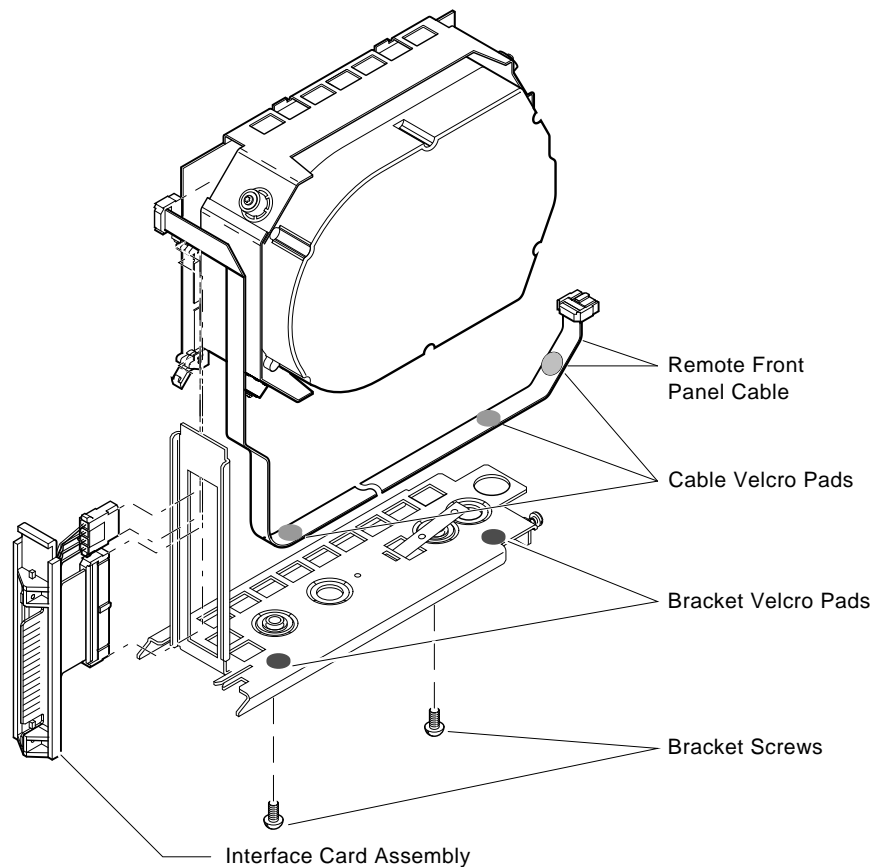
Remove the ISE lower bracket by removing the two Phillips screws at the rubber shock bushings that secure the lower bracket to the head-disk assembly (Figure 3–7).

3.3.1.4.2 Removing the Remote Front Panel Cable

NOTE: *Observe cable routing to ensure that you route the cables properly when reassembling.*

To remove the remote front panel cable, unplug the cable from its connector on the drive module, then pull the cable free from the lower bracket at the two points where the cable is secured by Velcro. Reverse the procedure to install the remote front panel cable.

Figure 3-7: Removing the Remote Front Panel Cable



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3.3.2 Replacing the TLZ04 Tape Drive

This section describes how to replace the TLZ04 tape drive. In addition, procedures are provided to replace the following individual FRUs that make up the mounting hardware for the integrated storage element:

- Tape drive front panel module
- Interface card assembly
- ID cable

For information on troubleshooting strategy, error analysis, and diagnostics, refer to the TLZ04 tape drive service manual.

3.3.2.1 Removing the TLZ04 Tape Drive

Use the following instructions to a TLZ04 tape drive. Refer to Figure 3–8.

CAUTION: *Static electricity can damage integrated circuits. Use the wrist strap and antistatic mat found in the Antistatic Kit (PN 29–26246) when you work with the internal parts of a computer system.*

Handle the tape drive with care. Dropping or bumping it can damage the drive. Carry or hold the drive by its metal brackets to avoid damaging the drive.

1. Loosen the single captive Phillips screw that secures the TLZ04 front panel (Figure 3–8A).
2. Separate the TLZ04 front panel from the enclosure, being careful of the ID cable, which is connected to the TLZ04 front panel.

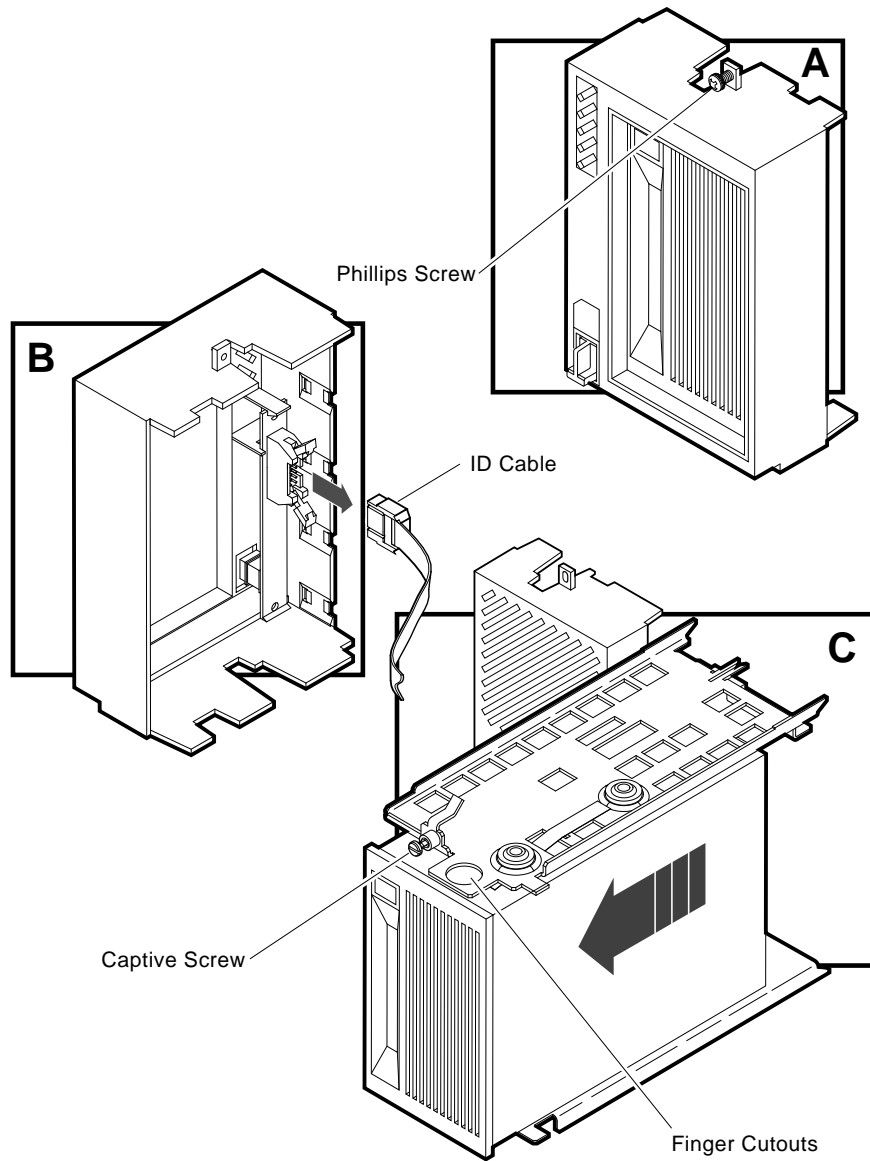
NOTE: *If the cause of the drive failure is undetermined, inspect the connection of the ID cable and the TLZ04 front panel. The cable may not be connected securely, or the cable or connector is defective.*

If the front panel appears to be the problem, refer to Section 3.3.2.3 for instructions on replacing the TLZ04 front panel. To replace the ID cable, continue removing the tape drive and then refer to Section 3.3.2.2 for instructions on replacing ID cable (PN 17–01936–02).

3. Unplug the remote ID cable from the TLZ04 front panel and set the front panel aside (Figure 3–8B).
4. Loosen the upper and lower captive screws that hold the drive in place (Figure 3–8C).
5. Using the upper and lower finger cutouts on the drive bracketry, carefully pull the drive out of its backplane connector and slide the drive out of the enclosure. Support the weight of the drive at the lower bracket as the drive clears the enclosure (Figure 3–8C).

NOTE: *If the cause of the drive failure is undetermined, inspect the condition of the interface card and its associated cables and cable connections. Refer to Section 3.3.2.4 for instructions on replacing the interface card assembly (PN 54–20136–03).*

Figure 3–8: Removing the TLZ04 Tape Drive



MLO-005795

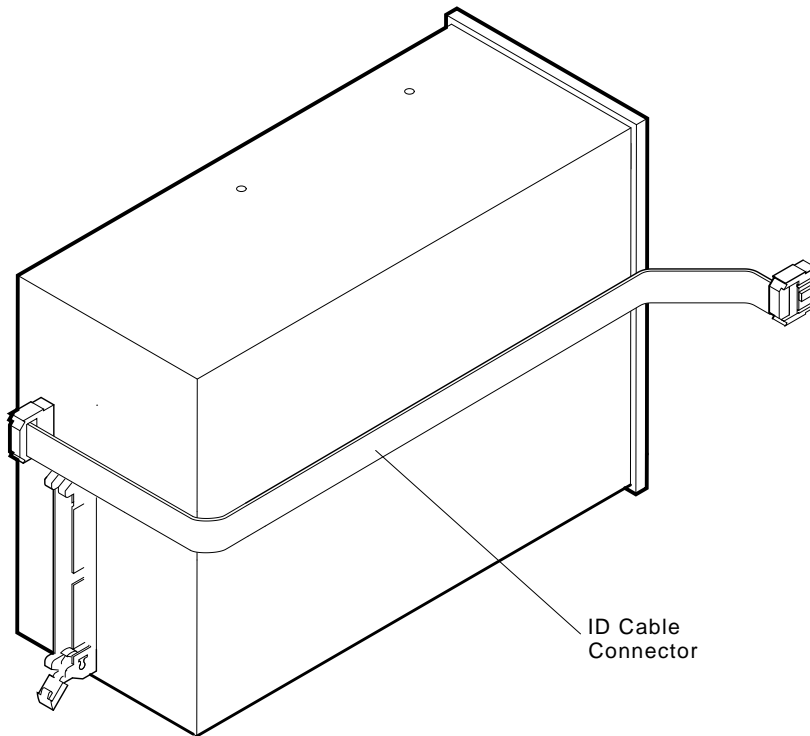
To install a new or replacement TLZ04, refer to Section 2.5.2.

3.3.2.2 Replacing the ID Cable

NOTE: *Observe cable routing to ensure that you route the cables properly when reassembling.*

To remove the ID cable, you first remove the drive and unplug one end of the ID cable as described in Section 3.3.2.1. Unplug the opposite end of the ID cable from the rear of the tape drive (Figure 3–9).

Figure 3–9: Removing the ID Cable



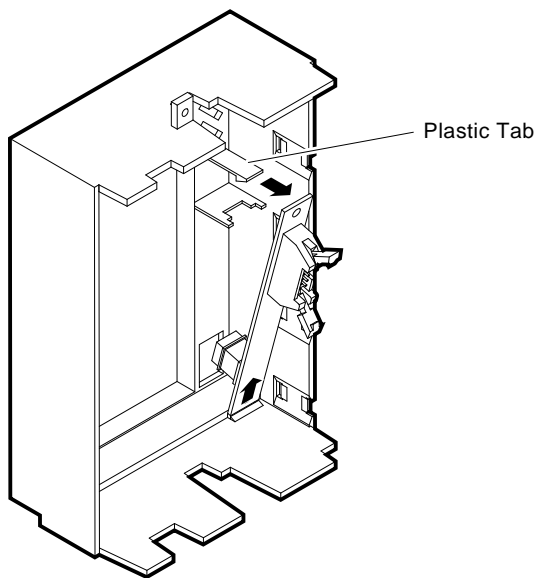
MLO-005796

3.3.2.3 Replacing the TLZ04 Front Panel Module

This procedure assumes you have completed steps one and two in Section 3.3.2.1. Use the following instructions to remove the TLZ04 front panel module (PN 54-20438-01) and refer to Figure 3-10.

1. Unplug the ID cable from its connector on the TLZ04 panel.
2. Remove the bus node ID plug on the TLZ04 front panel by pulling it straight out.
3. Lift the plastic tab that holds the front panel module in place and remove the module.
4. Reverse the procedure to install a module.

Figure 3-10: Removing the TLZ04 Front Panel Module



MLO-005797

3.3.2.4 Replacing the Interface Card Assembly

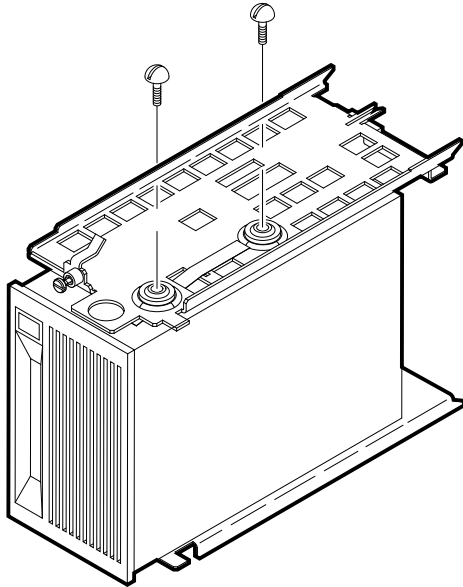
Use the following instructions to replace the interface card assembly (PN 54-20136-03). To remove the interface card assembly, first remove the upper mounting bracket.

3.3.2.4.1 Removing the Upper Mounting Bracket

This procedure assumes you have removed the drive as described in Section 3.3.2.1. Remove the drive upper bracket as follows:

1. Place the drive on an antistatic mat.
2. Remove the two Phillips screws at the rubber shock bushings that secure the upper bracket to the drive (Figure 3-11).

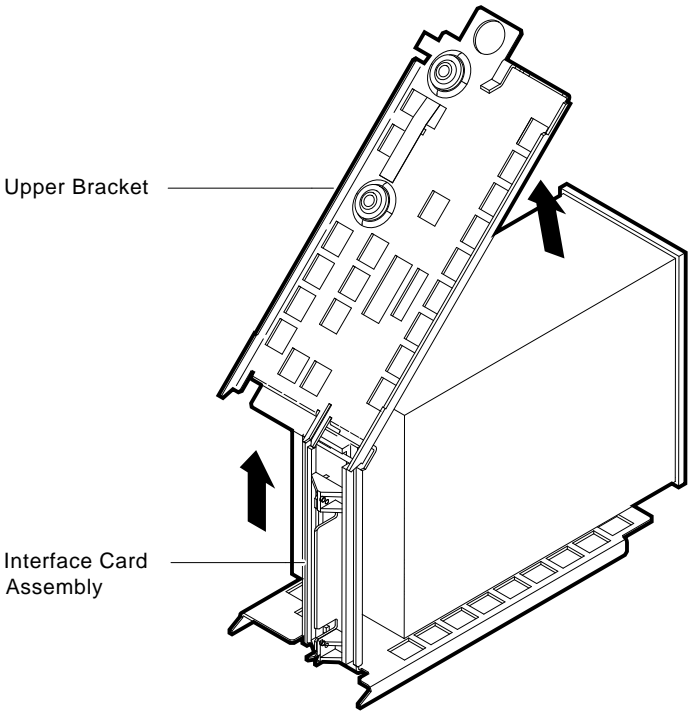
Figure 3-11: Removing Bracket Screws



MLO-005799

3. Slide the interface card assembly up and lift off the upper bracket (Figure 3-12).

Figure 3–12: Removing the Upper Mounting Bracket



MLO-005800

3.3.2.4.2 Removing the Interface Card Assembly

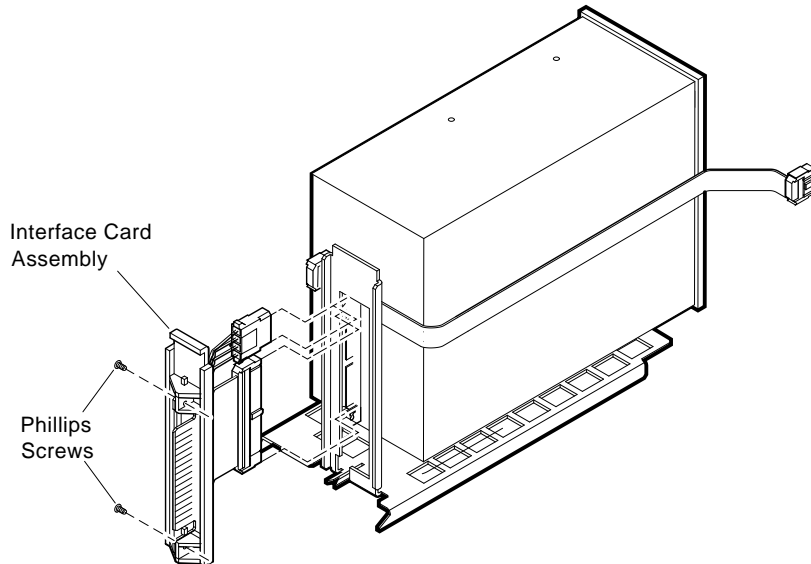
Remove the interface card assembly as follows:

1. Unplug the 4-pin power cable, the 50-pin signal cable, and the remote front panel cable from their connectors on the controller module.

NOTE: *Observe cable routing to ensure that you route the cables properly when reassembling.*

2. Lift and remove the plastic interface card assembly being careful to guide the cables through the cutout in the metal bracket (Figure 3–13).
3. To remove the plastic assembly from the interface card, remove the two Phillips screws that hold it in place (Figure 3–13).
4. Reverse the procedure to install the interface card assembly.

Figure 3–13: Removing the Interface Card Assembly

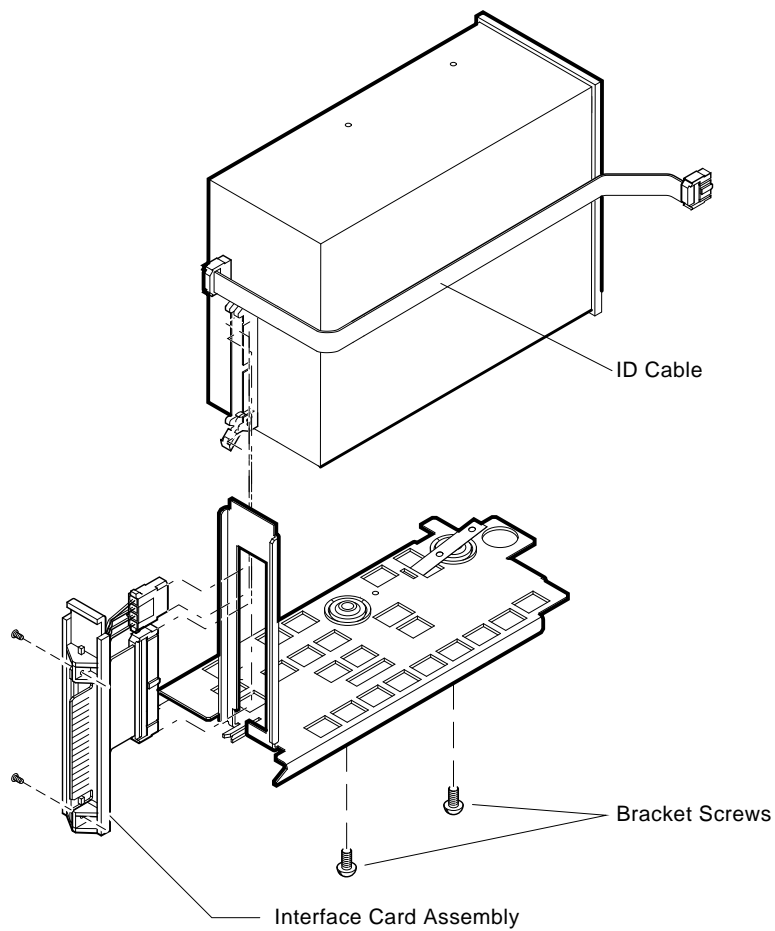


MLO-005801

3.3.2.5 Removing the Lower Mounting Bracket

Remove the lower mounting bracket by removing the two Phillips screws at the rubber shock bushings that secure the lower bracket to the drive (Figure 3–14).

Figure 3–14: Removing Lower Mounting Bracket



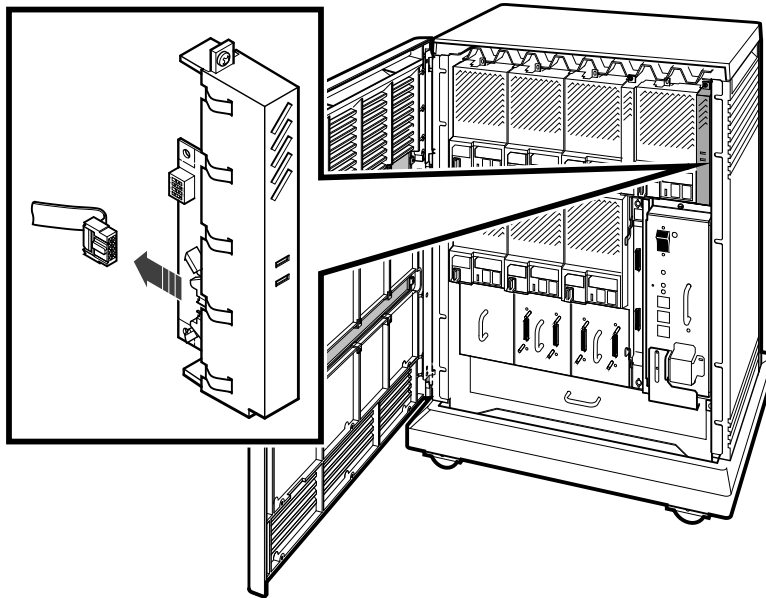
MLO-005802

3.3.3 Removing the Status Panel

The status panel contains the DC OK and Over Temperature Warning indicators. Remove the status panel according to the following instructions:

1. Open the upper access door.
2. Loosen the captive Phillips screw securing the status panel (Figure 3–15).
3. Detach the status panel cable.
4. Remove the status panel.
5. Install a status panel in the reverse order.

Figure 3–15: Removing the Status Panel



MLO-004934

3.3.4 Removing the SCSI Connector Module

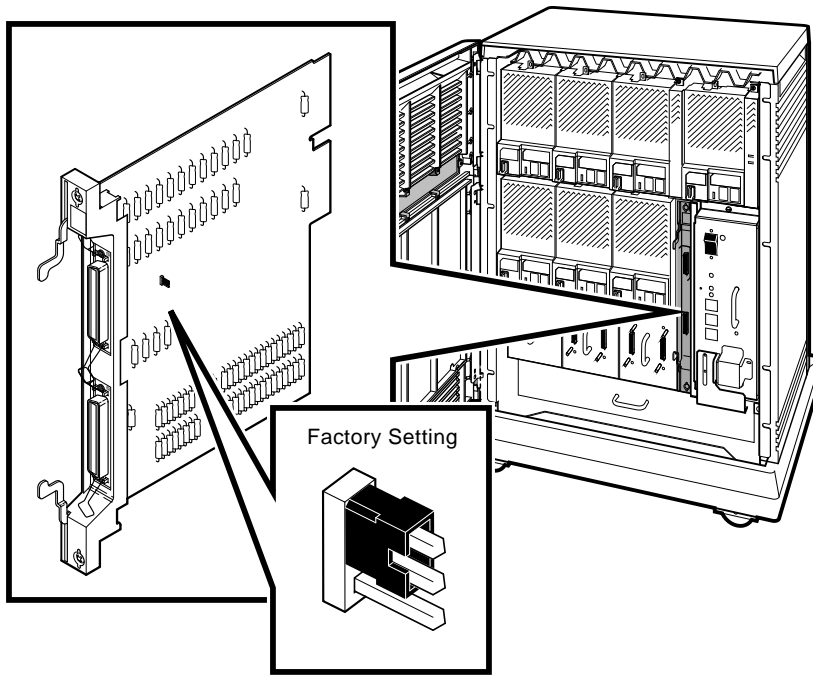
The SCSI connector module (M7493-PA) provides connectors to the SCSI bus, as well as relay circuitry that sequences the power-up of the expander RF-series ISEs. RF-series ISEs in the top row of drives should power up a few seconds before RF-series ISEs in the bottom row.

Use the following procedure to remove the SCSI connector module.

1. Note the orientation of external SCSI cables connected to the module. Carefully label and disconnect the cables.
2. Release the two quarter-turn captive screws that hold the module to the card cage (Figure 3-16).
3. Unlock the module's handle and remove the module from the card cage.

NOTE: *Figure 3-16 shows the factory setting of the jumper. This setting properly sequences the power-up order of RF-series ISEs (upper RF-series ISEs first).*

Figure 3–16: Removing the SCSI Connector Module

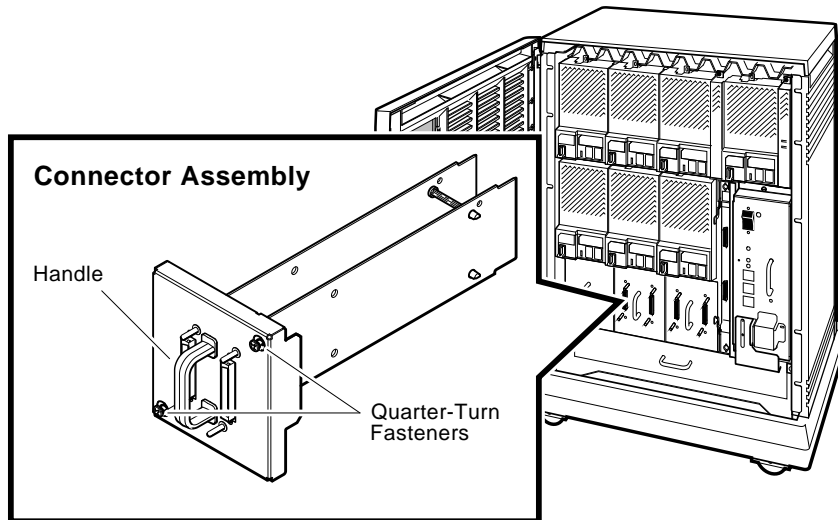


MLO-004935

3.3.5 Removing the DSSI Jumper Assembly or a DSSI Connector Assembly

To remove a DSSI jumper assembly or DSSI connector assembly, release the two quarter-turn captive screws and slide the module out by its handle (Figure 3–17).

Figure 3–17: Removing a DSSI Jumper or Connector Assembly



MLO-004235

3.3.6 Removing Fans

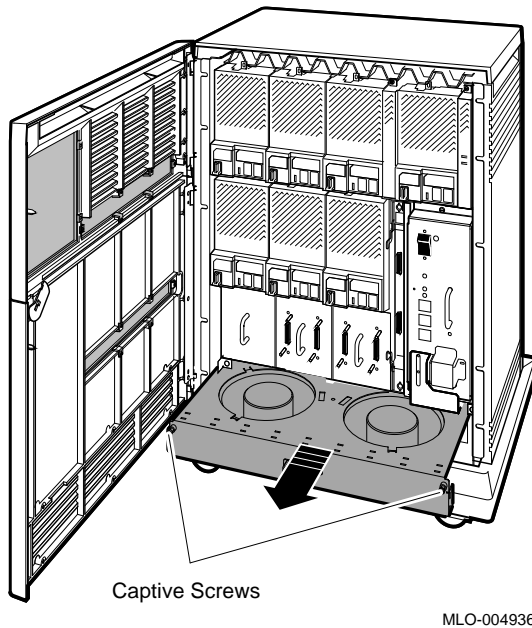
A fan tray containing two 6-inch fans provides cooling for the R400X expander. The fans are controlled by a heat sensor that accurately varies the fan speed according to the expanders internal temperature. The two fans are attached to the metal tray by a single mounting bracket. The fan tray slides under the card cage and fastens to the chassis by two captive screws.

Remove the fans as follows:

1. Open the lower access door.
2. Remove or reroute any option cables away from the fan tray.
3. Unplug the power cord from the ac wall outlet.

4. Loosen the two captive screws that hold the fan tray to the chassis (Figure 3–18).

Figure 3–18: Removing the Fan Tray



5. Pull out the fan tray (Figure 3–18) and turn it over (Figure 3–19).

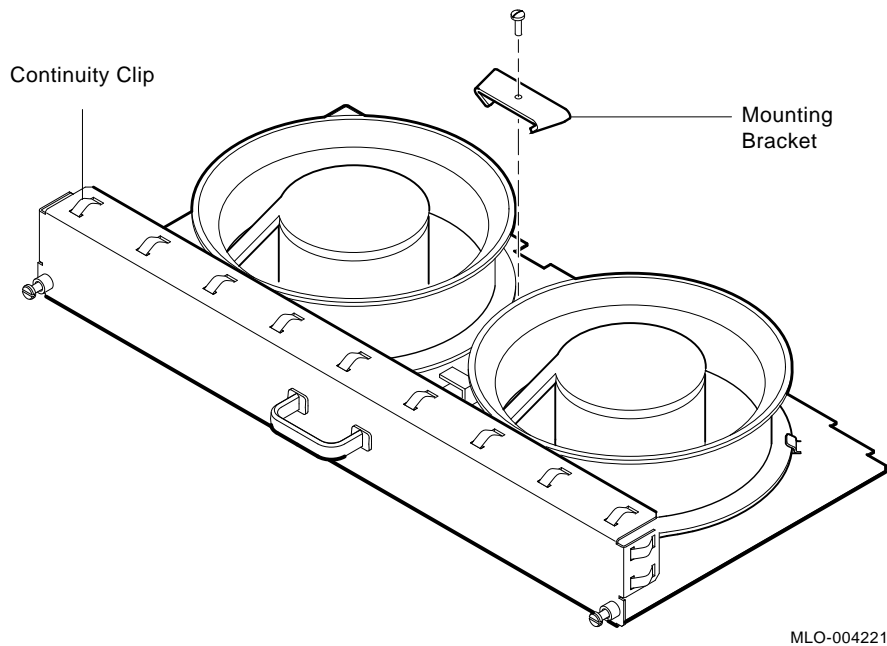
NOTE: *You may need to lift up the front of the fan tray while sliding it out.*

6. Disconnect the dc power cable connector from the fan.
7. Remove the center screw and bracket securing both fans to the tray (Figure 3–19).
8. Remove the fans.

NOTE: *It is recommended that fans be replaced in sets (or pairs).*

9. To replace the fan tray, reverse the procedure.

Figure 3–19: Removing the Fan Assembly



3.3.7 Removing the Power Supply

The expander enclosure has one power supply. To remove the power supply, follow the removal procedure carefully.

DANGER—HIGH VOLTAGE



This warning symbol indicates risk of electric shock.

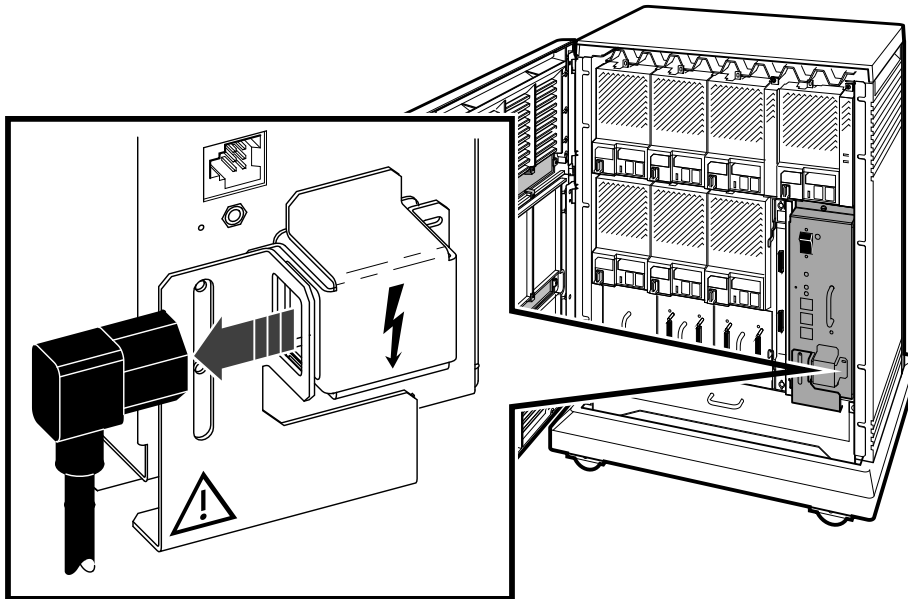
WARNING: *The power cord must be removed from this unit's appliance inlet to disconnect ac power. The circuit breaker power switch is NOT a disconnect device.*

*A plate covers one fastener that secures the system to the expander enclosure in such a way that the power cord set must be removed before this fastener can be disconnected. This fastener **MUST BE TIGHTENED** when service is completed before replacing the power cord.*

WARNING: *The power supply stores an electrical charge which, if not bled (discharged) correctly, could cause physical harm. Bleed the power supply before removing. To bleed the power supply, remove the power cord and push up on the metal plate on the bottom of the power supply. This sliding plate depresses the bleed switch or button located under the power supply. Hold the cover plate in the up position for at least 45 seconds after removing the ac power cord. This discharges the system and makes the power supply safe to handle.*

1. Open the lower access door.
2. Turn off the H7874 power supply switch and unplug the ac power cord from the wall outlet.
3. Remove the power cord from the power supply (Figure 3–20).

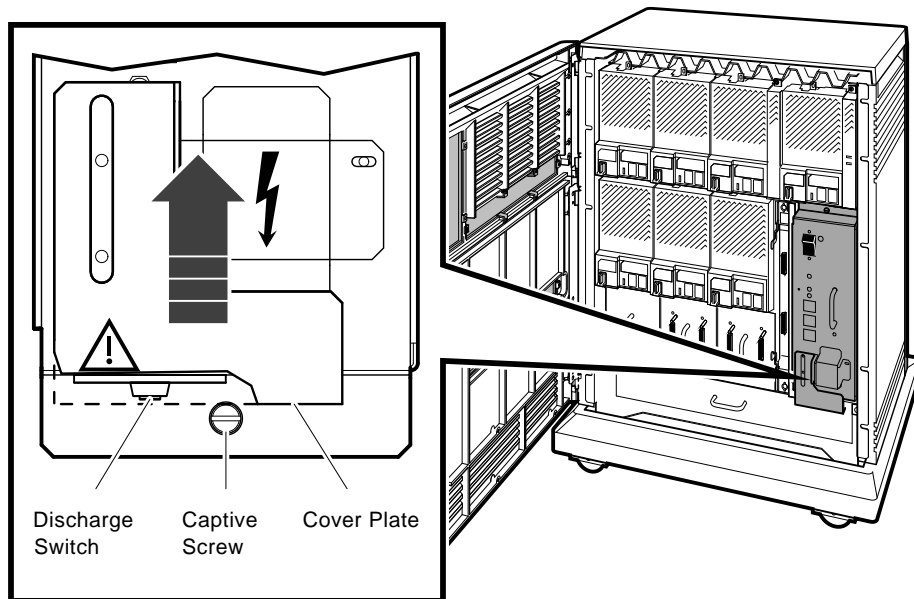
Figure 3–20: Removing the Power Supply Cord



MLO-004937

4. Remove ground cable (if any) and power control bus cables (if any).
5. Release the top power supply captive screw.
6. Release the bottom captive screw by raising the metal plate up against the bottom of the power supply and hold for 45 seconds. The bottom screw is exposed when the plate is held up in the bleed position. (Figure 3–21). Release the bottom screw.

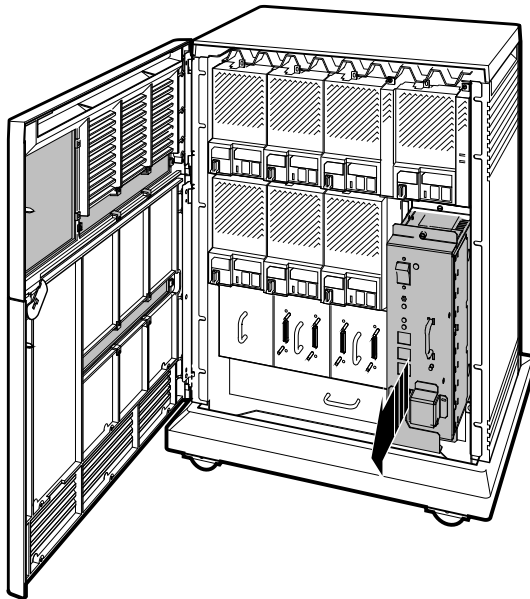
Figure 3–21: Discharging the Power Supply



MLO-004938

7. Grasp the handle with one hand and pull the supply out from the backplane connection (Figure 3–22).
8. Remove the power supply.

Figure 3–22: Removing Power Supply



MLO-004939

Installation Note

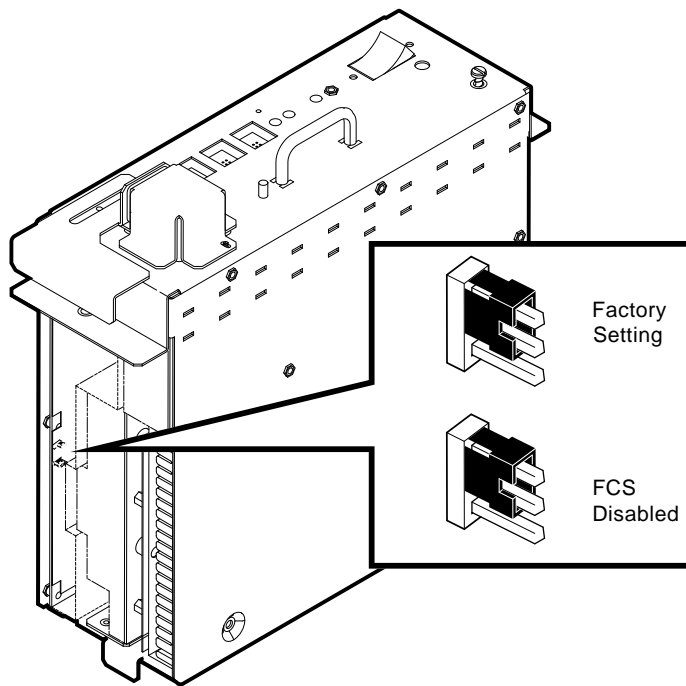
When installing the power supply, make sure the top and bottom edges of the supply are aligned and mounted in the plastic guides in the enclosure.

Fan Speed Control Disable

A system manager may request that you override the power supply's temperature sensor so that the fans run at maximum speed. This action increases overall system reliability, as the expander's internal temperature will be lower. Before disabling the factory setting, be sure that the increased fan noise is not objectionable to the users.

Figure 3–23 shows the location and settings for the fan speed control (FSC) jumper.

Figure 3–23: Fan Speed Control Jumper



MLO-004204

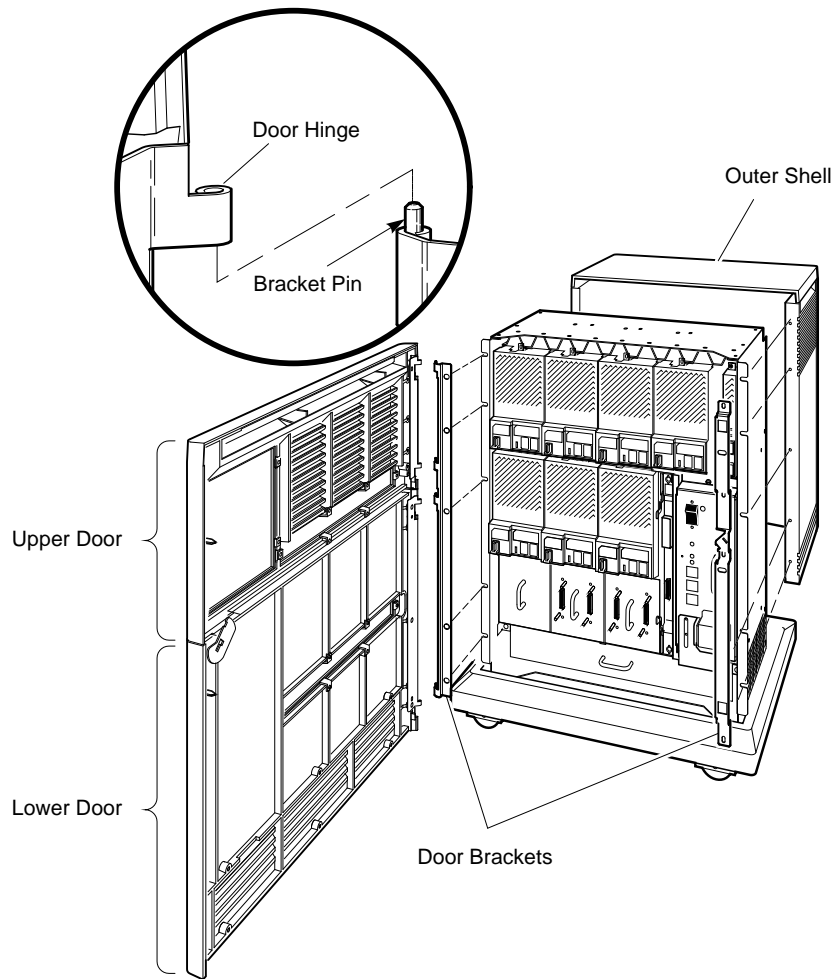
3.3.8 Removing the R400X Backplane

The backplane is the only part of the R400X expander that must be removed from the rear. To remove the backplane, follow the steps listed below:

1. Turn off the expander power switch (0) and unplug the ac power cord from the wall outlet.
2. From the front of the expander:
 - a. Unlock and open both doors.
 - b. Remove the top door by swinging it out past 90 degrees and lifting it off the hinges.
 - c. Remove the bottom door by swinging it out past 90 degrees and lifting it off the hinges.

- d. To remove the right door latching bracket, remove the three self-tapping screws and one 6/32 screw. Remove the bracket. Remove the remaining self-tapping screws (Figure 3–24).
 - e. To remove the left hinge bracket, remove the five self-tapping screws (Figure 3–24).
- 3. Slide the R400X expander's outer shell back and off. Lay the shell and other hardware aside.

Figure 3–24: Outer Shell Removal

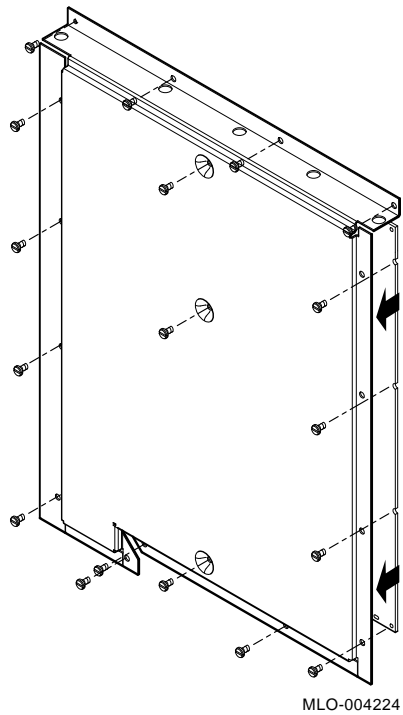


MLO-004940

4. Remove all storage devices from the expander (Section 3.3.1.1 and Section 3.3.2).
5. Remove the status panel and its cable (Section 3.3.3).
6. Remove the SCSI connector module (Section 3.3.4).

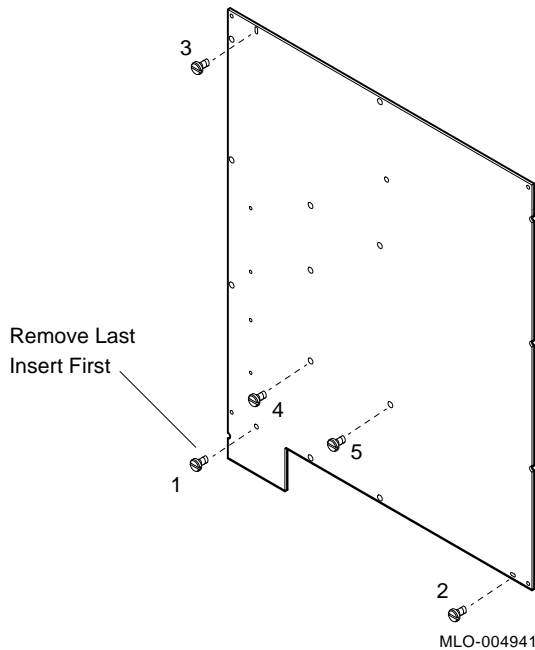
7. Remove the DSSI jumper and connector assemblies (Section 3.3.5).
8. Remove the fan tray assembly (Section 3.3.6).
9. Remove the power supply. See Warning Note (Section 3.3.7).
10. Turn the expander around so that you face the rear panel (Figure 3–25).
11. Remove the 18 screws that hold the rear panel. Lay the panel aside (Figure 3–25).

Figure 3–25: Rear Panel Removal



12. Remove the five 6/32 screws that hold the backplane to the enclosure.
Remove the backplane (Figure 3–26).

Figure 3–26: Removing the Backplane



3.3.9 Installing a Backplane

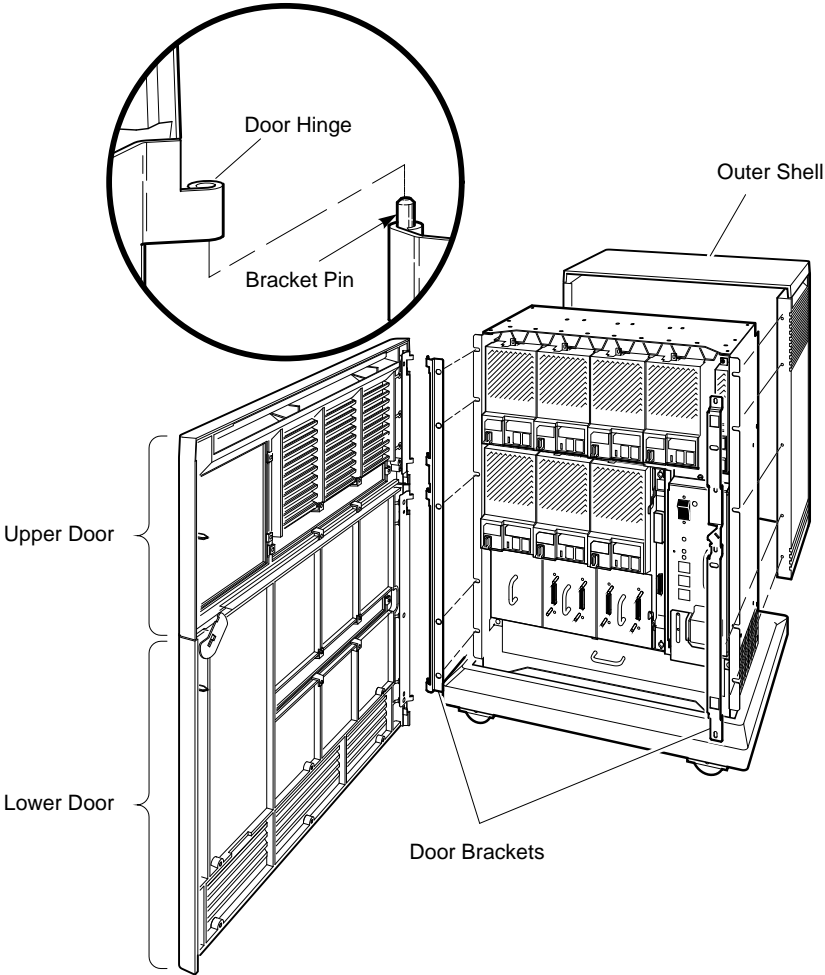
Complete the following steps to install the backplane:

1. Align the new backplane assembly with the rear of the R400X expander. Insert the five screws in the order shown in Figure 3–26 to align the backplane against the card cage. Tighten all screws.
2. Install the metal cover over the backplane, using the 18 screws previously removed, starting with the upper left. Do not tighten screws until all are inserted properly; then tighten.
3. Install the power supply (Section 3.3.7).
4. Install the status panel and its cable (Section 3.3.3).
5. Install the SCSI connector module (Section 3.3.4).

6. Install the storage devices (Section 2.5).
7. Install the fan tray (Section 3.3.6).
8. Install the DSSI jumper and connector assemblies (Section 3.3.5).
9. Connect all external cables.
10. Position the outer shell on the chassis and move it forward toward the hinge and latching bracket positions.
11. Install two of the self-tapping screws (right side, second and fourth from the bottom) to hold the shell against the chassis.
12. Install the right door latching bracket, using the three self-tapping screws and the 6/32 screw (Figure 3–27).
13. Install the left hinge bracket with the self-tapping screws previously removed (Figure 3–27).
14. Tighten all screws.
15. Install the upper and lower doors (Figure 3–27). Position the doors at approximately 90 degrees (half open position) and hook the door over the hinge bracket pin. They should drop into position.

NOTE: *Check and adjust the door latching bracket alignment to ensure the door latch clears the door latching bracket.*

Figure 3–27: Door Installation



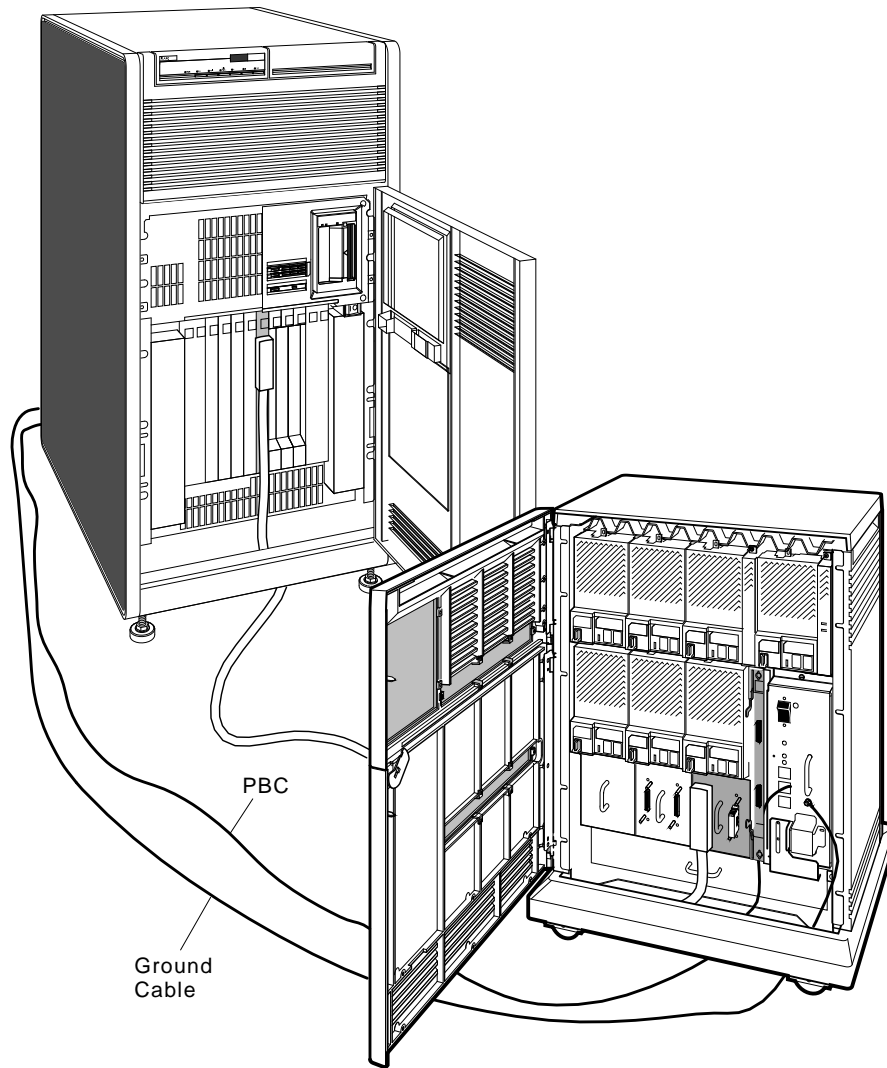
MLO-004940

Appendix A

DSSI Cabling for BA200-Series Enclosures or Earlier Systems

This appendix provides illustrations of expanded systems that do not use the BA440 or BA430 enclosures. These earlier system enclosures require the H4010-AA hardware kit to provide proper grounding and power bus cabling. Information on installing these cables is included in the H4010-AA hardware kit.

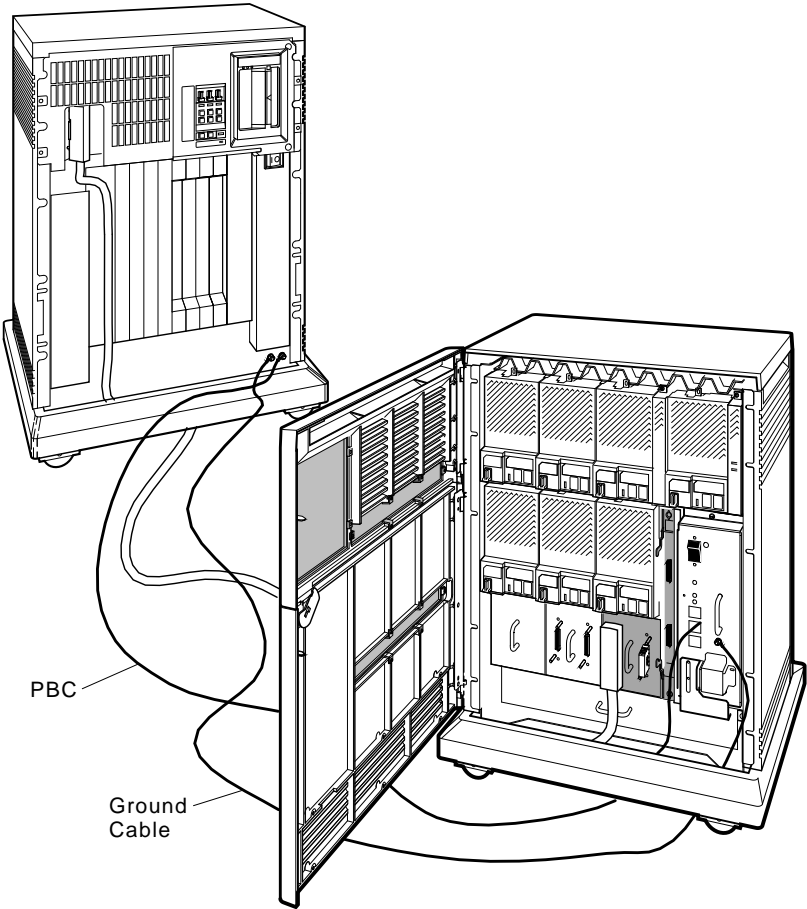
Figure A-1: Expanded MicroVAX 3900, MicroVAX 3600 or DECsystem 5400 Cabinet



MLO-004248

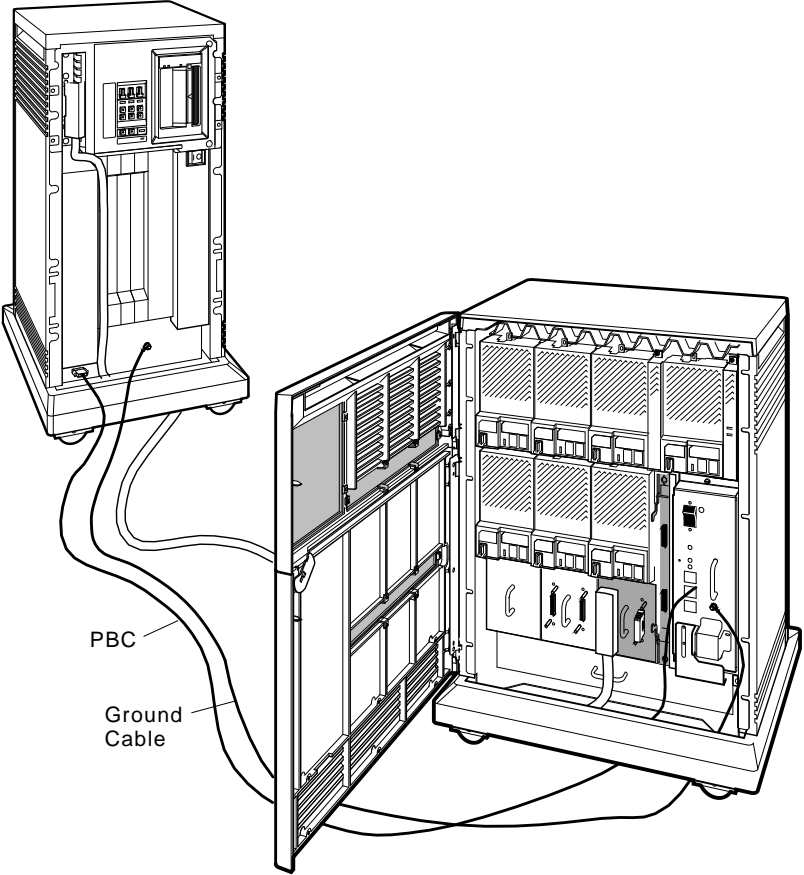
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Figure A-2: Expanded MicroVAX 3400, 3500, 3800 or DECsystem 5400 Pedestal



MLO-004250

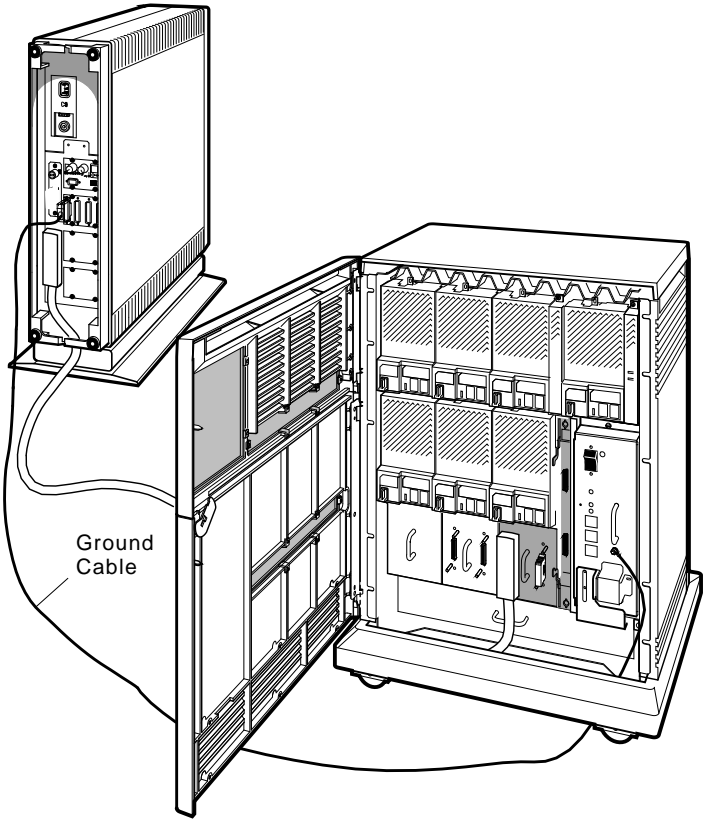
Figure A-3: Expanded VAX 4000 Model 200 (BA215) or MicroVAX 3300



MLO-004251

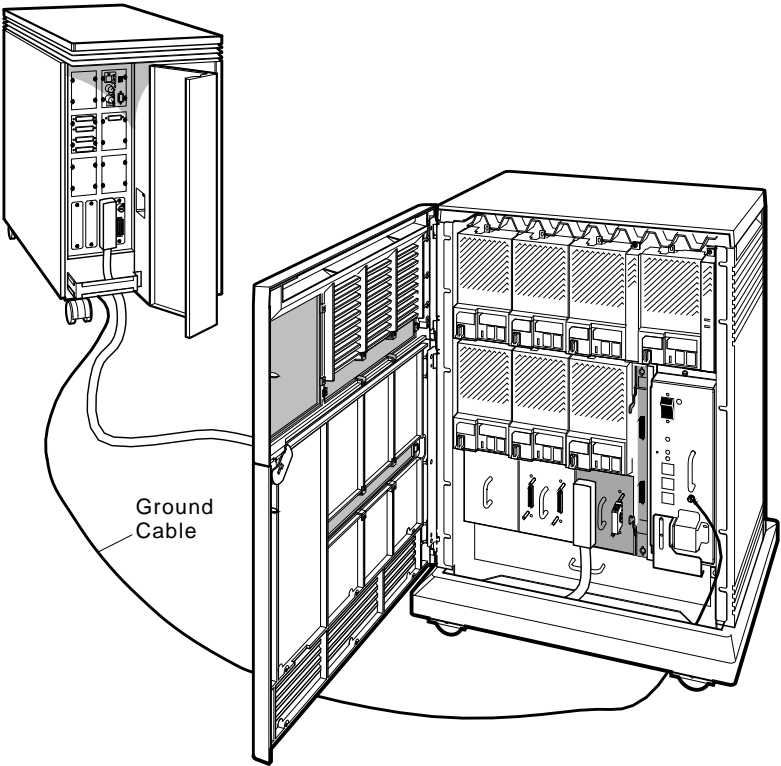
A-4 R400X Expander Installation and Maintenance

Figure A-4: Expanded MicroVAX II (630QY, 630QZ)



MLO-004252

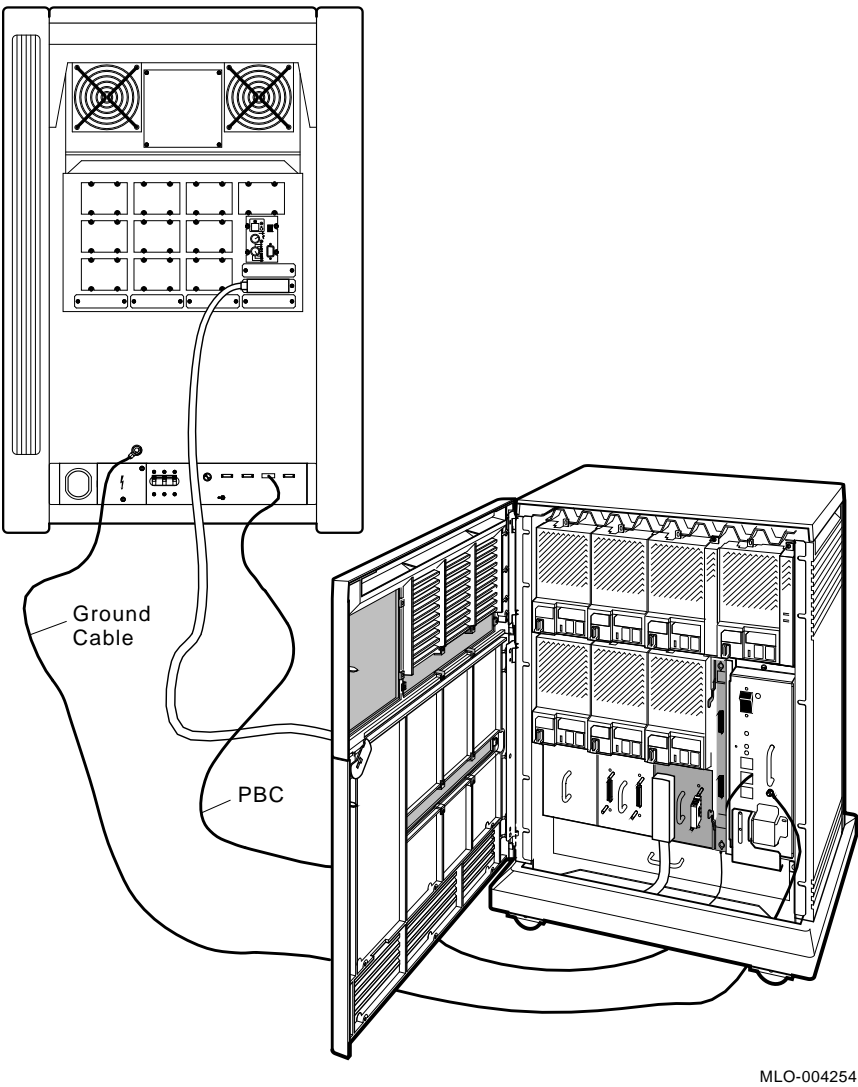
Figure A-5: Expanded MicroVAX II (630QB)



MLO-004253

A-6 R400X Expander Installation and Maintenance

Figure A-6: Expanded MicroVAX II (630QE)



MLO-004254

Appendix B

Programming Parameters for RF-Series ISEs

This appendix describes the procedures for setting and examining parameters for RF-series ISEs.

Two types of DSSI storage adapters are available for VAX 4000, MicroVAX 3000-series, MicroVAX II, and DECsystem systems: an embedded DSSI host adapter that is part of the CPU and the KFQSA storage adapter.

Each storage adapter provides a separate DSSI bus that can support up to seven RF-series ISEs (six ISEs for a dual-host configuration). The adapters make a connection between the CPU and the requested ISE on their respective DSSI bus. Each ISE has its own controller and server that contain the intelligence and logic necessary to control data transfers over the DSSI bus.

B.1 RF-Series ISE Parameters

Six principal parameters are associated with each RF-series ISE:

- Bus Node ID
- ALLCLASS
- UNITNUM
- FORCEUNI
- NODENAME
- SYSTEMID

NOTE: *Each of the above ISE parameters, with the exception of the Bus Node ID, are programmed and examined using the console-based Diagnostic and Utility Protocol (DUP) driver utility. The ISE Bus Node ID is physically determined by the numbered Bus Node ID plug that inserts into the ISE front panel.*

A brief description of each parameter follows:

The Bus Node ID parameter is provided by the bus node ID plug on the ISE front panel. Each DSSI bus can support up to seven ISEs, bus nodes 0 through 6 (0 through 5 for dual-host systems). Refer to your *Operation* manual for instructions on changing bus node ID plugs.

The ALLCLASS parameter determines the device allocation class. The allocation class is a numeric value from 0 to 255 that is used by the VMS operating system to derive a path-independent name for multiple access paths to the same ISE. RF-series ISEs are shipped from the factory with a default allocation class of zero. Each RF-series ISE to be served to the cluster should have an allocation class that matches the allocation class of the host system. Refer to the *VMS VAXcluster* manual for rules for specifying allocation class values.

The UNITNUM parameter determines the unit number of the ISE. By default, the ISE unit number is supplied by the bus node ID plug on the ISE front panel. Certain multiple bus configurations, described later in this section, require that the default values be replaced with unique ISE unit numbers. To set unit numbers and override the default values, you use the console-based DUP driver utility to supply values to the UNITNUM parameter and to set a value of zero to ISE parameter FORCEUNI.

The FORCEUNI parameter controls the use of UNITNUM to override the default ISE unit number supplied by the bus node ID plug. When FORCEUNI is set to a value of zero, the operating system uses the value assigned to the UNITNUM parameter; when FORCEUNI is set to a value of one, the operating system uses the value supplied by the bus node ID plug.

The NODENAME parameter allows each ISE to have an alphanumeric node name of up to eight characters. RF-series ISEs are shipped from the factory with a unique identifier, such as R7CZZC, R7ALUC, and so on. You can provide a node name of your choosing if you prefer.

The SYSTEMID parameter provides a number that uniquely identifies the ISE to the operating system. This parameter is modified only when replacing an ISE. Only Customer Services representatives and qualified self-maintenance customers can remove an ISE.

The following describes how the operating system uses the ISE parameters to form unique identifiers for each ISE. Configurations that require you to assign new unit numbers for ISEs are also described.

With an allocation class of zero, the operating system can use the default parameter values to provide each ISE with a unique device name. The operating system uses the node name along with the device logical name in the following manner:

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`NODENAME$DIA u`

where:

`NODENAME` is a unique node name and u is the unit number.

With a nonzero allocation class, the operating system relies on unit number values to create a unique device name. The operating system uses the allocation class along with the device logical name in the following manner:

`$ALLCLASS$DIA u`

where:

`ALLCLASS` is the allocation class for the system and ISEs, and u is a unique unit number.

Using the KFQSA storage adapter and mass storage expanders, you can fill multiple DSSI busses. Each bus can have seven ISEs (bus nodes 0–6). When a second bus is added to the system, and your system is using a nonzero allocation class, you need to assign new unit numbers for ISEs on one of the busses, as the unit numbers for ISEs throughout the system must be unique. Table B–1 illustrates the need to program unit numbers for a system using both more than one DSSI bus and a nonzero allocation class. In the case of the nonzero allocation class, the operating system sees the ISEs as having duplicate device names.

Table B-1: How the VMS Operating System Identifies the ISEs

Allocation Class=0	Nonzero Allocation Class (Example: ALLCLASS=1)
R7CZZC\$DIA0	\$1\$DIA0*
R7ALUC\$DIA1	\$1\$DIA1*
R7EB3C\$DIA2	\$1\$DIA2*
R7IDFC\$DIA0	\$1\$DIA0*
R7IBZC\$DIA1	\$1\$DIA1*
R7IKJC\$DIA2	\$1\$DIA2*
R7ID3C\$DIA3	\$1\$DIA3
R7XA4C\$DIA4	\$1\$DIA4
R7QIYC\$DIA5	\$1\$DIA5
R7DA4C\$DIA6	\$1\$DIA6

*Indicates duplicate device names. For one of the DSSI busses, the unit numbers need to be reprogrammed to avoid this error.

The following instructions describe how to change ISE parameters using the DUP driver utility. In the sample procedures, the allocation class will be set to 2, the ISEs will be assigned new unit numbers, and the system disk will be assigned a new node name.

1. Enter the console mode.

The procedure for programming internal parameters for RF-series ISEs requires that you issue commands to those RF-series ISEs at the console prompt (>>>). You may enter these commands in either uppercase or lowercase letters. Unless otherwise instructed, enter each command, then press Return.

Enter console mode as follows:

- a. Set the Break Enable/Disable switch on the CPU cover panel to the enable position.
- b. Set the power switch for each unit (both hosts for a dual-host system, and any expanders for expanded systems) to on (1).

Wait for the system to display the console prompt (>>>).

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2. Make sure the ISEs for which you want to set parameters are on line and are not write protected. The Run/Ready button should be (lit), and the Write-Protect button should be out (not lit).
3. For systems with embedded DSSI, enter `SHOW DSSI` at the console prompt for a display of all DSSI devices in your expanded system. For KFQSA-based DSSI, enter `SHOW UQSSP`.

The firmware displays two lines of information for each ISE. The first line contains the node number and node name. The second line contains the device name and unit number followed by the device type in parentheses.

For embedded DSSI, the device name consists of the letters `DIA n` and the DSSI host adapter is identified by an asterisk (*). For KFQSA-based DSSI, the device name consists of the letters `DU c n` , where c is the controller letter and n is a unique unit number.

The following examples show a system with three RF31 ISEs. Example B–1 shows a system with embedded DSSI and Example B–2 shows a system with KFQSA-based DSSI.

Example B–1: SHOW DSSI Display (Embedded DSSI)

```
>>>SHOW DSSI
DSSI Node 0 (R7CZZC)
-DIA0 (RF31)
DSSI Node 1 (R7ALUC)
-DIA1 (RF31)
DSSI Node 2 (R7EB3C)
-DIA2 (RF31)
DSSI Node 7 (*)
>>>
```

Example B-2: SHOW UQSSP Display (KFQSA-Based DSSI)

```
>>>SHOW UQSSP
UQSSP Disk Controller 0 (772150)
-DUA0 (RF31)
UQSSP Disk Controller 1 (760334)
-DUB1 (RF31)
UQSSP Disk Controller 2 (760340)
-DUC2 (RF31)
UQSSP Tape Controller 0 (774500)
-MUA0 (TK70)
```

In this example, each ISE will be assigned an allocation class of 2, and the system disk will be given a new node name. Also, ISEs DIA0, DIA1, and DIA2 (or DUA0, DUB1, and DUC2) will be assigned unit numbers 10, 11, and 12, respectively.

B.2 Entering the DUP Driver Utility

To examine and change internal RF-series ISE parameters, you must first activate the DUP driver utility by setting host to the specific ISE for which you want to modify or examine parameters.

Use the following commands for embedded DSSI:

For VAX 4000 Model 300 systems:

```
SET HOST/DUP/DSSI/BUS:<bus_number> <node_number> PARAMS
```

where:

<bus_number> is the DSSI bus number (0 or 1), and <node_number> is the bus node ID (0–6) for the ISE on the bus.

For all other systems with an embedded DSSI bus:

```
SET HOST/DUP/DSSI <node_number> PARAMS
```

where:

<node_number> is the bus node ID (0–6) for the ISE on the bus.

Use the following command for KFQSA-based DSSI:

```
SET HOST/DUP/UQSSP/DISK <node_number> PARAMS
```

where:

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<node_number> is the bus node ID (0–6) for the ISE on the bus.

The following examples show the commands entered at the console prompt to start the DUP server for the ISE at node 0. In Example B–3, you enter SET HOST/DUP/DSSI 0 PARAMS for embedded DSSI. In Example B–4, you enter SET HOST/DUP/UQSSP/DISK 0 PARAMS for KFQSA-based DSSI.

Example B–3: Starting the DUP Driver Utility (Embedded DSSI)

```
>>>SET HOST/DUP/DSSI 0 PARAMS
Starting DUP server...
Copyright (c) 1990 Digital Equipment Corporation
PARAMS>
```

Example B–4: Starting the DUP Driver Utility (KFQSA-Based DSSI)

```
>>>SET HOST/DUP/UQSSP/DISK 0 PARAMS
Starting DUP server...
Copyright (c) 1990 Digital Equipment Corporation
PARAMS>
```

B.3 Setting Allocation Class

After entering the DUP driver utility for a specified ISE, you can examine and set the allocation class for the ISE as follows:

1. At the PARAMS> prompt, enter SHOW ALLCLASS to check the allocation class of the ISE to which you are currently connected.
2. Enter SET ALLCLASS 2 (or enter the allocation class you desire).
3. Enter SHOW ALLCLASS to verify the new allocation class.

Example B–5 shows the steps for examining and changing the allocation class for a specified ISE. In the example, the allocation class is changed from an allocation class of 0 to an allocation class of 2.

Example B-5: Setting Allocation Class for a Specified ISE

```
PARAMS>SHOW ALLCLASS
Parameter      Current      Default      Type      Radix
-----
ALLCLASS              0              0      Byte      Dec      B

PARAMS>SET ALLCLASS 2
PARAMS>SHOW ALLCLASS
Parameter      Current      Default      Type      Radix
-----
ALLCLASS              2              0      Byte      Dec      B
```

B.4 Setting Unit Number

After entering the DUP driver utility for a specified ISE, you can examine and set the unit number for the ISE as follows:

1. At the `PARAMS>` prompt, enter `SHOW UNITNUM` to check the unit number of the ISE to which you are currently connected.
2. Enter `SET UNITNUM 10` (or enter the unit number you desire).
3. Enter `SET FORCEUNI 0` to override the default unit number value supplied by the bus node ID plug.
4. Enter `SHOW UNITNUM` to verify the new unit number.
5. Enter `SHOW FORCEUNI` to verify that the current value for the `FORCEUNI` parameter is 0.

Example B-6 shows the steps for changing the unit number of a specified ISE from unit number 0 to unit number 10.

6. Label the ISE with its unit number, using the unit number labels shipped with your system. Figure B-1 shows where to affix a unit number label on the ISE front panel.

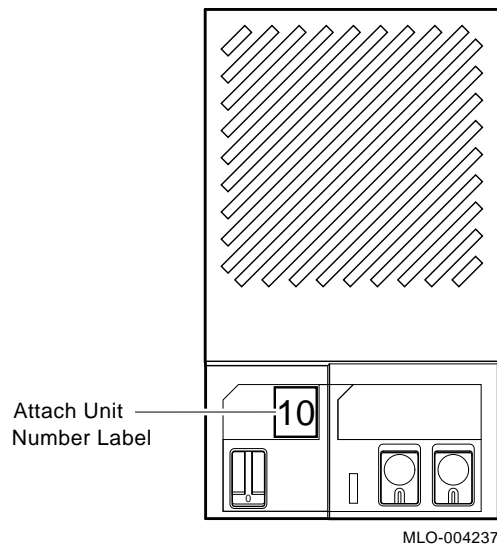
Example B-6: Setting a Unit Number for a Specified ISE

```
PARAMS>SHOW UNITNUM
Parameter      Current      Default      Type      Radix
-----
UNITNUM        0            0           Word      Dec      U

PARAMS>SET UNITNUM 10
PARAMS>SET FORCEUNI 0
PARAMS>SHOW UNITNUM
Parameter      Current      Default      Type      Radix
-----
UNITNUM        10            0           Word      Dec      U

PARAMS>SHOW FORCEUNI
Parameter      Current      Default      Type      Radix
-----
FORCEUNI       0            1          Boolean    0/1      U
```

Figure B-1: Attaching a Unit Number Label to the ISE Front Panel



B.5 Setting Node Name

After entering the DUP driver utility for a specified ISE, you can examine and set the node name for the ISE as follows:

1. At the `PARAMS>` prompt, enter `SHOW NODENAME` to check the node name of the ISE to which you are currently connected.
2. Enter `SET NODENAME SYSDSK` (or enter the desired alphanumeric node name of up to eight characters).
3. Enter `SHOW NODENAME` to verify the new node name.

Example B-7 shows the steps for changing the node name of a specified ISE from the factory-supplied name to SYSDSK.

Example B-7: Changing a Node Name for a Specified ISE

```
PARAMS>SHOW NODENAME
Parameter      Current      Default      Type      Radix
-----
NODENAME       R7CZZC       RF31        String    Ascii     B

PARAMS>SET NODENAME SYSDSK

PARAMS>SHOW NODENAME
Parameter      Current      Default      Type      Radix
-----
NODENAME       SYSDSK       RF31        String    Ascii     B
```

B.6 Setting System ID

NOTE: *This parameter is modified only when replacing an ISE. Only Customer Services representatives and qualified self-maintenance customers should remove an ISE. All parameters for the replacement ISE should be programmed to match those of the original ISE. When replacing an ISE, be sure to set the `SYSTEMID` parameter to match that of the original.*

After entering the DUP driver utility for a specified ISE, you can examine and set the system ID for the ISE as follows:

1. At the `PARAMS>` prompt, enter `SHOW SYSTEMID` to check the system ID of the ISE to which you are currently connected.
2. Enter `SET SYSTEMID System ID` (enter the desired serial number-based system ID).

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3. Enter `SHOW SYSTEMID` to verify the new system ID.

Example B–8 shows the steps for changing the system ID of a specified ISE from the factory-supplied system ID to 1402193310841 (the system ID for the replacement ISE is programmed to match that of the original ISE).

Example B–8: Changing a System ID for a Specified ISE

```
PARAMS>SHOW SYSTEMID
Parameter      Current      Default      Type      Radix
-----
SYSTEMID       0402193310841    00000000000000 Quadword    Hex    B

PARAMS>SET SYSTEMID 1402193310841

PARAMS>SHOW SYSTEMID
Parameter      Current      Default      Type      Radix
-----
SYSTEMID       1402193310841    00000000000000 Quadword    Hex    B
```

B.7 Exiting the DUP Server Utility

After you have completed setting and examining internal ISE parameters, enter the `WRITE` command at the `PARAMS>` prompt to save the ISE parameters you have changed using the `SET` command. The changes are recorded to nonvolatile memory.

If you have changed the allocation class or node name of an ISE, the DUP driver utility will ask you to initialize the controller. Answer Yes (Y) to allow the changes to be recorded and to exit the DUP driver utility.

If you have not changed the allocation class or node name, enter the `EXIT` command at the `PARAMS>` prompt to exit the DUP driver utility for the specified ISE. Example B–9 shows the procedure for saving parameter changes. In the example, the controller is initialized.

Example B-9: Exiting the DUP Driver Utility for a Specified ISE

```
PARAMS>WRITE
Changes require controller initialization, ok? [Y/(N)] Y
Stopping DUP server...
>>>
```

NOTE: *You must repeat the procedures in this chapter for each ISE for which you want to change parameters.*

Example B-10 shows the display for the SHOW DSSI command for a system with embedded DSSI after the unit numbers for the ISEs have been changed from 0, 1, and 2 to 10, 11, and 12. Notice that the bus 0 device names are now DIA10, DIA11, and DIA12.

Example B-10: SHOW DSSI Display

```
>>>SHOW DSSI
DSSI Node 0 (SYSDSK)
-DIA10 (RF31)
DSSI Node 1 (R7ALUC)
-DIA11 (RF31)
DSSI Node 2 (R7EB3C)
-DIA12 (RF31)
DSSI Bus 0 Node 7 (*)
>>>
```

Example B-11 shows the display for the SHOW UQSSP command for a system with KFQSA-based DSSI.

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Example B-11: SHOW UQSSP Display (KFQSA-Based DSSI)

```
>>>SHOW UQSSP
UQSSP Disk Controller 0 (772150)
-DUA0 (RF31)
UQSSP Disk Controller 1 (760334)
-DUB1 (RF31)
UQSSP Disk Controller 2 (760340)
-DUC2 (RF31)
UQSSP Tape Controller 0 (774500)
-MUA0 (TK70)
```

Appendix C

Related Documents

The following documents contain information relating to the R400X expander and the systems it can expand.

Title	Part Number ¹
R400X Expander Addendum to Customer Hardware Information	EK-R400X-CM
KA670 CPU System Maintenance	EK-347A#-MG
KA660 CPU System Maintenance	EK-498AA-MG
KA655 CPU System Maintenance	EK-306A#-MG
KA650 CPU System Maintenance	EK-180A#-MG
KA640 CPU System Maintenance	EK-179A#-MG
KA630 CPU System Maintenance	EK-178A#-MG
KN210 CPU System Maintenance	EK-329A#-MG
KFQ Storage Adapter Installation and User Manual	EK-KFQSA-IN
RF31 Integrated Storage Element User's Guide	EK-RF31D-UG
RF71 Integrated Storage Element User's Guide	EK-RF71D-UG
RF30 Service Guide	EK-RF30D-SV
RF71 Service Guide	EK-RF72D-SV
VAX 4000 Site Preparation Guide	EK-387A#-SP
Micro Systems Site Preparation Guide	EK-O67A#-PG
MicroVAX Site Preparation Guide	EK-239A#-SP
BA123 Enclosure Maintenance	EK-188A#-MG
BA213 Enclosure Maintenance	EK-189A#-MG

¹# = current revision, which is always shipped.

Title	Part Number¹
BA215 Enclosure Maintenance	EK-191A#-MG
H9644 Cabinet Maintenance	EK-221A#-MG
H9642-J Cabinet Maintenance	EK-187A#-MG
¹ # = current revision, which is always shipped.	

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